

Donations

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Abstract:

This paper is an empirical study of the motives for charitable donations. It is based on a unique dataset on the English National Opera (ENO) that includes detailed micro-level information on individual donations, tickets purchases, and the consumption of fringe benefits available to donors. This allows us to examine the extent to which individuals donate to fund a *public good*—here, new productions—or to have access to a *private good*—here, fringe benefits. We find evidence that individuals behave as if they feel pivotal in the provision of a public good. Moreover, we find that the relative importance of these motives varies cross-sectionally depending on the income level. Low income individuals, who buy cheap seats, are more sensitive to the private good motive. These results are important to show that individuals behave as if they were pivotal even in presence of a large number of potential donors. They may also help charities in developing their fund-raising campaigns and the government its grant policy.

JEL classification: D1, D64, H41, L3.

Keywords: Donations, public good.

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1 Introduction

Donations are a crucial source of funds for many non profit organizations such as museums, universities, and hospitals. In 1997, they accounted for 11.4% of the non-profit sector’s revenues, compared to 7.9% for government grants. Charitable giving also represents a significant fraction of personal income. In the U.S. the total itemized individual giving totaled \$123Ml in 1999, about 2.1% of income.¹ Understanding the motives for donations is important non only for charities designing fund raising campaigns, but also for policy makers deciding public subsidies to charities or the tax treatment of donations.

Why do people donate? The economics literature distinguishes four different motives for donations. First, people may donate out of *altruism*, i.e. because they care about other people’s utility. For example, they may donate to improve the welfare of the poor. Second, people may derive utility from the very act of donating. This motive is known as *warm-glow* or *joy-of-giving* (Andreoni, 1989). Third, in the *private good* motive theory, donations are the price for accessing a private benefit. For instance, donations can improve the donors’ social status, e.g. when their names are publicized in a donors’ list (Harbaugh (1998a, 1998b)) or give access to special events, such as gala dinner or dress-rehearsas. Fourth, people may donate in order to improve the service provided by the charity. If others can enjoy the improvement, donations are funding a *public good*.²

In this paper, we take advantage of a unique and extremely detailed dataset to identify the relative and absolute importance of these motives. The dataset has been constructed by merging both the box-office and donation records of the English National Opera (ENO), one of the two major opera houses in London. We observe 358,026 individuals’ donations, tickets purchases and consumption of fringe benefits available to donors between 1994 and 1999. The data allows to instrument for a number of other individual characteristics (e.g. wealth).

The spirit of the empirical analysis is the following. Because our dataset contains not only donations but also consumption choices, we can identify directly the private and public good motives. In the *private good* theory, donations and the consumption of private goods should be positively correlated. Similarly, if donations were due to the *public good* motive, one should expect a positive correlation between donations and the consumption of the public good. Finally, if donations were motivated by *altruism* or *joy-of-giving*, one should

¹Based on individual income tax returns, National Center for Charitable Statistics.

²The distinction between altruism and the public good motive is not clear cut. Indeed, improving other people’s utility is a public good among altruists. Since only the latter can be rigorously tested with our data, in what follows we refer to the public good motive only when the public good is a consumption good and not when the externality arises directly from an increase in other’s people utility.

expect no systematic correlation between donations and the consumption of either private or public goods. The additional advantage of our dataset is that it covers not only donors but also *all* individuals with an interest in ENO performances so that we can use non-donors as a control group.

We identify private and public goods consumed by donors and non-donors of ENO as follows. The *private goods* available to donors are fringe benefits such as dress rehearsals, gala concerts, special dinners, special events, and the publication of the name on the donors' list. The *public goods* that we consider are the new productions offered by ENO. New productions are either operas that have never been staged before, or well known operas that are presented in a new version that entails new stages, costumes, light design etc. The public good aspect may not be obvious since opera performances are excludable. However, their production has a public good nature due to their cost structure. Commissioning new productions entails substantial additional fixed costs.³ Since box office revenues cannot cover these fixed costs, donations, together with public grants, help fund the fixed costs, making it more likely that a new production will be staged. Funding the fixed costs is a public good because the opera can then be "consumed" by others (Hansmann (1980), Cornelli (1996) and Andreoni (1999)). This public good aspect of donations is often stressed explicitly by the ENO which states that it uses donations to stage new productions: Figure 1 shows a leaflet about Friends of the ENO, stating that "... When you become a Friend, a substantial proportion of your membership goes to the *staging of new productions*." This suggests that donors are aware that donations will fund new productions and that ENO believes that reinforcing the public good motive is an effective way to motivate people to donate.⁴

To illustrate what type of behavior is consistent with the public and private good motives, we develop a model where individuals choose which operas to attend and the amount to donate, under a budget constraint. They take these decisions knowing that donations are used to fund new productions and that donors have access to fringe benefits. The relation between donations and attendance to new productions depends on two opposite effects. On the one hand, individuals who have a preference for new productions donate to increase the number of new productions they can attend. Thus, donations are complement to the consumption of new productions. On the other hand, donations reduce the income available to buy tickets and induce a substitution effect between donations and consumption of new

³The ENO has a reputation for being more avant-garde both in the choice of operas and in the staging of new productions. Examining the ENO and the Royal Opera (the other major opera house in London) Frank and Wrigley (2001) conclude that these opera houses sacrifice net profits from ticket sales to stage newly-commissioned productions.

⁴In private conversations, the ENO management confirmed that in the past a shortfall of donations induced them to cancel some new productions.

productions. The net effect depends on the individual's income level. High income individuals are shown to buy more expensive seats in equilibrium and to attend more frequently. For them, the complementary effect and thus the public good motive prevails. For low income individuals donations are a substitute to consumption and the private good motive prevails.

We then examine and compare the empirical consumption pattern of donors and non-donors. We use the extent to which donors consume fringe benefits and attend new productions to assess the importance of the private and public good motives. We find that compared to non-donors, donors show a higher preference for new productions, as measured by the new productions attended as a percentage of total attendance. This shows that individuals may feel pivotal even in presence of a large number of potential donors. Moreover, consistently with the model predictions, two distinct patterns of behavior emerge. For individuals buying cheap tickets the correlation between donations and the consumption of fringe benefits is larger than correlation between donations and the consumption of new productions, after controlling for other characteristics. This suggests that for these individuals the public good motive is less relevant than the private good one. For individuals buying expensive seats, instead, the private good motive is less important than for individuals buying cheap seats.

Note that the correlation between the preference for new productions and the probability of becoming a donor (or the amount donated) would not arise if the motives for donating were only pure altruism (in the sense we defined it before) or joy-of-giving. In fact, if an individual is donating because he feels good by doing it, donations should not be correlated with the attendance to new productions. We thus find that the public good motive is important for donations and that donors feel pivotal despite the large number of potential and actual donors.

We then take advantage of the fact that ENO categorizes donors into different classes depending on their donation level to look at donations that exceed the threshold to be in a given donation class. If a donor were concerned only about fringe benefits and to appear on the public donor list of the charity, he would never donate in excess to the minimum to be in a particular class (since it would make no difference). Since excess donations cannot be motivated by the private good motive, we use excess donations to assess the presence of the public good motive versus the joy-of-giving. We find that excess donations are positively correlated with the preference for new productions. This is additional evidence confirming the importance of the public good motive.

Finally, in order to explore the robustness of the previous cross-sectional results we

examine the time-series dimension of donors behavior. We compare the behavior of individuals before and after they start or stop donating and find that, on average, individuals increase (decrease) their ticket expenditure and attendance to new performances in the year in which they start (stop) donating. This reinforces the finding about the importance of the public good motives and the substitution effect.

The previous empirical results have several implications.

First, the presence of the public good motive implies that people feel pivotal. This finding is important because it has been argued that, when the number of potential (and actual) donors is very large, individuals should free-ride (see Andreoni (1988) and Ribar and Wilhelm (2002)) hoping that someone else would donate and cover the costs. An implication is that fund raising campaigns may be more effective when funds are tied to specific items (see Cornelli, 1996) or by using matching funds (see Andreoni, 1999).

Second, from a theoretical point of view the findings that a large proportion of donors are those who most value new productions is in line with models of public good provision under imperfect information. For instance, Bliss and Nalebuff (1984) and Palfrey and Rosenthal (1984) characterize Bayesian equilibria in which donations increase with an individual's valuation for the public good. This is in contrast with models of perfect information (for example, Bagnoli and Lipman (1989)) in which any individual can be pivotal and donations do not depend on valuations.

Third, the presence of the private good motive shows that offering fringe benefits induces people to donate. However, we also find a substitution effect: donations partially displace box office revenues. A charity should therefore ensure that the cost of the fringe benefits, together with the lost revenues, is not higher than the minimum donation necessary to have access to these benefits. If it is, the minimum threshold should be increased.

Fourth, the substitution effect has implications also for government policy when subsidizing the arts, through the crowding-out effect. The crowding-out effect occurs when an increase in public grants causes private donations to decrease. Our finding that donations and consumption are substitutes for cheap tickets buyers suggests that for these individuals the crowding out effect (the decrease in their donations) would be mitigated by increased ticket expenditure, generating more funds for the theater. Our finding that this holds for cheap tickets' buyers but not for expensive tickets buyers suggest that the "composition" of the donors' pool may be important to evaluate the overall effect of public grants.

The literature on donations is quite extensive. Our contribution is to provide evidence at a micro-individual level and to be able to match consumption and donation choices. Most of the existing evidence on donations is based on experimental data (Harbaugh and

Krause (1999), Andreoni and Petrie (2001) and List and Lucking-Reiley (2002)). Most empirical studies of donations have focused on the crowding out effect and use data on donations aggregated at the national level thus yielding only indirect evidence on individual preferences.⁵ In contrast, given the nature of our dataset we can directly test the link between donations and individual preferences. The papers closest to ours are Kingma (1989), Kingma and McClelland (1995) and Straub (2002). They use data on household level of donations to public radio. Like us, they have data on donation at an individual level. However, they focus on the existence of the crowding out of government funding. A difference in the characteristics of our two dataset is that we can measure directly the consumption of both donors and non-donors. Thus, we focus instead on the underlying motives of donation by analyzing the correlation between donation and consumption.

The paper proceeds as follows. Section 2 presents a model of individuals' joint consumption-donation decision and derives predictions. Section 3 describes the data set and gives details about ENO. Section 4 provides some summary statistics. Section 5 presents the empirical results. Section 6 focuses on the excess donations within a class of donors and Section 7 looks at changes in consumption of an individual when he starts or stops donating. Section 8 concludes.

2 A Model of Individual Donations

In this section, we present a model of individual's donation and consumption choices. The fully fledged model is solved in Appendix 1. The model is used to derive a set of jointly consistent working hypothesis that we test in the empirical part of the paper. We proceed as follows. We look at the relation between consumption and donation choice if an individual feels pivotal and donates to fund a public good. We thus start assuming that the individual believes that his contribution will have a positive effect on the number of new productions offered. This assumption in the model is consistent with ENO's claim in their fund-raising efforts that the main use of donations is to support new productions (Figures 1). We then derive consumption implications which would not arise if individuals donated for different motives. In particular, if he donated because of the joy-of-giving motive he should not necessarily expect that the decision to donate is correlated with consumption.

2.1 The Model

Consider an opera house producing an exogenous number N of performances each year. There are two types of productions: regular (i.e. replicas of existing productions) and

⁵See, e.g., Weisbrod and Dominguez (1986), Posnett and Sandler (1989), and Khanna and Sandler (2000).

new productions. Out of the N performances, the opera house chooses to produce S new productions, at an additional fixed cost M per new production.

