Lift and Shift: The Effect of Fundraising Interventions in Charity Space and Time

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Abstract

Fundraising interventions may lift donations and/or shift their composition and timing. Using data rich in both the charity space and time dimensions we find that major fundraising appeals lift donations to the appeal charity, and that this increase is not offset by lower donations later in time. Strikingly, major appeals also forward-shift donations to other (non-appeal) charities that are offset by lower donations later. To understand these response patterns we introduce a two-period, two charity "lift-shift" model. The model indicates that the observed response patterns are possible only if warm glow is substitutable, both intertemporally and between charities.

Keywords: Warm glow; donations; substitution; intertemporal substitution.

JEL codes: H41, D12, D64

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1. Introduction

The provision of public goods requires interventions to reduce to free-riding. A large literature in economics has studied how different fundraising interventions can mitigate free-riding and increase donations.[1] This literature typically focuses only on how much is raised by the charity doing the fundraising. However, it is important to take into account not only how much is raised by the fundraising charity at the time of the intervention, but also what happens to donations received by other charities and by the fundraising charity at a later point in time—because what enters the social welfare calculation is the overall level and mix of different types of public goods provided (Andreoni and Payne, 2013). The social welfare implications of a fundraising intervention that lifts total donations may be different in comparison to an intervention that shifts donations from other charities or from the future. The importance of the lift/shift question has been recognized since the early economic literature on fundraising (Rose-Ackerman, 1982), but remains unresolved (List, 2014) because addressing it places daunting requirements on the data.

This paper is the first to address the lift/shift question using data on donations to charity uniquely strong in the two dimensions necessary to provide a clear answer. The first dimension is charity space – the data must include donations to a comprehensive set of charities. The second is time – the data must be at a high enough frequency, and over a sufficiently long duration, to capture time-shifting behaviour across the comprehensive set of charities. [2]

[1] Among the fundraising interventions shown to be effective are door-to-door fundraising (Landry et al., 2006, 2010; DellaVigna, List, and Malmendier, 2012; Andreoni, Rao, and Trachtman, 2017), lotteries (Morgan, 2000; Morgan and Sefton, 2000; Lange et al., 2007; Carpenter and Matthews, 2017) match subsidies (Karlan and List, 2007; Eckel and Grossman, 2008), lead donations (Huck and Rasul, 2011), gifts (Falk, 2007; Alpizar et al., 2008), social information (Meier, 2007; Shang and Croson, 2009), and recognition (Harbaugh, 1998). For reviews, see Andreoni and Payne (2013), List (2011).

[2] Previous empirical investigations satisfactorily addressing the time dimension have had a low-dimensional charity-space of one to five different charities (Falk, 2007; Meier, 2007; van Diepen et al., 2009; Lange and Stocking, 2012; Donkers et al., 2017), or considered multiple donor-funded projects having similar purpose (Meer, 2017). The *Panel Study of Income Dynamics* allows comprehensive measurement of the charity-space, but the data are low-frequency in the time dimension and time-shifting and between-charity shifting that occurs at frequencies faster than biennially cannot be detected (Reinstein, 2011; Brown et al., 2015). The data used by Bekkers' (2015) and Deryugina and Marx (2020) are also low-frequency in the time dimension. Other studies have been based on single point-in-time investigations of a low-dimensional (e.g., two or three) charity-space (Cairns and Slonim, 2011; Krieg and Samek, 2017; Klar and Piston, 2015; Harwell and Eckel, 2015; Ek, 2017; Filiz-Ozbay and Uler, 2017).

The new data are administrative records from the accounts of more than 100,000 donors, recording donations to 80,000 charities on a day-by-day basis over the period June 2009 through July 2014. The donors in our sample typically give more than the average donor in the population, making them well-suited to studying aggregate lift/shift because they drive more of aggregate donations than the average donor. They also make 2.8 donations per month (likely more than the average donor) making it possible that they engage in 'shift' behavior. The data capture donations over a comprehensive set of all charities, allowing us to detect any shift in composition. The data also measure donations at a high enough frequency, and for long enough after the fundraising intervention, to capture any time-shifting behaviour.

The main focus is on six major appeals launched during the period by the UK Disasters Emergency Committee (DEC) in response to natural disasters and humanitarian crises. DEC is a charitable umbrella organisation of thirteen large international charities who co-ordinate relief, including a combined appeal for donations. Its appeals are nationwide in scope, and represent a set of plausibly exogenous, large-scale fundraising interventions. We also investigate the observed donation responses to major annual fundraising telethons, BBC Children in Need and Comic/Sports Relief, to check whether disaster appeals are atypical fundraising interventions.