For each performance, two types of seats are available: quality can be low or high, with corresponding prices p_1 and $p_2 > p_1$. With no loss of generality, we normalize $p_1 = 1$. Moreover, for simplicity we assume these prices as exogenous. The opera house does not have complete freedom when setting prices, since it competes with other entertainment establishments (such as theaters or concert halls) and behaves very much as a price-taker.⁶ Finally, each year the opera house offers R special events, such as dress rehearsals, lunch meetings with singers, cocktail receptions which are available only to individuals who donate more than a minimum amount \underline{d} .⁷

An individual attends n_1 performances in low quality and n_2 in high quality seats. Hence,

$$n_1 + n_2 \leq N \tag{1}$$

Of these, $g(S) \leq S$ are new productions.

The individual chooses a donation amount $d_i \geq 0$ and, if he donates an amount larger than \underline{d} , he can attend special events. Let r be the number of special events attended by the individual, with $r \leq R$ and $r = 0$ if $d \leq \underline{d}$.⁸

The individual budget constraint is:

$$p_1 n_1 + p_2 n_2 \leq \bar{y}_i - d_i \tag{2}$$

where \bar{y}_i is individual i 's income.⁹

The utility function of individual i is assumed to take the following form¹⁰

$$v_i [\alpha n_1 - n_1^2 + \beta(\alpha n_2 - n_2^2) + \phi g(S)] + \gamma_i r(R - r) \tag{3}$$

The parameters are as follows. v_i captures individual i 's taste for opera, β the preference for higher quality seats with $\beta \geq 1$ and assume that $p_2 > \beta$, γ_i the additional utility

⁶For instance, the English National Opera in London competes not only with theaters and concert houses, but also with the Royal Opera House at Covent Garden and the occasional touring opera companies. Allowing the opera house to also set prices would make the analysis more complex, since the prices could affect donations, but would not change our basic conclusions.

⁷For instance, a minimum donation of 25 pounds is requested to become a "Friend of the ENO." Donations below 25 pounds are possible but do not give access to fringe benefits.

⁸Many of the special events are dress rehearsals. They may be substitutes for regular performances. We abstract from this issue. Also we assume that special events are free. While they are not always, the price to pay is usually so small as to be irrelevant.

⁹More precisely, \bar{y}_i should be the income available for entertainment expenditure. The fraction of income dedicated to entertainment expenditure should depend on individual preferences. For simplicity, we abstract from this aspect and assume it is a constant fraction of the income.

¹⁰We could add d_i in the utility function to capture the "joy-of-giving" motive. However, our data do not allow to separately identify this motive from the others.

from attending a special event, and ϕ the additional marginal benefit from attending a new production rather than a regular production.¹¹

Some people prefer to attend new productions, either because the staging is more modern or because they have already seen all the repertory productions and want some novelty, while others have no preference for new productions. Clearly, all else equal, an individual who prefers new productions would always choose to attend as many new productions as possible. However, this would ignore two important aspects. First, we are treating all performances as perfect substitutes, whether they are by Puccini or a modern composer. Second, individuals have timing constraints and may not be free when a certain opera is offered. As a result, they do not attend only new performances even if they have a preference for them. We thus assume that $g(S)$ increases with the number of new productions offered, i.e. $g'(S) > 0$. In other words, as more new productions are offered, it is more likely that the individual will be able to choose a new production over a regular one.¹² The functional form of the utility in (3) also implies that the additional utility $v_i\phi$ from attending a new production rather than a regular one is not affected by seat quality.¹³ In general, if it were affected, individuals with $\phi > 0$ would buy more expensive seats. Although we do not model it explicitly, in Section 5 we test it.

Let us now consider the opera house choice. We assume that the opera house maximizes S subject to its budget constraint. Since a new production entails an additional fixed cost M , S increases with the total donations collected.¹⁴ Therefore, the individual rationally anticipates the opera house's optimal decision:

$$S \times M = \sum_i d_i \tag{4}$$

As a result, S is an increasing function of the resources available (in particular, total donations). The number of special events, R , instead, does not depend on the resources. In reality, the choice of special events is likely determined by exogenous circumstances, such as

¹¹We introduced R in the utility function so that an individual never wants to attend more than the available number of special events and the solution is always interior. This is just for simplification and has no bearing on the results.

¹²More generally, one may imagine that $g(S)$ is a step function, where the steps depend on the total attendance $n_1 + n_2$. For example, $g(S)$ is a low number if $n_1 + n_2$ is low, while it is higher if total attendance is higher. That would imply that the optimal attendance is different for individuals with $\phi > 0$.

¹³The specific functional form is chosen in order to derive closed form solutions and thus simple predictions. We will point out when the predictions depend on this specific form and are not robust to more general specifications.

¹⁴We are ignoring the possibility that the opera house uses an intertemporal budget. This type of consideration will make the rules more complex but in general will not affect the basic result that S increases with donations.

the availability of singers. Moreover, special events are not very costly with respect to the staging of an opera (for instance, dress rehearsals entail no extra costs to the opera house).

The timing is as follows. At $t = 0$ each individual chooses how much to donate. At $t = 1$, after collecting donations, the opera house chooses the number of new productions S . At $t = 2$, individual i , given his donation and knowing S , chooses his attendance. Moreover, if he chooses to donate, he also decides which special events to attend.

Therefore, at $t = 0$ each individual chooses d_i anticipating what effect his donation will have on the choice of S (at $t = 1$) and on his choice of attendance (at $t = 2$).

We solve the model backwards. The actual solution is presented in Appendix 1. Here we only describe the main results.

In equilibrium, we find that individual who attend more often or have a higher income are more likely to donate. We also find a substitution effect which takes place through the budget constraint: a larger donation reduces the income available in order to buy seats. About the motive to donate (to increase the number of new productions or to have access to fringe benefits) two types of behavior may arise in equilibrium. Individuals with low income buy only cheap seats $n_1^* = \bar{y}_i - d_i$, while individuals with high income will buy both cheap and expensive seats. When we look at the choice to donate, we find that individuals buying only cheap seats are more likely to donate mainly to have access to special events (which implies they will donate only the minimum amount). Individuals buying expensive seats, instead, are more likely to donate to increase the number of new productions S . Moreover, they show a smaller substitution effect than individuals buying cheap seats. The intuition of this result can be obtained by looking at the first order conditions of the maximization with respect to the amount donated. As explained in the Appendix, if we abstract from the special events motive and focus only on the new productions motive, the first order condition is:

$$\frac{\partial U}{\partial n_1} \frac{dn_1^*}{dd_i} + \frac{\partial U}{\partial n_2} \frac{dn_2^*}{dd_i} + v_i \phi g'(S) \frac{dS}{dd_i} \geq 0$$

The first two terms are the substitution effects and are non-positive: when an individual's budget constraint is binding, his donations reduce the budget available for purchasing tickets. In that case, donations and ticket purchases are substitutes. The third term captures the fact that a larger donation allows the opera house to stage more new productions. This term is positive only if $\phi > 0$, i.e. if the individual prefers new productions and feels pivotal. In the Appendix it is shown that the substitution effect is larger for individuals buying cheap seats (rather than individual buying expensive seats). As a consequence, all else equal, an individual buying cheap seats is less likely to become a donor in order to increase the number of new productions, and if he donates he is more likely to do it because

of the special events motive.

We can thus derive some empirical predictions about which variables will affect the probability that a customer becomes a donor and the amount he will donate. Moreover, these empirical predictions are different for people with high or low income, allowing us to derive additional testable implications. The actual proofs of these implications are in the Appendix:

Hypothesis 1: *There is a substitution effect between donations and consumption: the larger is the amount donated, for a given level of income, the smaller is the amount spent to attend.*

Hypothesis 2: *The probability to become a donor and the amount donated are positively correlated with the preference for new performances (ϕ .)*

Hypothesis 3: *The positive correlation between the amount donated (or the probability to become a donor) and the preference for new performances is stronger for individuals buying expensive seats than for individuals buying only cheap seats.*

Hypothesis 4: *Individuals who donate the minimum amount are the most sensitive to the consumption of the fringe benefits.*

Moreover, if there are different classes of donors and a higher class is associated to more fringe benefits, the following implication holds:

Hypothesis 5: *The probability to donate enough to have access to a higher donors' class is positively correlated with the preference for fringe benefits. This correlation is stronger for individuals buying only cheap seats than for individuals buying expensive seats.*

3 The Data Set

Our data set was obtained from the English National Opera (ENO), a British registered charity, and it covers the behavior of 358,026 individuals who either made a donation or purchased a ticket from ENO between 1994 and 1999. Since ENO assigns a unique ID number to each individual (more specifically, the entire household), we can merge the data from the box office and fundraising department, and construct a dataset that contains detailed information on ticket purchases (type of production, quality of the seat, price, number of tickets), donations, and the effective consumption of fringe benefits. An important advantage of our dataset with respect to previous studies is that it covers not only donors but

also *all* individuals with an interest in the ENO performances. This allows us to use the non-donors as a control group.

On average, ENO stages 18 operas per year, for a total of about 190 performances. Of these operas, usually every year 7 or 8 are new productions. Donations represent a large part of ENO’s budget, almost equal to the revenues from ticket sales. For instance, in 1997 revenues from ticket sales amounted to 7.5 million pounds while donations amounted to 10.2 million pounds. The importance of donations is even more evident if one considers that the current endowment of the ENO is 14.1 million pounds. Given the current level of expenditures of 25 million pounds, ENO would find it very difficult to finance two seasons without donations, even using all the endowment. Our analysis focuses on individual donations. At ENO, individual donations are larger than corporate donations and are the most important component of ENO’s budget. For instance, in 1997 corporate donations were 2.9 million versus 7.3 million pounds of individual donations.

There are two types of productions: regular and new productions. A *regular production* is the staging of an opera which has already been offered in previous years and is in the repertory. A *new production* is the new staging of an opera. The ENO is known for being active in developing new productions. These are typically more expensive than regular productions since the ENO commissions the work to a director, a set designer, a costume designer and a lighting designer (and often also the translation into English of the original libretto). For regular productions, these fixed costs would have instead already been paid in previous years. In letters soliciting donations, the ENO emphasizes explicitly the fact that money from donations is used to support new productions. In a leaflet about Friends of the ENO (*Figure 1*), it is written that “... When you become a Friend, a substantial proportion of your membership goes to the *staging of new productions*. ”

Table 1 describes the Gift Program of ENO, which has four levels of “Friends”. The minimum donation to be part of the lowest level of friends is 25 pounds, although donations can be (and many are) lower. In addition to the four Friend levels, there are four higher levels of membership not described in the Table 1. Associated with this structure are similarly graduated packages of fringe benefits. These include advance information about performances at the ENO, access to rehearsals and invitations to talks and, for the most generous donors, invitations to the “Annual Fellows’ Dinner”.

Our data includes the individuals’ postcodes. The UK postcode is a very precise description of a particular address. For central London, a postcode identifies a household to the precision of a single building. For rural areas, a postcode identifies a set of at most 80

households. The UK Bureau of Consumption provides data that associates to each postcode the average household expenditure. We use this as a proxy for the income. The data set associates average expenditure to a postcode up to the last two digits. In central London this corresponds to the average expenditure of a block.

In the U.K., unlike in the U.S., during the period of our study most donations choices are unaffected by tax implications. The so called “Gift Aid” scheme was introduced in 1990 and later modified in 1991. According to this scheme, a donor can claim tax relief on the amount donated for the difference between his/her marginal tax rate and the basic-rate. The charity can reclaim a relief in proportion to the basic tax rate. However, from 1993 to April 2000 (i.e. our sample period) this tax relief was available only for donations exceeding 250 pounds, which is an extremely high threshold with respect to the average size of the gifts to the ENO (as we will show in the next section). Moreover, in order for the donations to be tax deductible the fiscal identity of the donor had to be certified: phone and internet donations were not effectively accepted as part of the “Gift Aid” scheme. These restrictions imply that about 97.8% of the donations in our data are not tax deductible, so that the effective cost of the donation is independent of the (unobservable) level of the taxable income.

4 Summary Statistics

This section reports summary statistics about individual behavior. To avoid individuals who may be acting as agents, we exclude individuals buying more than 6 tickets for the same event. We obtain a data set with 72,193 donors (i.e. donor households) and 285,833 non-donors. To avoid outliers problems, we exclude the top 2% of all donations, i.e. all donations above 330 pounds. Figure 2 shows the distribution of all donations before dropping the top 2%. Less than the 0.05% of the donations are above 1,000 pounds.

Table 2 presents summary statistics on the average annual expenditure and the number of tickets bought, distinguishing between attendance to regular and new productions. For both regular and new productions, the average expenditure of donors is more than twice that of non-donors. This difference is particularly high for new performances. On average, donors spend 114 and 113 pounds for regular and new performances respectively, compared to 51.20 pounds and 31.77 pounds for non-donors. The number of performances attended shows a similar pattern. On average, donors buy 4.27 and 4.17 tickets for regular and new productions compared to 2.18 and 1.39, respectively, for non-donors. All differences are statistically significant.

The difference between the attendance of donors and non-donors is much larger for new productions, suggesting that donors attend, in proportion, more new productions.¹⁵ In Figure 3, the histogram of the distribution of the attendance of new productions by donors and non donors provides a clear picture. A large number of non donors, i.e. 53%, never went to a new production. In comparison, only 19% of the donors did not attend any new production. Moreover, the overall distribution of the donors is more shifted to the right than the distribution of the non-donors. There is a substantially higher proportion of donors attending new performances than non-donors. For instance, 8% of the donors purchase 8 tickets for new productions, while only 2% of the non-donors display the same behavior.

In Table 3 we stratify the sample according to the seat price. We rank the individuals according to the average price paid per seat. An individual is classified as buying “expensive” (“cheap”) seats if the average price is in the top (bottom) three deciles of the price distribution, corresponding to at least 33 pounds (less than 17 pounds). Table 3 compares the behavior of individuals who buy cheap versus expensive seats. The average (annual) donation is larger for individuals buying expensive rather than cheap seats, although the difference is not large. In both subsamples it remains true that donors attend more performances than non-donors and the result is actually strengthened. Among those individuals who buy cheap seats, the median number of performances increases from 2 (non-donors) to 4 (donors), for both regular and new productions. The same results hold for individuals purchasing expensive seats: the median goes from 2 (non-donors) to 3 or 4 (donors) for, respectively, regular and new performances. These differences are statistically significant.

¹⁵By total attendance we mean the number of *different* performances attended, independently on the number of tickets bought for each performance. In this way we abstract from the possibility that an individual would buy tickets also for friends (and get reimbursed). We have repeated the same analysis using also, as a measure of attendance, the number of tickets bought. We find no qualitative difference. When we measure the annual expenditure, instead, in order to differentiate the analysis, we look at total expenditure, i.e. we take into account the number of tickets bought.

5 Regression Analysis

This section studies the empirical relation between donation and consumption choices. The first issue to address is the fact that donations and attendance are both endogenous variables and determined simultaneously. To take that into account we estimate a system of two equations simultaneously.¹⁶ The first equation describes the donation decision, while the second one describes the consumption decision.

In the first equation, the model implies that the *amount donated* (obtained from the first order condition of the maximization with respect to the amount donated) depends on the total attendance, income, the preference for new productions and the preference for fringe benefits. Since a large part of fringe benefits are dress-rehearsals, which are available to all those who donated at least 25 pounds, in the regressions we distinguish dress-rehearsals and special events (all other fringe benefits).

In the second equation, the model implies (obtained from the first order condition of the maximization with respect to ticket purchases) that the total ticket *expenditure* depends, through the budget constraint, on the amount donated, the preference for new productions and income.¹⁷

First, we study the *binomial* decision to become a donor by estimating a multivariate Probit, then we study the decision of *how much* to donate, simultaneously.

Two main methodological issues arise. First, some of the right-hand-side variables, such as the consumption of fringe benefits are potentially endogenous. We address this issue by using Instrumental Variables. Second, because the amount donated is censored at zero, a simple linear regression on the entire sample would give biased results. We address this issue by using a generalized multivariate Tobit approach¹⁸.

5.1 The Binomial Donation Decision

Consider the binomial decision to become a donor $I_i(d_i > 0) \in \{0, 1\}$. The first order conditions of the model can be summarized in terms of an individual decision function $\zeta_i \equiv X_i' \alpha$: an individual decides to become a donor if the difference between his marginal utility as a

¹⁶Estimating the system of simultaneous equations avoids the bias generated by endogenous explanatory variables.

¹⁷Although the model had a specific functional form, it is easy to see that these predictions can be obtained from a more general functional form. Moreover, although the model did not imply a correlation between expenditure and preference for new productions, we mentioned that if we allow $g(S)$ to depend on total attendance or we assume that an individual enjoys attending a new production even more if he buys a high quality seat then the model would imply such correlation. Here we can therefore test for it.

¹⁸More details are given in each specific section.

donor and the cost of the donation is positive, i.e. $\zeta_i > 0$. Let $\{X_t, Z_t\}$ be the explanatory of variables describing the donation and consumption decision respectively. Since the donation decision is simultaneous to the individual expenditure decision, we consider the following system of two equations.

$$\begin{cases} \text{eq.1:} & I_i(d_i > 0) = \begin{cases} 1 & \text{if } \zeta_i > 0 \\ 0 & \text{else} \end{cases} \quad \text{with } \zeta_i = X_i'\alpha + \varepsilon_{\zeta,i} \\ \text{eq.2:} & \text{Total Expenditure}_i = Z_i'\beta + \varepsilon_{e,i} \end{cases}$$

The dependent variable of the first equation is binomial, i.e. being a donor, while the dependent variable of the second equation, the total expenditure, is continuous. Thus, we estimate the system assuming that $(\varepsilon_{\zeta,i}, \varepsilon_{e,i}) \sim N(0, \Lambda\Lambda')$ and using a multivariate maximum likelihood Probit approach. Appendix 2 describes in detail the functional form of the bi-variate likelihood function and the econometric methodology.

Of all the explanatory variables, the only ones which are not directly observable are the preference for new productions (ϕ) and for fringe benefits (γ_i). Since the model implies that the higher ϕ , the higher the proportion of new productions attended, we empirically identify ϕ by using the percentage of attendance to new productions. The preference for fringe benefits is measured by the attendance to dress rehearsals—since the model implies a one-to-one relation with γ_i —and special events. The parameters are estimated using a multivariate Probit. We instrument the consumption of dress-rehearsals and special events to correct for the potential endogeneity of these variables. A similar Instrumental Variable Probit approach is used in an univariate framework by Nelson and Olson (1978), Kingma (1989), and Straub (2002).

We classify as donors those individuals donating more than 25 pounds because this is the amount necessary to gain access to the first set of fringe benefits, such as dress-rehearsals. We have also conducted the same analysis by classifying as donors individuals donating any positive amount. The results are even stronger (except, obviously, those pertaining fringe benefits).

5.1.1 Instrumental Variables

Since the consumption of dress-rehearsals and special events (fringe benefits) is potentially correlated with the residuals, we instrument these two variables. However, since only donors have access to these fringe benefits, using a simple linear projection over the entire sample to obtain the instrument for the consumption of fringe benefits would give biased estimators. Therefore we use the Two Stage Heckit Estimator (Heckman (1979)). In the first stage, we

use a Probit to estimate the inverse Mills ratio. In the second stage, the inverse Mills ratio is added to the right hand side variables in the instrumental variable equation of the fringe benefits.

The standard errors of the estimators are corrected for the presence of imputed variables. We use a Newey-West (1987) estimator since the Nelson and Olson (1978) approach involve matrices of dimension $(n \times 2n)$, with n being the sample size.

The optimal selection of the instrumental variables is not clear cut. Ideally, one would like instrumental variables correlated with the regressors, but not with the observation errors, such as expenditure for entertainment not directly linked to the ENO. Unfortunately, such information is not available at an individual level and therefore we use the lagged values of the same variables. In the IV regressions, to instrument for the attendance to dress-rehearsals and special events, we proceed as follows. If the individual was a donor in year $t - 1$, we instrument the attendance to dress-rehearsals in year t with the lagged attendance to dress-rehearsals, a dummy variable for the lagged decision of being a donor, the total attendance and the level of income. If instead in year $t - 1$ the individual was not a donor, then we estimate how many dress rehearsals he would have attended had he been a donor, based on total attendance, level of income in year $t - 1$ and the regression estimated for repeated donors. Special benefits are instrumented in a similar way.

Two caveats should be made. First, unobservable variables may affect both total attendance and donation choice. For instance, a preference shock inducing an individual to love opera more, would increase both his attendance and donation. Therefore, this could lead to a biased estimate of the total attendance coefficient. To control for this potential bias, in the robustness check section, we use non contemporaneous attendance as instrumental variable, when available. Clearly, although this instrumental variable is a good choice to control for preference shocks, it may not be a good instrument for other unobservable variables. Second, in the model the variable y refers not so much to total disposable income, but to income available for expenditure to the arts. Thus, we decide to use as proxy for y the total household expenditure. Since y is a subset of total income, household expenditure is likely to be more closely correlated to our variable of interest.

5.1.2 Results

Table 4 presents the results of the *joint* estimation of the two equations for the entire sample and the subsamples of individuals buying cheap and expensive tickets.¹⁹

¹⁹An individual is said to buy cheap (expensive) tickets if the average price per seat paid is in the bottom (top) three deciles of the distribution of the price per seat.

Table 4 shows that the consumption pattern has a strong predictive power on the decision to become a donor. The pseudo- R^2 of the probit regression for the entire sample is 17%. In the subsamples of individuals buying cheap and expensive tickets the R^2 is 21% and 17%, respectively. All the slope coefficients are positive and significantly different from zero at the 1% confidence level, with the exception of some of the income coefficients for the expensive seats subsample.

In the full sample, the probability to become a donor is positively correlated with total attendance and the percentage of attendance to new productions. The fact that people who go more often to the opera are more likely to donate is not surprising and is consistent with several possible interpretations. It is instead very interesting the fact that the coefficient of the percentage of attendance to new productions is significantly positive and large even after controlling for total attendance. This result is consistent with Hypothesis 2 that individuals who have a preference for new productions are more likely to donate, so as to contribute to their staging (the *public good motive*). It suggests that attendance and donations are complementary: an individual who likes new productions donates in order to increase his marginal utility from attending operas. Note that if an individual donates exclusively because of the joy-of-giving motive, there is no reason to expect the probability to become a donor to be correlated with the preference for new productions. Therefore, these results suggest that the public good motive is important.²⁰ It thus provides evidence that individuals, although small, do feel pivotal and do not completely free-ride.