Figure 1 tells the main story of the response to DEC appeals, showing the estimated average response in log donations, week-by-week, for the two weeks before the launch of an appeal through 20 weeks after (Section 3 presents full estimation details). Donations to DEC and its thirteen member charities, large international relief charities are in Panel a (we refer to the aggregate DEC plus its member charities as italicised "*DEC*"). The figure shows a large increase in donations to *DEC* during the immediate aftermath of an appeal, followed in weeks 5-14 by an adjustment and settling back to baseline. Weeks 15-19 confirm that the baseline has been re-established. Appeals increase donations to *DEC* over the entire 20-week period, and there is no indication of any time-shifting.

Donations to all other charities (hereafter *Other*) are in Panel b. The results are striking. During the immediate aftermath, donations to other charities *increase* relative to their baseline level. The increase in Panel b is smaller in percentage terms compared to the percentage increase in donations to *DEC* in Panel a, but this is a smaller percentage increase on a much larger base. When expressed in terms of a common

denominator, the increase in donations to other charities is two-fifths of the magnitude of the increase in donations to *DEC* (details in Section 3A). Later, this immediate increase in donations to other charities is offset by lower-than-baseline donations during what we term the adjustment and settling phases. In other words, the fundraising appeal by DEC time-shifts donations to other charities.

The later offset is such that, when summed over the entire 20-week period, donations to other charities are unchanged. There is no evidence of any overall shift in donations to *DEC* from other charities. This result, in combination with the increased donations to *DEC*, means that the appeal lifts total donations. This is not unique to DEC appeals. In response to major annual fundraising telethons we also find a lift in non-telethon donations in the immediate aftermath, and over the entire response period, a lift in total donations.

A plausible behavioural explanation for these findings is that the DEC appeal heightens the salience of giving to *DEC*, akin to a reminder effect (Huck and Rasul, 2010; Sontag and Zizzo, 2015; Damgaard and Gravert, 2018), and that, for those people so-reminded, there is a wider reminder effect for giving to all charity—a behavioural spillover which can be thought of as a halo effect.[3] However, although intuitive, this interpretation does not, on its own, explain exactly how donations might be re-allocated across charity time and space, nor does it suggest any implications about underlying warm glow preferences.

Therefore the paper's second contribution is to model this intuitive, heightened salience interpretation formally using a dynamic model with two sources of warm glow across two time periods. This "lift-shift" model establishes an identification framework that maps donation re-allocation patterns to underlying warm glow preferences. That mapping, combined with the donation re-allocation evidence, leads to two results. First, the warm glow from donating to *DEC* is a substitute for the warm glow from donating to other charities. Second, warm glow is intertemporally substitutable.

The findings from our paper are significant for several reasons. First, the main substantive finding is that major fundraising interventions lift total donations. This has

[3] The halo effect, first introduced by Thorndike (1920) is used in the marketing literature to describe the positive experience of one good affecting perceptions of a larger class of related goods to which the one good belongs. For example, Chandon et al. (2007) report a healthy-food halo: people going to restaurants that promote their main dishes as healthy, perceive the larger class of food at the restaurants to be healthy, and increase their orders of side dishes, even though those side dishes are not directly promoted by the restaurant as healthy. The general increase can also be interpreted from the perspective of the behavioral spillover literature (Truelove et al., 2014; Krieg and Samek, 2017).

implications for understanding the effect of fundraising on the level and mix of public goods provided. It also suggests that heated concern that major campaigns succeed at the expense of donations to other charities is exaggerated (e.g., Bernstein, 2005; MacAskill, 2014; Riley, 2014). Second, the lift-shift model uses standard price theoretic constructs to provide new insights into the identification of warm glow preferences. Third, applying this framework to the empirical results produces specific conclusions about underlying warm glow preferences. These include, for the first time as far as we are aware, that warm glow is substitutable both between charities and across time.

The plan of the rest of the paper is as follows. Data and empirical strategy are discussed in the next section, with empirical results in Section 3. Section 4 presents the model and then uses it to discuss explanations of the empirical results. Section 5 discusses some implications of the findings and directions for future research.