In the second equation, where the dependent variable is total ticket expenditure, the coefficient of gift amount is negative and significant, which suggests that there is also a substitution effect between attendance and donations: donations reduce the budget available to buy tickets (Hypothesis 2).

We find support also for Hypothesis 5 that individuals donate in order to gain access to fringe benefits (the *private good motive*). The coefficients of dress rehearsals and special events are positive, statistically significant, and important in terms of the size of the coefficient. Finally, the coefficient of the percentage of new productions is positive and significant also in the second equation, suggesting that individuals with a preference for new productions tend to buy more expensive tickets or to attend more often.

We then stratify the sample and find that the differences between cheap and expensive tickets buyers are consistent with the model. The coefficients for total attendance and percentage of attendance to new productions in the first equation are significantly higher

²⁰The result is also consistent with the fact that the ENO declares that it will use the donations to this purpose.

for individuals buying expensive seats. The coefficient for dress rehearsals is higher for individuals buying cheap seats. This suggests that individuals buying expensive seats are more likely to be motivated by the *public good* reason, while individuals buying cheap seats by the *private good* reason (Hypothesis 3). Moreover, the coefficient of the income variable (in the first equation) is positive and significant for individuals buying cheap seats while it is non significant for individuals buying expensive seats. In other words, the budget constraint is binding only for donors buying cheap seats. This is consistent with the fact that the coefficient of attendance in the second equation (the substitution effect) is negative and significant only for individuals buying cheap seats. Since individuals buying expensive seats are less budget constrained, the substitution effect of a donation (less disposable income to purchase tickets) is less relevant and the complementarity effect (improving the “quality” of performances attended) is predominant.²¹

In summary, the Probit analysis suggests that a large subset of individuals do feel pivotal for the production of the public good. The relative importance of this motivation with respect to the consumption of fringe benefits depends on the income level. Individuals with high income (who buy expensive seats) are more likely to donate because they want to support the production of new operas (i.e. *public good motive*); individuals with low income (who buy cheap seats) may also feel pivotal but the net benefit of their contribution is lower so that they may donate mainly in order to attend dress rehearsals (*private good motive*). Notice that the possibility to disentangle these two effects relies on the detailed micro-level nature of the dataset, as aggregate data would have not enabled us to display them.

5.2 Donation Amount

This section estimates the donation amount decision, correcting for the potential bias of the sample self-selection due to censoring. The estimators are obtained by maximizing the log-likelihood of a *system of two equations*. The two dependent variables are the amount donated (Gift amount) and the total expenditure (attendance multiplied by the price paid for each performance). In the first equation, the explanatory variables are total attendance, the percentage of attendance to new productions, the number of special events and dress rehearsals attended, and income. In the second equation, they are the amount donated, the percentage of attendance to new productions, and income.²² To formalize the estimation

²¹Notice that the fact that the coefficient of special events is larger for individuals buying expensive seats is consistent with the previous results, since some special events are available only to individuals donating more, who are more likely to be the individuals buying expensive seats.

²²The system is identified since the number of exogenous variables excluded in each of the two equations is at least equal to the number of included endogenous variables.

procedure, let (X_i, Z_i) be the set of explanatory variables, and let us define d_i to be the dollar amount donated, which can be either zero (non-donors) or positive (donors). Let d_i^* be the latent donation decision, so that $I_i = 1$ if $d_i^* > 0$

$$\begin{cases} eq.1 : & d_i^* = X_i' \alpha + \varepsilon_{di} \quad \text{with} \quad d_i = d_i^* \cdot I(d_i^* > 0) \\ eq.2 : & Total\ Expenditure_i = Z_i' \beta + \varepsilon_{e,i} \end{cases}$$

Since the dollar amount donated d_i and the fringe benefits are observable only if $d_i^* > 0$ the system of equations is censored. Thus, we assume that $(\varepsilon_d, \varepsilon_e) \sim N(0, \Lambda \Lambda')$ and estimate the system simultaneously using a Full Information Maximum Likelihood Tobit approach (Tobin (1958)).

The Full Information feature of the approach gives asymptotically efficient estimators and takes into account of the potential correlation between the errors. As before, we use instrumental variables for the attendance of dress rehearsals and special events.²³ Appendix 2 describes the construction of the functional form of the bi-variate likelihood function and the econometric methodology.

We consider two censoring cases. First, we classify as donors all individuals donating a strictly positive amount. We ask whether, conditional on having decided to be a donor, the donation's amount is positively correlated with the explanatory variables. Second, we define as donors only those individuals donating more than 25 pounds, since they are the only ones who have access to dress rehearsals and special events. In both cases we test the assumption of normality (Tobit) using Pagan and Vella (1989) approach. The null hypothesis of normality is not rejected.

Table 5 presents the results of the regressions using both censoring classifications. In both cases, total attendance has a positive and statistically significant effect on the amount donated, and the coefficient of the percentage of attendance to new productions is positive and significant. This shows that preferences for new productions are correlated not only with the probability to become a donor, but also with the amount donated. The public good motive is thus relevant not only for the choice to become a donor, but also for the amount donated.

The dress rehearsals coefficient is positive and significant in the first case, but not for individuals donating more than 25 pounds. This is not surprising, since in order to attend dress rehearsals it is sufficient to donate the minimum threshold level of 25 pounds. The special events coefficient is positive and significant in all three cases. This is consistent with the fact that access to some of these events requires to be in a higher class of donors.

²³Potentially endogenous explanatory variables are a common issue in the public choice literature. Kingma (1989), Kingma and McClelland (1995), Straub (2002) discuss the use of instrumental variables in a related setting.

Consider now cheap and expensive ticket buyers. In the first equation, the total attendance coefficient is significantly larger for those who purchased expensive tickets. For these individuals, the coefficient for the percentage of attendance to new productions is positive and significant, while the special event coefficient is lower than for buyers of cheap tickets. Finally, the income coefficient is positive and significant only for cheap seats. In the second regression, the coefficient of the amount donated is negative and significant only for individuals buying cheap seats. The coefficient of the percentage of attendance to new productions is positive and significant for both subsamples.

These results confirm the interpretation suggested by the Probit analysis. The *public good motive* is more important for individuals buying expensive seats. The *private good motive* is statistically significant and it plays an important role for individuals buying cheap seats. This is also confirmed by the fact that in the second equation the coefficient of total attendance is significantly higher for individuals buying expensive seats since, as the model predicts (Hypothesis 2), for these individuals there is no substitution effect.

5.3 Robustness Check

In this section we explore the extent to which the previous results are robust to alternative specifications and different econometric methods. For reason of space we only summarize the results: the specific tables are available upon request.

First, the previous results are based on a Full Information ML approach, which gives asymptotically efficient estimators. It has been shown that in finite samples the results can be sensitive to the estimate of the variance-covariance matrix. We check the robustness of the results by computing Limited Information 2SLS estimators with instrumental variables, which, although not asymptotically efficient, is known to be robust in small samples. We find that the point estimates are not statistically different and the standard deviations are marginally higher.

Second, we check the robustness of the results using as explanatory variables the total *dollar expenditure* instead of the total *number* of performances attended. The results are very similar to the one reported in Table 5.

Third, we check whether the assumption of normality of the residuals used to construct the generalized Tobit regression is responsible for some of the results. We consider two alternative distributional assumptions for the censored model: Weibull and generalized Logistic. These two distributions may account for some of the skewness and kurtosis that may be present in the residuals. We find that the coefficient estimates appear to be robust

to the choice of the distribution. The only exception is the coefficient of income which is on average larger in the case of the Weibull distribution.

Fourth, in the model of Section 2 an individual chooses whether to donate, taking into account his future attendance. Since there might be a delay between the donation decision and the actual use of these funds to finance new productions, we run regressions in which the attendance is measured with a delay of one or more years. This regressions can also be interpreted as a way to instrument the total attendance because of the potential presence of unobservable variables affecting both attendance and donations, such as preference shocks. In the case of the one year lag, the pattern is very similar. In the case of the two years lag, the coefficient for total attendance is no longer statistically significant while the coefficient of the percentage of attendance to new productions is still positive and significant.

Finally, we check whether the results could be due to the existence of a deterministic time trend as the total number of new productions, dress rehearsals and special events offered has increased over the last ten years. In Table 6 we add year-dummies to control for this potential effect. Moreover, since individuals may attend a higher number of new productions because they have already attended the regular productions of the same operas in previous years, we also control for the cumulative number of performances attended in the previous years up to the donation moment.²⁴ Notice that the second control variable is introduced mainly for interpretation reasons, since the fact that the individual has seen old productions and wants to see new ones does not contradict the public good motive for donating. We find that even controlling for the cumulative performance and time effect, the previous interpretation of the results is confirmed.

6 Excess Donations

So far we have considered the amount donated (and the benefits attached to it) as a continuous variable. However, ENO (and in general most charities) aggregates donors in different categories. A category of donors (e.g. “Friends” or “Bronze Friends” in Table 1) is characterized by a minimum and maximum level of donation: all donations within that interval will belong to the same category and will obtain access to the same fringe benefits. For instance, donors’ names are publicized only as members of a given category.

Therefore, the private good motive can justify why a donor chooses to be in a certain category, but not why he would donate more than the minimum to be in that specific category. In this Section, we study donations in excess of this minimum amount.²⁵ The advantage of this Section is that working with excess donations allows us to abstract from all

²⁴We refer to this variable in Table 6 as “cumulative performance”.

²⁵See Harbaugh (1998) for a first use of this approach.

private good motives including the social status, and to focus more directly on the public and joy-of-giving motives.²⁶ These two motives yield different predictions. The public good motive predicts that the excess donation is positively correlated with consumption of new performances, while joy-of-giving predicts no correlation between excess donations and percentage of attendance to new performances. Thus, we explore these two predictions by regressing excess donations on the attendance to new productions, controlling for total attendance and other characteristics to check the presence of the public good motive.

We proceed as follows. We first divide donors within each class of donation, say 25 to 50 pounds, into four groups: for example 25 to 27.50 pounds, 27.50 to 35.00, 35.00 to 42.50 and 42.50 to 49.99. Each of these subgroups has the same right to attend special events. In Figure 4 we document for each subgroup what percentage of individuals attends dress rehearsals. We find very clearly that the individuals who donate just the threshold of a given donation class are the ones who attend more dress rehearsals. The relationship is less strong for higher donation classes.

What does motivate donation in excess to the minimum? In Table 7 we present the results of a regression of the excess donation over the consumption choice. The excess donation is defined as the difference between the actual amount donated and the minimum level to be in a donation class. For each class we regress the excess donation onto the attendance to special events, dress-rehearsals, income and the preference for new performances.

We find that the coefficient for the percentage of attendance to new productions is positive and significant. This supports the public good motive.²⁷

Moreover, we find that excess donations are positively correlated with the consumption of special events (for the lowest category only) and new performances. Not surprisingly, the correlation with the attendance to dress rehearsals is negative and significant: donating more than the minimum does not give access to more dress rehearsals. The positive correlation with the special events is more surprising, although it is present only for the lowest category.

7 Repeated (and Interrupted) Donations

In this Section we take advantage of the time-series dimension of our data set. We focus on people who donate only once or continue donating over the years and look at whether they display different patterns of behavior. We aim to isolate two aspects. First, we can look at the change of behavior when an individual starts or stops donating and see whether this either reinforces or weakens the public and private good motives. For instance, it is

²⁶In the previous analysis, we have controlled for the private good motive by using as an explanatory variable the actual consumption of dress rehearsals and other special events.

²⁷The preference for new productions loses significance in the highest class of donation. However, this result could be due to the low number of data points in this donation class.

reasonable to expect that the correlation between the probability of becoming a donor and the preference for new productions is stronger for repeated (rather than occasional) donors, if individuals are motivated by the public good reason.

In Table 8 we present summary statistics about the behavior of donors in four different periods: the year before they donate for the first time, the first year in which they donate, the second consecutive donation year and the first year in which they stop donating.

We find that the average price per seat (for both new and regular productions) decreases when an individual starts donating and increases when he stops donating. The result holds for both new and regular productions and it is consistent with a substitution effect between consumption and donations.

The average attendance to new productions increases in the year following the donation, while the average attendance of regular productions decreases. The proportion of new performances attended ($\frac{\text{new seats}}{\text{not new seats}}$) is higher when the individual starts donating and is even higher for those who continue to donate. (However, it does not decrease when the individual stops donating). This is additional supporting evidence for the existence of a public good motive and the fact that a substantial percentage of individuals do feel pivotal.

We also find that the attendance to dress rehearsals (special events) is three times (twice) higher for continuing donors. This suggests that repeated donors are also strongly motivated by the access to fringe benefits.

In Table 9 we look at how the consumption choice changes when an individual starts or stops donating. In particular, we look at the change in the average seat price, attendance to new productions as a percentage of total attendance, total attendance and total attendance including dress rehearsals. Panel A looks at individuals' behavior in the year in which they start donating and Panel B in the year in which they stop donating. In panel A the dummy takes value 1 if the individual, who was not a donor in year $t - 1$, becomes a donor in year t . In panel B the dummy takes value 1 if the individual, who was a donor in year $t - 1$, stops donating in year t . When the dependent variable is the change in the average price per seat, the dummy is negative and significant in Panel A and positive and significant in panel B. This suggests that there is a substitution effect between consumption and donations: the individual, having donated money, is more budget constrained, and therefore reduces his expenditure in buying tickets. In the regression in which the dependent variable is the percentage of new performances attended, the dummy is positive and significant in Panel A and negative and significant in panel B. This is additional supporting evidence that individuals feel pivotal and donate to support new productions.

8 Conclusions

We have studied three of the main reasons that the literature has identified to explain the economics of donations: the public good motive—an individual donates because he feels pivotal for the production of a public good—the private good motive—an individual donates to gain access to fringe benefits—and the joy of giving—an individual may derive utility from the very act of donating. These three motives lead to three mutually exclusive patterns of donation and consumption. Thus, to explore these motives we build a dataset that merges information on both donations and consumption from the English National Opera. We find that even after controlling for the incentive to donate provided by the fringe benefits (such as access to dress rehearsals and other special events that ENO offers to donors), donations are consistent with the hypotheses that individuals feel pivotal and contribute for the production of a public good (e.g. new productions). The joy-of-giving may also be present, but it is particularly important to document the presence of the public good motive since with a large number of potential donors it has been argued that people may have the incentive to completely free-ride.

We explore the relative importance of the public good motive for different subsets of individuals. For instance, we find that for individuals buying cheap seats attendance and donations are more likely to be substitutes (since a donation reduces the income available to buy tickets) while for individuals buying expensive seats the substitution effect is limited and donations and attendance are more likely to be complements (since donations increase the quality of the good consumed). As a result, individuals buying cheap seats are more likely to donate only to have access to fringe benefits, while individuals buying expensive seats are more likely to respond to the public good motive. Finally, intertemporal evidence shows that individuals who start donate show an increase in their preference for new productions (the public good) and in the substitution effect.

These results show that some individuals donate in order to make sure that a public good is provided. Our research may be useful for fund-raising efforts in the arts, indicating which people to target and how, and for public policy purposes. For instance, the existence of a significant substitution effect between donations and expenditure suggests that a reduction in public grants, although partially offset by an increase in private donations, would indeed reduce the revenues from ticket sales and thus the funding available for new productions.

Appendix 1 (The Model)

We solve the model presented in Section 2 backwards.

At $t = 2$, individual i , having donated $d_i \geq 0$ and knowing S , chooses n_1 , n_2 and r to maximize (3) subject to (1) and (2).

If constraint (2) is binding, we can substitute

$$n_1 = (\bar{y}_i - d_i) - p_2 n_2. \quad (5)$$

in the objective function, so that the first order conditions with respect to n_2 and r are

$$-\alpha p_2 - 2n_2 p_2^2 + 2(\bar{y}_i - d_i)p_2 + \beta\alpha - 2\beta n_2 \geq 0 \quad (6)$$

$$\gamma_i R - 2r = 0 \quad (7)$$

The number of special events attended by a donor is therefore

$$r^* = \frac{\gamma_i R}{2}. \quad (8)$$

To determine n_1^* and n_2^* we distinguish two cases, depending on whether the following condition holds or not:

$$\bar{y}_i - d_i \leq \frac{\alpha(p_2 - \beta)}{2p_2}. \quad (9)$$

CASE 1: CONDITION (9) IS SATISFIED. This case arises when individual's income net of donation $\bar{y}_i - d_i$ is low. These individuals are budget-constrained and spend their budget on cheap seats:

$$n_1^* = \bar{y}_i - d_i \quad (10)$$

$$n_2^* = 0. \quad (11)$$

CASE 2: CONDITION (9) IS NOT SATISFIED. This case arises when the individual buys both expensive and cheap seats.

$$n_2^* = \frac{2p_2(\bar{y}_i - d_i) - \alpha(p_2 - \beta)}{2(p_2^2 + \beta)}, \quad (12)$$

and

$$n_1^* = \bar{y}_i - d_i - p_2 n_2^*. \quad (13)$$

Finally, if constraint (2) is not binding then:

$$n_1^* = n_2^* = \frac{\alpha}{2}$$

However, we will show later that this last case never arises in equilibrium (i.e. constraint (2) always binds).

At $t = 1$, the opera house maximizes the number of new productions S . Given its break-even constraint, this means that S will be an increasing function of donations.

At $t = 0$, the individual i chooses to donate d_i to maximize (3) subject to (2) and knowing that S is an increasing function of donations, with $n_1 = n_1^*$ and $n_2 = n_2^*$. We first ignore the constraint that $d \leq \underline{d}$ implies $r = 0$. If the first order condition implies $d_i \geq \underline{d}$, then we can indeed disregard the constraint. Otherwise, we explicitly consider the constraint.

If we define $U(n_1, n_2) \equiv v_i [\alpha n_1 - n_1^2 + \beta(\alpha n_2 - n_2^2) + \phi g(S)]$, the first order condition with respect to d_i is:

$$\frac{\partial U}{\partial n_1} \frac{dn_1^*}{dd_i} + \frac{\partial U}{\partial n_2} \frac{dn_2^*}{dd_i} + v_i \phi g'(S) \frac{dS}{dd_i} \quad (15)$$

The first term captures the effect of d_i on the number of low quality performances attended, n_1^* . Since the budget constraint (2) binds, this term is negative. The intuition is that when an individual's budget constraint is binding, his donations reduce the budget available for purchasing tickets. In that case, donations and ticket purchases are substitutes. The second term is the effect on n_2^* . Since we are at an interior solution, this term is always zero. The third term captures the fact that a larger donation allows the opera house to stage more new productions. This term is positive only if $\phi > 0$, i.e. if the individual prefers new productions and feels pivotal.

Both the first and third term increase with attendance, while the substitution effect decreases with attendance, since the utility is concave. Therefore, as attendance increases so does the expression in (15), which means that equation (15) is more likely to be positive and d^* is larger and attendance is positively related to the probability to become a donor and to the amount donated. Also, it is easy to show that the first order condition (15) increases with y_i , therefore income is positively related to the probability to become a donor and to the amount donated. Thirds, if $\phi > 0$ the first order condition includes the additional last (positive) term and therefore it is larger (Hypothesis 2).

Note that for individuals buying only cheap seats $n_1^* = \bar{y}_i - d_i$, and $\frac{dn_1^*}{dd_i} = -1$, while for individuals who buy also expensive seats $\frac{dn_2^*}{dd_i} = -\frac{p_2}{p_2^2 + \beta} < 0$, $\frac{dn_1^*}{dd_i} = -1 - p_2 \frac{dn_2^*}{dd_i} = -1 + \frac{p_2^2}{p_2^2 + \beta}$, which is between zero and -1. Therefore, all other things equal, the first order condition is more likely to have a solution at $d^* \geq \underline{d}$ for individuals buying expensive seats (Hypothesis 3). The intuition is the following: to increase his donation, each individual has to reduce his expenditure. If he is already buying only cheap seats, he can only reduce attendance, but if he is buying also expensive seats he can shift from expensive to cheap seats, which has a less negative impact on his utility. The implication is that the relevance of the public good motive is lower for individuals buying only low quality seats (i.e. low income individuals), since for those individuals the substitution effect is larger and it counterbalances the desire

to have more new productions.

Now consider the possibility of donating to have access to fringe benefits. Assume that the first order condition described above were negative when computed at $d_i = \underline{d}$. (If they were already non-negative, the fringe benefits motive becomes irrelevant). In that case the only reason an individual may donate is to gain access to special events. An individual donating for this reason will never donate more than the minimum amount \underline{d} . Moreover, $d \geq 0$ if and only if the utility from donating \underline{d} and consuming fringe benefits makes up for the reduction in the income available for ticket expenditure. This can be written as:

$$\frac{(\gamma_i R)^2}{4} \geq v_i \underline{d} [\alpha + \underline{d} + \bar{y}_i] \quad (16)$$

If (16) is not satisfied, then $d_i^* = 0$. If instead (16) is satisfied, then $d_i^* = \underline{d}$. Note that (16) is more likely to be satisfied the higher the individual's income \bar{y}_i and the less he appreciates opera, i.e. the lower v_i .

Appendix 2 (Econometric Methods)

Consider a set of observed data $\{(\xi_i, d_i), I_i, (Z_i, w_i)\}$, $i = 1, \dots, N$. Let ξ_i be the vector of consumption decisions, d_i be the amount donated, and let (Z_i, w_i) be a set of explanatory variables. I_i is a binomial indicator function for the decision of becoming a donor, i.e. $I_i = 1$ if $d_i > 0$.