2. Empirical Approach

A. Data

The data are anonymized records from donor accounts administered by the Charities' Aid Foundation (CAF). The accounts are dedicated checking accounts for making donations to charities. Anyone can set up an account with a minimum £100 one-off payment or £10 monthly direct debit; they can make additional contributions at any time, but cannot withdraw funds. Account holders can use available funds to make donations directly out of their account. Donations can be made to any registered charity and can be made in a variety of ways, including online, by phone or check.[4]

The data consist of all donations made via the accounts over the period June 2009 – July 2014. 107,559 individuals make at least one donation over the period and in total, there are 4.5 million donations to more than 80,000 charities. The mean (median) donation size is £99 (£25). The mean (median) number of donations per donor per year is 14.9 (7), while the mean (median) value of total donations per donor per year is £1,478 (£450).[5] For each donation, the data contain information on the amount donated,

[4] As per our agreement with CAF, all analysis was conducted with the data remaining on a secure CAF server, and all reported results are based on aggregated data, to ensure that no individual behaviour can be identified. More detailed discussion of CAF accounts and the evidence to be discussed in this section is available in Appendix A.

[5] Donations through CAF accounts represent six per cent of total giving in the UK. Major fundraising charities are well-represented in the CAF sample. The data contain donations to 80,000 charities, compared to a total of 160,000 registered charities. However, not all registered charities receive

the charity receiving the money, and the exact date. This data richness in both dimensions—charity-space and time—is the innovation that enables a better answer to the lift/shift question.

It is important during the interpretation of the results to keep in mind that the population of CAF donors represents people who do a large amount of charitable giving compared to a typical donor in the population. The advantages of setting up a CAF account, compared to making donations out of a regular checking account, are that a CAF account makes it easier to obtain the tax benefits of donating under the UK *Gift Aid* system, helps manage one's giving, and serves as a commitment device. These advantages would be expected to be more important to people who do a large amount of giving. A comparison of donations by CAF account holders with donations made by donors in a random sample drawn from the UK population (*UK Giving*, 2010) shows that CAF account holders give much more than donors in the wider population (see Appendix A). Mean monthly donations are £278.94 among CAF account holders compared to £33.42 in *UK Giving*. In part this is because the CAF data capture a small number of donors who give very large amounts but are not picked up at all in *UK Giving* (the largest monthly donation made by a CAF account-holder was £1.5 million, compared to £1,330 in *UK Giving)*.[6]

But even setting these very large donors aside, people in the CAF data give disproportionally much more than donors captured in the random population sample in *UK Giving*. Just over half of the CAF account-holders would be placed in the top decile of *UK Giving* donors, while 71 per cent of the CAF sample would be placed in the top two deciles. Relevant for our analysis of the overall effect of disaster appeals on donations, these top two deciles are important in terms of accounting for a large share of aggregate donations – in the *UK Giving* sample, the top two deciles of donors account for 70 per cent of the total amount donated. What is true about studying the behaviour of the CAF population is that it sheds light on lift/shift behaviour among the

donations. The number receiving donations is not formally reported; authors' own estimates based on a sample of register data suggest that it is around two-thirds. The largest fundraising charities are all represented in the CAF sample. Although tax relief is an important factor for setting up a CAF account, the timing of donations is not strongly linked to the tax-year end, largely because payments into (not donations out from) CAF accounts trigger tax relief.

[6] No million-pound donors are captured in *UK Giving* and few in the CAF data. Million-pound donors gave a total of nearly £2 billion in 2016 (Coutts, 2017), but this amount goes to a relatively small number of charities (around 300). Hence, million-pound donations are not relevant for most charities.

type of donors who give to a wide range of different charities and who account for a high proportion of aggregate giving.[7]

B. DEC appeals

Our analysis focuses on the six appeals launched by DEC during the period June 2009 – July 2014. These are described in Table 1; they include appeals in response to both natural disasters and humanitarian crises. For convenience, we use the term "disaster" to refer to both situations. Smith et al. (2017) provide more information on DEC and other disaster appeals.

The appeals have several features that make them well-suited for addressing the lift/shift question. First, they are large-scale fundraising interventions. A decision by DEC to launch an appeal triggers the Rapid Response Network. This network includes broadcasters who produce appeal packages which go out on national television and radio. The network also includes commercial banks, the Post Office, and telecommunication companies who work together to facilitate the collection of donations in person, online and by phone. The appeals generate a sizeable increase in donations to one charitable purpose (*DEC*) that should be large enough to detect any lift/shift behavior.

Second, the disasters occur overseas, rather than within the UK. In the case of domestic disasters, there may be broader, within-country effects caused by the disaster that impact donations through channels other than the fundraising appeals. These include changes in levels of social cohesion and pro-sociality (De Alessi, 1975; Solnit, 2009; Rao et al., 2011) and religiosity (Bentzen, 2015) as well as effects on economic conditions and government spending (Fidrmuc et al., 2015).