Since donations cannot be negative and the fringe benefits can only be consumed by donors, the reduced form representation of the model is censored. Let d_i^* be the latent variable affecting the decision to become a donor.

$$\begin{aligned} d_i^* &= w_i' \gamma + \varepsilon_{di} \\ d_i &= d_i^* \cdot I(d_i^* > 0) \end{aligned}$$

Let $\xi_i = [\xi_{1i}, \xi_{2i}]$ be the consumption decision, with ξ_{1i} being the attendance to new and repertoire productions and ξ_{2i} being the consumption of fringe benefits

$$\xi_i = Z_i' \beta_1 + \varepsilon_{\xi i}$$

Let us consider the estimation of the vector of parameters γ . One can immediately notice that it would be inappropriate to estimate this model on the entire sample using the observed information d_i since, for the observation which are censored, one cannot consider the censoring rule as a true realization of the underlying relationship. The probability of observing censored observation is

$$Pr(d_i = 0 | w_i) = [1 - \Phi(w_i' \gamma)]$$

Thus

$$\begin{aligned} E(d_i|w_i) &= Pr(d_i = 0|w_i) \cdot E(d_i|w_i, d_i > 0) \\ &= \Phi\left(\frac{w'_i\gamma}{\sigma}\right) \left[w'_i\gamma + \sigma\lambda\left(\frac{w'_i\gamma}{\sigma}\right) \right] \end{aligned}$$

The additional term in the square brackets is known as the inverse Mills ratio, $\lambda\left(\frac{w'_i\gamma}{\sigma}\right) \equiv \phi\left(\frac{w'_i\gamma}{\sigma}\right) / \Phi\left(\frac{w'_i\gamma}{\sigma}\right)$. Due to censoring, the expected value of the amount donated is affected by the probability that an individual does not donate at all. If the explanatory variables were exogenous, the parameter vector γ can be estimated using Maximum Likelihood, with the likelihood function given by

$$\mathcal{L}(d_i|\gamma, \sigma) = \prod_{d_i=0} \left[1 - \Phi\left(\frac{w'_i\gamma}{\sigma}\right) \right] \prod_{d_i>0} \left[\frac{1}{\sigma} \phi\left(\frac{d_i - w'_i\gamma}{\sigma}\right) \right]$$

In our case, the set of explanatory variables w_i includes ξ_i , the consumption decision. Since the decision to donate, or how much to donate –equation (15)–, is determined jointly with the decision on the expenditure amount–equation (6), we face a classical endogenous explanatory variables problem.²⁸ Two forces affect the relationship between the two variables. Given the preference parameters, the budget constraint makes the correlation between donation and expenditure in new productions negative; given the budget constraint, a preference for new production makes the correlation positive. This problem is very common in a variety of different public finance problems.

This issue can be tackled using either Full Information or Instrumental Variables methods. Let us consider the simultaneous estimation of the system of first order conditions involving both the donation decision and the consumption decision $[d_i, \xi_i]$. Let us assume that the vector of residuals $\varepsilon = [\varepsilon_d, \varepsilon_\xi]$ is conditionally Multi-Normal distributed with density ϕ and cumulative function \mathcal{N}

$$\varepsilon \sim \phi(0, \Lambda\Lambda')$$

Let ξ be the orthogonalized vector of residuals, so that $\xi_i = [\xi_{1i}, \xi_{2i}]' = \Lambda^{-1} \begin{bmatrix} \omega'_i\gamma \\ \xi_i - Z'\beta \end{bmatrix}$, then

$$Pr\{d_i = 0, \xi_i = Z'\beta\} = \left[1 - \int_{-\infty}^{\omega'_i\gamma} \phi(\zeta, \xi_{2i}) d\zeta \right]$$

Thus, in the case of endogenous explanatory variables, the (multivariate) Likelihood function should be re-written as

$$\mathcal{L}(d_i, \xi_{1i}|\gamma, \beta, \Lambda) = \prod_{d_i=0} \left[1 - \int_{-\infty}^{\omega'_i\gamma} \phi(\zeta, \xi_{2i}) d\zeta \right] \prod_{d_i>0} \left[|\Lambda\Lambda'|^{-1} \phi(\xi_{1i}, \xi_{2i}) \right]$$

²⁸The optimal attendance is then given in (10) and (11) for low levels of income and in (12) and (13) for high levels of income.

Consistent and asymptotically efficient estimators of the parameters γ and β_1 can be obtained by FIML.²⁹

Clearly, since the donation amount is censored at zero, given a set of consistent ML estimators of the model, the parameters γ measures the marginal effect on the latent variable, not on the observable donation variable

$$\begin{aligned}\frac{\partial E(d_i^*|w_i)}{\partial w_i} &= \gamma \\ \frac{\partial E(d_i|w_i)}{\partial w_i} &= \gamma \left[\int_{-\infty}^{\infty} \int_{-\infty}^{w_i \gamma} \phi(\zeta_1, \xi_2) d\zeta_1 d\xi_2 \right]\end{aligned}$$

For simplicity, in all Tables we present the results in terms of the marginal effect, correcting for the censoring effect.

The previous generalized Tobit approach corrects both for the censoring of the observations that the decision to donate entails and for the endogeneity of some of the right hand side variables. An alternative approach that delivers consistent estimators in the presence of endogenous explanatory variables is based on Instrumental Variables techniques. This approach is known to be more robust than Full Information methods in small samples, however it is not asymptotically efficiency. We our empirical analysis we use both methods to discuss the robustness of the results.

²⁹Test statistics of null hypothesis of the type $H_0 : \theta = \theta_R$ can be constructed using the property that, for the joint model, under the null hypothesis the score of the likelihood function is a martingale in difference over time and independent across cross-sectional observations, so that a LM Chi-square test is given by:

$$J = N \left[\frac{\partial \ln L(\theta_R)}{\partial \theta_R} \right]' W_N^{-1} \left[\frac{\partial \ln L(\theta_R)}{\partial \theta_R} \right]$$

with W_T being a consistent estimator of the variance-covariance matrix of the score, such as $W_T = \sum_{i,t} \frac{\partial^2 \ln L_{i,t}}{\partial \theta^2}$. As usual, the standard deviations of the parameters is given by

$$\Sigma = \left[\sum_{i,t} \frac{\partial \ln L_{i,t}}{\partial \theta} \right]^{-1} \left[\sum_{i,t} \frac{\partial^2 \ln L_{i,t}}{\partial \theta^2} \right] \left[\sum_{i,t} \frac{\partial \ln L_{i,t}}{\partial \theta} \right]^{-1}.$$

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Benefits include

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- Advance information about performances at the Coliseum
- Priority booking for ENO performances**
- Priority booking for a variety of events including talks and recitals
- Priority booking for up to 15 Dress Rehearsals each season
- A subscription to ENO's *Coliseum* magazine, published 3 times a year
- A personalised membership card

Bronze Friend £50-99

Bronze Friends receive all of the Friends' benefits, plus an invitation to a special pre-rehearsal talk.

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Gold Friend £175-249

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We also offer opportunities for patrons wishing to make contributions in excess of £250. Please ring the Development Office on 0171 836 0111 x439 for further information.

*Senior citizens can purchase £25 membership for £20.
**except charity fundraising galas

Figure 1. “Become a Friend and Support New Productions”: part of a leaflet describing the advantages of becoming a donor of the English National Opera.

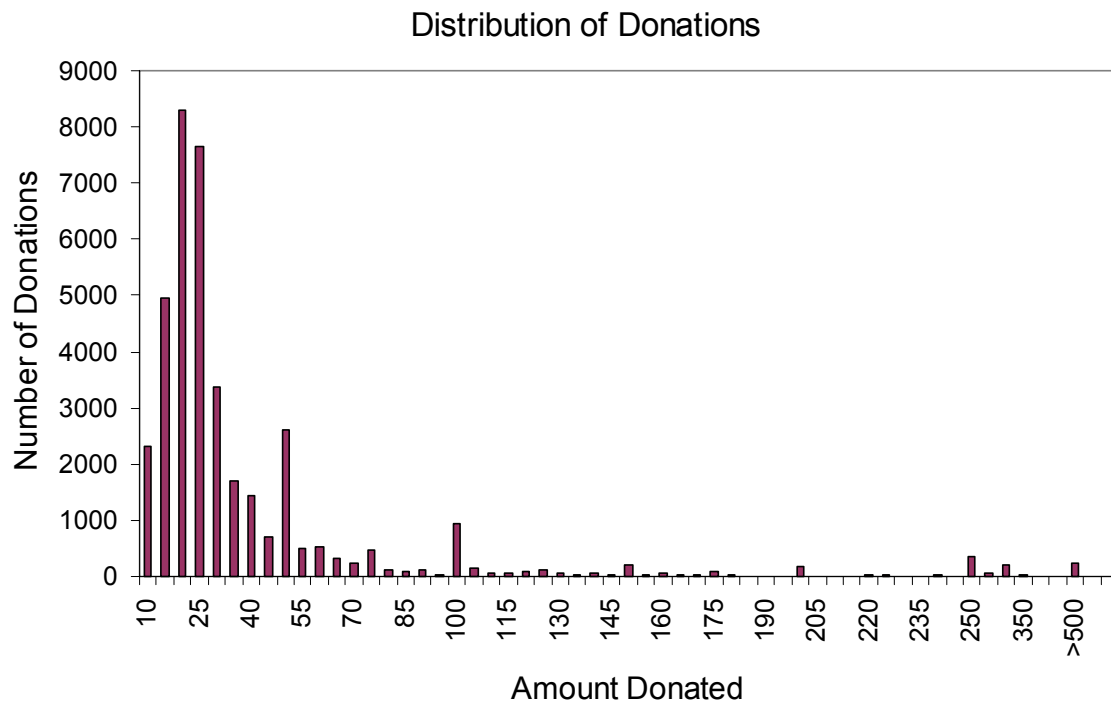


Figure 2. Distribution of the amount donated (x-axis). The vertical axis shows the absolute number of donations of a given amount.

Distribution of New Productions for Non-Donors and Donors

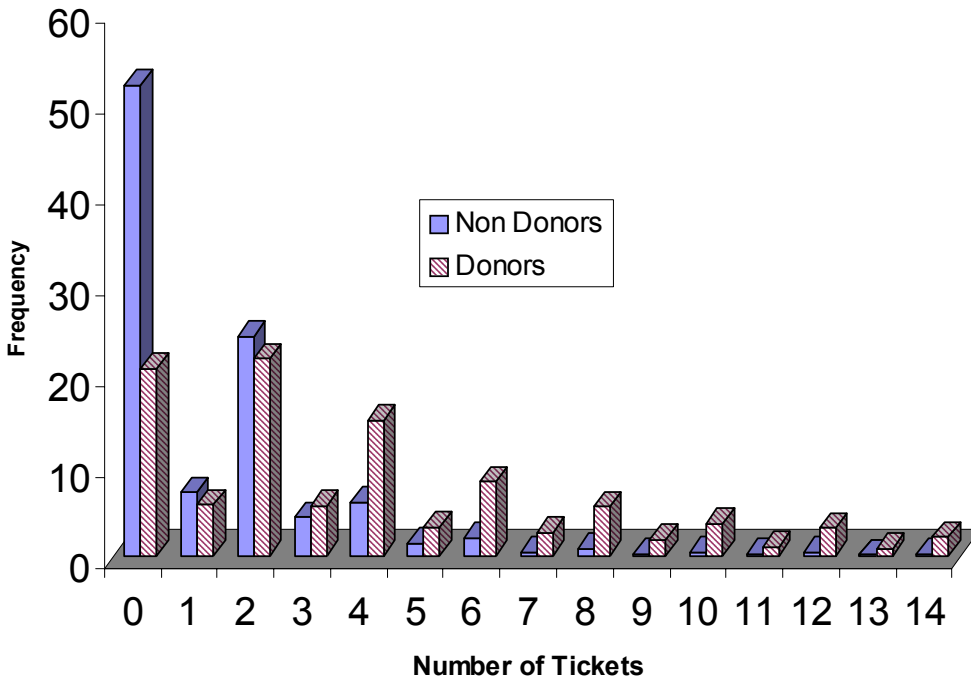


Figure 3. Histogram of the distribution of the number of tickets for New Productions purchased by Non-Donors (left bar) and Donors (right bar).

Dress Rehearsals

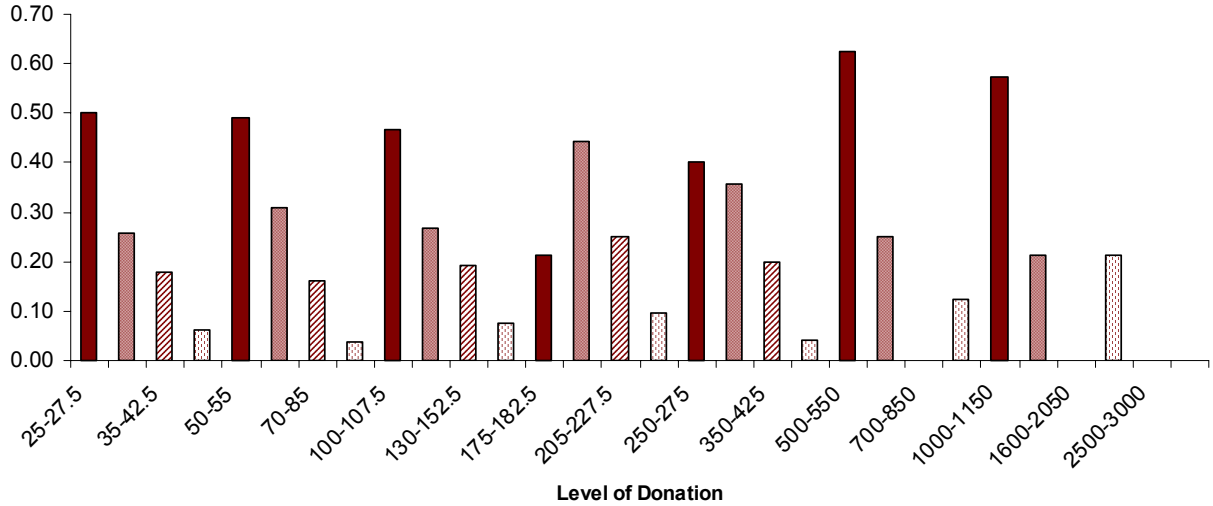


Figure 4. Distribution of attendance to Dress Rehearsals as a function of the different level of donation. Each donation class is subdivided into four groups: (a) the group that donated the minimum amount to be in that class, (b) two groups of individuals who donated an amount that falls between two consecutive thresholds, and (c) the group that donated the largest amount in that class. Each of these groups has the same rights to attend special performances. For each group, we represent the number of people (as a percentage of the total number of individuals in that donation class) who attended dress rehearsals.

Table 1
THE ENO'S GIFT PROGRAMS

This table describes the characteristics of the fringe benefits that are offered to different classes of donors up to a donation amount of 250 pounds

<i>Program</i>	<i>Level of Gift</i>	<i>Fringe Benefits</i>
Friend:	25-49	Advance information about performances Priority booking for ENO performances Priority booking for variety of Friends Events, including talks Priority booking for dress rehearsals A subscription to ENO's Coliseum magazine, published three times a year A personalised membership card
Bronze Friend:	50-99	All of the above plus: An invitation to a special pre-rehearsal talk
Silver Friend:	100-174	All of the above plus: An invitation to an annual reception to meet Company members and performers
Gold Friend:	175-249	All of the above plus: An exclusive opportunity to attend a music rehearsal

Table 2
GENERAL DESCRIPTION OF THE DATA SET

This table presents summary statistics of the data set. Panel A focuses on the average annual expenditure of each individual during one opera season; panel B focuses on the number of tickets bought. To avoid the effect of individuals acting as agents, we restrict the analysis to individuals buying at most 6 tickets for the same event. The unit of measure of the average annual expenditure is UK pound sterling.

<i>Event</i>	<i># Obs</i>	<i>Mean</i>	<i>Median</i>	<i>Std. Dev.</i>
Annual Gift Amount:		28.21	20	41

PANEL A: Average Annual Expenditure

Donors:

<i>Total Expenditure</i>	36,098	227	150	240
<i>Regular Prod.</i>		113	72	143
<i>New Prod.</i>		114	75	143

Non Donors:

<i>Total Expenditure</i>	284,451	83	56	98
<i>Regular Prod.</i>		51.20	36	67
<i>New Prod.</i>		31.77	9	61

PANEL B: Number of Tickets Bought

Donors:

<i>Total Attendance</i>	36,098	8.45	6	8.83
<i>Regular Prod.</i>		4.28	2	5.24
<i>New Prod.</i>		4.17	2	4.97
<i>Dress Rehearsal</i>		0.58	0	2.44

Non Donors:

<i>Total Attendance</i>	284,451	3.58	2	4.34
<i>Regular Prod.</i>		2.18	2	2.83
<i>New Prod.</i>		1.39	0	2.50

PANEL C: Average Price Per Seat

Donors:

<i>Total Attendance</i>	36,098	29.39	28.6	12.44
<i>Regular Prod.</i>		28.73	27.64	12.26
<i>New Prod.</i>		29.10	28	12.51

Non Donors:

<i>Total Attendance</i>	284,451	25.28	25	13.63
<i>Regular Prod.</i>		25.98	25	13.12
<i>New Prod.</i>		25.46	25	13.25

Table 3
ATTENDANCE FOR CHEAP AND EXPENSIVE TICKETS

This table presents summary statistics of the cross-sectional characteristics of the average attendance during an opera season and of the gift amounts. The dataset is stratified in two subsamples. The “cheap” ticket subsample includes all those individuals spending on average an amount which is in the *bottom three deciles* of the distribution of prices per seat, i.e. less than UKP 17. The “expensive” ticket subsample includes all those individuals spending on average an amount which is in the *top three deciles* of the distribution of prices per seat, i.e. more than UKP 33. To avoid the effect of individuals acting as agents, we restrict the analysis to individuals buying at most 6 tickets for the same event. The unit of measure of the price per seat is UK pound sterling.

<i>Event</i>	<i># Obs</i>	<i>Mean</i>	<i>Median</i>	<i>Std. Dev</i>
Annual Gift Amount:	17,102	33.27	20	47.33
PANEL A: Expensive Tickets				
Donors:				
<i>Total Attendance</i>	17,102	8.20	6	8.23
<i>Regular Prod.</i>		4.08	3	4.84
<i>New Prod.</i>		4.21	4	4.81
<i>Dress Rehearsal</i>		0.40	0	1.90
Non Donors:				
<i>Total Attendance</i>	87,236	3.56	2	3.87
<i>Regular Prod.</i>		2.14	2	2.52
<i>New Prod.</i>		1.41	2	2.39
PANEL B: Cheap Tickets				
Annual Gift Amount:	8,426	25.82	19	34.50
Donors:				
<i>Total Attendance</i>	8,426	11.73	8	11.46
<i>Regular Prod.</i>		6.04	4	6.74
<i>New Prod.</i>		5.69	4	6.23
<i>Dress Rehearsal</i>		0.85	0	3.06
Non Donors:				
<i>Total Attendance</i>	82,928	4.26	2	5.54
<i>Regular Prod.</i>		2.54	2	3.47
<i>New Prod.</i>		1.73	2	3.02

Table 4
MULTIVARIATE IV PROBIT

This table reports the estimation results for the system of first order conditions. The estimation is based on the log-Likelihood of the joint system of two equations

$$\begin{aligned} & \left\| \begin{array}{l} \text{eq.1: } \text{Prob}(Gift_i > 0) = \mathcal{N}(w_i'\gamma) \\ \text{eq.2: } \text{Total Expenditure}_i = Z_i'\beta \end{array} \right. \\ \log L = \sum_{i=1}^N I_i \cdot \log \left[\int_{-\infty}^{w_i'\gamma} \mathcal{N}_2\left(z, \frac{\xi_i - Z_i'\beta}{\sigma}; \rho\right) dz \right] + (1 - I_i) \log \left[1 - \int_{-\infty}^{w_i'\gamma} \mathcal{N}_2\left(z, \frac{\xi_i - Z_i'\beta}{\sigma}; \rho\right) dz \right] \end{aligned}$$

γ describes the binary decision $I_i \in \{0, 1\}$ to become a donor, with $Gift_i > 0$, while $\xi \in \mathfrak{R}_+$ is the Total Expenditure. We instrument the consumption of dress-rehearsals and special events to correct for the potential endogeneity of the explanatory variables. We use their lagged values, income, and in the case of the fringe benefits also the total performance attended. The sample excludes the donations in the top 2% decile of the distribution and individuals that purchased more than 6 tickets for the same event. The subset of “cheap” and “expensive” tickets are respectively the bottom and top three deciles of the distributions of individuals in terms of the average price of the tickets purchased. Huber-White robust standard errors are reported under the estimated coefficients. A single (double) star stands for statistical significance at the 5% (1%) confidence level.

<i>Overall Sample</i>								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{\text{New Prod}}{\text{Total Prod}}$	<i>Dress Re</i>	<i>Spec</i>	<i>Income</i>	R^2
<i>Being a Donor</i>	-2.34 0.02**	0.0511 0.0006**		0.2932 0.0112**	0.2134 0.0035**	0.1999 0.0086**	0.0092 0.0009**	0.17
<i>Total Expenditure</i>	8.08 0.45**		-0.07 0.06*	1.12 0.31**			0.03 0.02**	0.04

<i>Cheap Seats Subsample</i>								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{\text{New Prod}}{\text{Total Prod}}$	<i>Dress Re</i>	<i>Spec</i>	<i>Income</i>	R^2
<i>Being a Donor</i>	-2.45 0.05**	0.0465 0.0009**		0.1819 0.0251**	0.2034 0.0044**	0.1762 0.0109**	0.0082 0.0016**	0.21
<i>Total Expenditure</i>	11.85 1.67**		-0.11 0.05**	0.65 0.55			-0.07 0.06	0.05

<i>Expensive Seats Subsample</i>								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{\text{New Prod}}{\text{Total Prod}}$	<i>Dress Re</i>	<i>Spec</i>	<i>Income</i>	R^2
<i>Being a Donor</i>	-1.92 0.04**	0.0645 0.0009**		0.3481 0.0167**	0.1589 0.0072**	0.2342 0.0159**	-0.0001 0.0012	0.17
<i>Total Expenditure</i>	6.43 0.76**		0.04 0.03	0.99 0.48**			0.07 0.02**	0.04

Table 5
MULTIVARIATE IV TOBIT

This table reports the estimation results for the system of two equations using Full Information Tobit. We use Instrumental Variables to correct for the potential endogeneity of Dress Rehearsals and Special Events.

$$\begin{cases} \text{eq.1:} & Gift_i^* = w_i' \gamma + \varepsilon_{g,i} & Gift_i = Gift_i^* \cdot I_i(Gift_i^* > 0) \\ \text{eq.2:} & Total\ Expenditure_i = Z_i' \beta + \varepsilon_{e,i} \end{cases}$$

γ describes the binary decision $I_i \in \{0, 1\}$ to become a donor, with $Gift_i > 0$. The two left hand side variables in the system are the Gift Amount and the Total Expenditure. *Total attend.* is the total number of performances attended. $\frac{New\ Prod}{Total\ Prod}$ is the logarithm of one plus the percentage of New Productions attended over Total Attendance. *Spec* are the special events attended. *Dress Re* are Dress Rehearsals. Since dress rehearsals can be attended only if one donates more than UKP 25, the estimation includes a projection of the dress-rehearsals on a set of instrumental variables. These instrumental variables are the lagged number of dress-rehearsals, the total number of performances, the percentage of new performances and income. The explanatory variables are measured in units of performances attended. The sample excludes the donations which are, in terms of size, in the top 2% decile. We do not consider those individuals that purchased more than 6 tickets for the same event. Standard errors are reported in parenthesis. A single (double) star stands for statistical significance at the 5% (1%) confidence level.