Third, the appeals were launched at different times of the calendar year. This allows us to use an identification strategy that relies on variation in the timing of disaster appeals to identify responses in donations. Specifically, because the appeals

[7] It seems likely that, as well as giving more money, CAF donors give to a larger number of charities than would a typical donor from a random sample of the population. This is both because of their higher total giving but also because the setup of a CAF account support this type of giving. However, we cannot verify this directly because *UK Giving* contains no data on donations to individual charities. We anticipate that the lift effect estimated using the CAF data is, if anything, an under-estimate of total lift because of extensive margin responses from people who would otherwise not make donations. We cannot rule out that CAF donors adjust other, off-account donations (money/ gifts in kind/ time) but we know from survey data that most donations by CAF account-holders are made through CAF accounts (Scharf and Smith, 2009). An offsetting reduction in donations to other charities, or to the same charity at a later point in time, through the CAF accounts would seem the most likely response.

occur at different times of the year, we can use flexible controls for systematic time effects. An identifying assumption is that any remaining unobserved time-varying factors that might cause donations to change around the time of an appeal are averaged out across the six appeals.

Finally, all but one of the appeals occurred with a gap of several months between one and the next. This allows the data to determine empirically the end of the response period following an appeal, during which any shift pattern plays out, rather than our *a priori* imposing the end of the period. DEC appeals are actively promoted for a two-week period, but left open for up to six months. In practice, the data indicate that the response to the appeal ends after about ten to 14 weeks.

C. Estimation

We estimate the following empirical specification:

$$\begin{aligned} \log(s_t) &= a^s + \Sigma^N_{n=-2}\ \beta^s_n\ W_n + \nu^s_t + u^s_t \\ \log(r_t) &= a^r + \Sigma^N_{n=-2}\ \beta^r_n\ W_n + \nu^r_t + u^r_t \end{aligned} \qquad (1)$$

where s_t is the sum of donations made by all donors to *DEC* on day t, and r_t is the donation sum to all *Other* charities. The key variables of interest are the set of weekly indicators $\{W_n;\ n = -2, -1, 0, 1, \ldots N\}$ defined relative to the date of the appeal, where week zero (W_0) is the first seven-day period following the start of the appeal. The $\{\beta^s_n$ and $\beta^r_n;\ n = -2, -1, 0, 1, \ldots N\}$ coefficients on the weekly indicators capture average changes in daily donations during each week beginning two weeks before the start of the appeal, then the week of the appeal and lasting N weeks after that. The pre-appeal indicators are included to test for any pre-existing trends in donations, including any response to the actual disaster that pre-dates the appeal. Hence, the "response periods" are the $N + 3$ weeks surrounding the starts of the six appeals.

The changes captured by the β^s_n and β^r_n are relative to donations outside the response periods—the "baseline" periods. The constant terms and error terms are a^s, a^r and u^s_t, u^r_t, respectively. ν^s_t and ν^r_t are systematic time effects that include a linear trend and control for day of week, day of month, month, public holidays, and the weeks after the two annual nationwide telethons. Regressions in (1) are estimated using OLS on data at the daily level to avoid arbitrary judgements that would be required with

weekly-aggregated data to construct indicators for seven-day periods before/after the dates of each of the disasters (e.g. how to deal with the partial weeks that are left by re-aligning the data from one disaster to the next). Using daily data does not result in overstating the degree of precision of the estimates (evidence is presented at the end of Section 3A).

Figure 2 illustrates the timing of response periods (in grey) and the baseline periods (in white). The figure presents residuals from a regression of log total donations, $d_t = s_t + r_t$, on all the systematic time controls, but excluding the $\{W_n\}$ set of weekly indicators in order to highlight the underlying response to appeals. There is considerable variation in the residuals, even after including systematic time controls, but the appeals are clearly visible and are associated with a distinctive pattern in donations. First, the appeals are associated with large spikes in donations: Of the five biggest spikes over the period, four occur after DEC appeals. Second, the spikes following the appeals are persistent; the non-disaster spike (in December 2010) is quickly reversed. Third, the spikes following the appeals are followed by a period in which donations appear to be below their baseline level. Evidence in the next section shows that this decrease is the result of time-shifting in *Other* donations.