Overall Sample								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{New\ Prod}{Total\ Prod}$	<i>Spec</i>	<i>Dress Re</i>	<i>Income</i>	R^2
<i>Gift Amount</i> $I_i=1$ if $d_i>0$	5.14 (1.16)**	1.62 (0.02)**		1.20 (0.59)*	2.86 (0.19)**	0.72 (0.09)**	0.28 (0.04)**	0.03
<i>Total Expenditure</i>	6.12 (0.26)**		-0.08 (0.04)*	0.64 (0.13)**			0.02 (0.01)	0.03
<i>Gift Amount</i> $I_i=1$ if $d_i>25$	36.96 (3.41)**	1.08 (0.06)**		3.20 (1.83)*	2.03 (0.35)**	-1.04 (0.21)**	0.66 (0.12)**	0.05
<i>Total Expenditure</i>	8.79 (0.62)**		-0.04 (0.03)	1.27 (0.33)**			0.03 (0.02)	0.04
Cheap Seats Subsample								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{New\ Prod}{Total\ Prod}$	<i>Spec</i>	<i>Dress Re</i>	<i>Income</i>	R^2
<i>Gift Amount</i> $I_i=1$ if $d_i>0$	2.70 (2.13)	1.24 (0.03)**		-0.64 (1.17)	2.45 (0.24)**	0.80 (0.13)**	0.28 (0.08)**	0.05
<i>Total Expenditure</i>	9.29 (0.71)**		-0.14 (0.05)**	1.04 (0.39)**			-0.02 (0.02)	0.05
<i>Gift Amount</i> $I_i=1$ if $d_i>25$	22.81 (6.48)**	0.98 (0.08)**		-0.51 (3.95)	2.12 (0.46)**	-0.31 (0.32)	0.84 (0.24)**	0.05
<i>Total Expenditure</i>	13.77 (1.72)**		-0.06 (0.03)*	0.47 (1.06)			-0.07 (0.06)	0.05
Expensive Seats Subsample								
	<i>Const</i>	<i>Total Attend.</i>	<i>Gift Amount</i>	$\frac{New\ Prod}{Total\ Prod}$	<i>Spec</i>	<i>Dress Re</i>	<i>Income</i>	R^2
<i>Gift Amount</i> $I_i=1$ if $d_i>0$	10.40 (1.97)**	2.25 (0.04)**		1.85 (1.00)*	3.46 (0.34)**	0.68 (0.20)**	0.07 (0.07)	0.05
<i>Total Expenditure</i>	4.49 (0.35)**		0.02 (0.02)	0.43 (0.18)**			0.06 (0.01)**	0.04
<i>Gift Amount</i> $I_i=1$ if $d_i>25$	50.12 (5.01)**	1.45 (0.09)**		5.25 (2.75)*	2.83 (0.58)**	-1.34 (0.40)**	0.24 (0.17)	0.04
<i>Total Expenditure</i>	6.25 (0.79)**		0.04 (0.03)	1.07 (0.43)**			0.09 (0.03)**	0.04

Table 6

IV REGRESSIONS FOR SAMPLE OF DONORS ≥ 25
EXPENDITURE AND DUMMIES

This table reports the results of the multivariate Tobit regressions of the size of the donations onto a set of explanatory variables. *Total Perf Expenditure* is the total amount spent in tickets. $\frac{New\ Perf}{Total\ Perf}$ is the logarithm of one plus the percentage of New Performances attended with respect to the Total Performances attended. *Spec* are the special events attended. *Dress Re* are the dress rehearsals. The sample excludes the donations in the top 2% decile of the distribution. We do not consider those individuals that purchased more than 6 tickets for the same event. *p* - values are reported in parenthesis. A single (double) star stands for statistical significance at the 5% (1%) confidence level.

	<i>Overall Sample</i>	<i>Cheap Tickets</i>	<i>Expensive Tickets</i>
<i>const</i>	1.4647 (26%)	0.4634 (37%)	3.8550 (57%)
<i>I</i> ₉₆	-3.9090 (26%)	-2.9485 (34%)	-5.9573 (57%)
<i>I</i> ₉₇	-4.0637 (26%)	-3.1934 (35%)	-5.9043 (56%)
<i>I</i> ₉₈	-1.5679 (26%)	-0.6637 (36%)	-2.2793 (56%)
<i>I</i> ₉₉	-3.5703 (25%)	-3.2946 (37%)	-5.1476 (55%)
<i>Tot Perf Expenditure</i>	0.0322 (0.04%)	0.0338 (0.07%)	0.0301 (0.07%)
$\ln\left(\frac{Exp\ New}{Exp\ Tot\ Perf}\right)$	4.0629 (0.0052%)	2.4033 (0.0041)	6.1611 (0.0066%)
<i>Cumulative Attendance</i>	0.0538 (4.93%)	0.0457 (5.74%)	0.0968 (4.77%)
<i>Spec Perf</i>	0.4932 (2.07%)	0.4290 (2.42%)	0.6537 (4.22%)
<i>Dress Rehearsals</i>	0.2848 (0.96%)	0.2766 (1.27%)	0.2721 (2.27%)
<i>Income</i>	0.0901 (0.70%)	0.1017 (1.02%)	0.0796 (1.42%)
<i>R</i> ²	0.12	0.16	0.10

Table 7
EXCESS DONATION AND CONSUMPTION PATTERN

The excess donations, defined as the difference between the actual donation and the minimum amount for each donation class, are regressed on a set of explanatory variables. There are four main donation classes, Friends, Silver Friends, Bronze Friends and Gold Friends, with donation thresholds equal to 25, 50, 100 and 175 respectively. $\frac{New}{Total}$ is the percentage of New Production attended with respect to the Total Attendance in both New and Regular productions. Standard deviations are shown in parenthesis. A single (double) star stands for statistical significance at the 5% (1%) confidence level.

EXOGENOUS VARIABLES:								
<i>Endogenous Variable</i>	<i>Const</i>	<i>Number Spec Events</i>	<i>Number Reg Prod</i>	<i>Total Num Perf</i>	<i>Number New Prod</i>	$\frac{New}{Total}$	<i>Number Dress Re</i>	<i>Income</i>
<i>“Friends”</i> $\pounds 25 \leq \text{Donation} < \pounds 50$	34.56** (4.87)	0.14** (0.03)	0.04** (0.01)		0.07** (0.02)		-0.01 (0.01)	0.61** (0.21)
	34.92** (4.23)	0.19** (0.04)		0.04** (0.01)		0.35** (0.12)	-0.06** (0.02)	0.58** (0.20)
<i>“Bronze Friends”</i> $\pounds 50 \leq \text{Donation} < \pounds 100$	67.45** (5.89)	-0.05 (0.04)	0.05** (0.01)		0.10** (0.02)		-0.19** (0.05)	0.54** (0.19)
	68.01** (5.26)	-0.01 (0.04)		0.05** (0.01)		0.27** (0.10)	-0.17** (0.05)	0.49** (0.21)
<i>“Silver Friends”</i> $\pounds 100 \leq \text{Donation} < \pounds 175$	131.40** (9.34)	0.11 (0.09)	0.01 (0.08)		0.11** (0.03)		-0.06 (0.05)	0.23* (0.09)
	131.96** (9.84)	0.38 (0.25)		0.01 (0.07)		0.56** (0.17)	-0.18 (0.08)	0.21* (0.09)
<i>“Gold Friends”</i> $\text{Donation} \geq \pounds 175$	252.61** (32.49)	0.06 (0.05)	0.08* (0.05)		0.26** (0.09)		0.04 (0.03)	0.15 (0.10)
	255.54** (30.59)	0.03 (0.04)		0.08* (0.05)		-0.47 (0.35)	-0.07 (0.05)	0.14 (0.09)

Table 8
AVERAGE CONSUMPTION AT DIFFERENT TIMES

This table reports the average consumption around the first and last year of donation. We stratify the sample with respect to the event of donation and construct four subsamples, depending on the sequence of donation events. “Before Donation” refers to the year before the individual made his first donation. “First Time Donors” refers to the year in which an individual becomes a donor. “Repeated Donors” refers to the second consecutive year of donation. “Interrupted Donors” refers to the year an existing donor stops donating. The sample excludes all donors that are in the top 2% decile of the distribution and those individuals who purchased more than 6 tickets for the same event.

	BEFORE DONATION	FIRST TIME DONORS	REPEATED DONORS	INTERRUPTED DONORS
<i>New Productions</i>	2.11	2.57	2.82	2.85
<i>Regular Productions</i>	3.16	2.69	2.42	2.98
<i>Percentage New Prod.</i>	40%	49%	54%	49%
<i>New Productions Price</i>	14.48	12.41	14.17	15.90
<i>Regular Prod. Price</i>	18.88	12.98	12.48	17.73
<i>Dress Rehearsals</i>	-	0.58	1.20	-
<i>Special Events</i>	-	0.08	0.15	-

Table 9
NEW AND INTERRUPTED DONORS

This table reports the results of regressions for those individuals that become donors for the first time and for the interrupted donors. In panel A we consider the sample of individuals who were not donor at time $t - 1$; in panel B we consider the individuals who were donors at time $t - 1$ and that either stopped donating or continued donating at time t . The left-hand-side variables are changes over two consecutive years of characteristics of the attendance at an individual level. The variable *AvgPr* is the average price paid during the season; *DR* are dress-rehearsals; *Dummy* is a dummy variable: in Panel A, it takes the value of one if the individual is a donor at time t , i.e. if he started to donate; in Panel B it takes the value of one if the individual is *not* a donor at time t , i.e. if he stopped donating. The sample excludes donors that are in the top 2% decile of the distribution and those individuals who purchased more than 6 tickets for the same event. A single (double) star stands for statistical significance at the 5% (1%) confidence level.

Panel A: Non Donors in year $t - 1$

	<i>Const</i>	<i>Dummy</i>	<i>Income</i>	<i>DressR</i>
$\Delta_i AvgPr(t)$	1.74** (0.14)	-7.45** (0.30)	0.0099 (0.0059)	-0.0176 (0.0662)
$\Delta_i \frac{New\ Perf}{Tot\ Perf}(t)$	0.11** (0.01)	0.07** (0.01)	-0.0018** (0.0001)	-0.0096 (0.0027)
$\Delta_i(New + Regular)$	0.23** (0.04)	0.14* (0.09)	0.0001 (0.002)	-0.1509** (0.0041)
$\Delta_i(New + Regular + DR)$	0.31** (0.04)	0.24** (0.09)	-0.0030 (0.0018)	

Panel B: Donors in year $t - 1$

$\Delta_i AvgPr(t)$	10.20** (0.40)	10.00** (0.37)	-0.0099 (0.0098)	-0.1982** (0.0354)
$\Delta_i \frac{New\ Perf}{Tot\ Perf}(t)$	0.12** (0.01)	-0.02** (0.008)	-0.0015** (0.0003)	0.0001** (0.0012)
$\Delta_i(New + Regular)$	0.55** (0.09)	0.38** (0.08)	-0.0029 (0.0022)	-0.0190** (0.0088)
$\Delta_i(New + Regular + DR)$	0.58** (0.10)	0.33** (0.08)	-0.0001 (0.0023)	