The effect of an appeal is modelled as a deviation from baseline lasting for twenty weeks after the launch of an appeal ($N = 19$ in (1)) after which donations return to the same (baseline) level. Three pieces of evidence support this approach. First, extending the definition of the response period beyond the 20th week shows no evidence of any significant response in donations during the extended period. Evidence of response in the extended period would have been a clear indication that twenty weeks was not enough to adequately capture the dynamics. Second, donations return to the same level during the baseline periods that follow each of the disasters, even though the magnitude of the response to the disasters varies considerably, i.e. donations are the same level 20 weeks after the Haiti appeal as they are 20 weeks after the Syria appeal, even though the amounts raised were more than three times greater. Third, serial correlation in the residuals from the specification with a twenty-week response period is rejected. Evidence of serial correlation would have suggested that a twenty-week response period was not sufficiently long to model the dynamic response. In short, the evidence indicates that a twenty-week response period is long enough to capture any

behavioral responses following the appeals, and that donations during the baseline periods are an appropriate reference point. [8]

3. Empirical Results

A. Main results

Figure 1 plotted the β^s_n and β^r_n coefficients and standard errors on the weekly indicators. In this section, however, we focus discussion on the average responses during equal-length, five-week phases rather than the full set of weekly coefficients. This allows us to focus attention on the key features of the response pattern. The simplification to five-week phases reflects the qualitative response pattern in Figure 1: During the immediate aftermath of the appeal (weeks 0 – 4) there is a strong increase in donations to *DEC* and also an increase in donations to *Other* charities. Then during an "adjustment phase" (weeks 5 – 9) donations to *DEC* are lower than during the immediate aftermath (however remain well above their baseline level), but donations to *Other* charities fall below their baseline level, reversing their increase in weeks 0 – 4. Then in a "settling phase" (weeks 10 – 14) donations to *DEC* and *Other* charities return to baseline levels. Weeks 15 – 19 indicate a return to baseline: The effect of the appeal has played out. In Table 2 columns 1 – 4 the point estimates are averages (within each phase) of the five β^s_n and β^r_n coefficient estimates from (1). Column 5 presents the average response over the entire 20-week period. Standard errors reported in the Tables (and used in Figure 1) are OLS heteroscedasticity-robust standard errors.[9]

The first row of Table 2 summarizes the average responses during the five-week phases in donations to *DEC*. Column 1 indicates that in the aftermath phase, donations to *DEC* are 381 per cent higher ($e^{1.571} - 1 = 3.81$) than they are in the baseline periods. In the adjustment and settling phases, the .429 and .112 estimates indicate that donations to *DEC* gradually converge back to their baseline level over the two phases, but remain significantly higher than their baseline level in each phase. That donations

[8] The Figure 1 response pattern is broadly similar across all six appeals, not driven by a single appeal. Details about this and the other results discussed in this paragraph are in Appendix B.

[9] The week-by-week estimates plotted in Figure 1 are available in Appendix B. The pre-appeal period is absent from Table 2, but the weekly coefficients are relatively small (.092 and .202) and insignificant. An indicator marking the exact date of the disaster is also insignificant. These results confirm earlier findings that it is the appeals, not the disasters themselves, that are important in triggering donations responses: Evangelides and Van den Bergh (2013) find that donations are appeal-driven, and Eisensee and Strömberg (2007) find evidence that media coverage is important for government responses to disasters.

have returned to baseline in weeks 15 – 19 is confirmed by the small (.035) insignificant coefficient. At no time do donations to *DEC* fall below baseline. Although there are large increases in donations to *DEC* in the weeks following the appeal, there is no evidence of subsequent offsetting reductions that would indicate time-shifting in donations. The average of the coefficients over the twenty-week response period is .537, indicating that donations to *DEC* are about 70 per cent ($e^{.537} - 1 = .71$) higher per week during the entire response period compared to baseline. Further analysis (Table B6 in the online appendices) shows that the increase in *Other* is driven by extensive and intensive margin responses: The number of donations and the size of donations both increase.

The second row of Table 2 summarizes responses in donations to all *Other* charities over the same phases. The results show a significant increase—10 per cent relative to baseline—in donations to other charities during the immediate aftermath of the disaster appeal. This increase is subsequently reversed; donations are significantly lower than their baseline level during the adjustment phase. This indicates time-shifting from the adjustment phase to the immediate aftermath in donations to *Other* charities. From the perspective of the entire twenty-week response period, the appeal has no overall effect on *Other* donations (the −.008 coefficient is essentially zero) and the hypothesis that the increase in donations to *DEC* comes entirely at the expense of *Other* donations (which would imply a 4.5 per cent drop to *Other*) can be rejected ($p < .01$).[10]

The evidence in Panel a indicates that the increase in donations to disaster relief in response to the appeal does not come at the expense of donations to disaster relief at a later point in time, nor donations to other charities. Table 2, Panel b confirms that the appeal lifts total donations: The average coefficient over weeks 0 – 19 indicates that total donations are almost 7 per cent higher in the response period compared to baseline.

Tests for the models from Table 2 indicate very weak first-order serial correlation and fail to reject the zero null (*DEC* $\hat{\rho} = .037$, *p*-value = .133; *Other* $\hat{\rho} = -.005$, *p*-value = .851). Newey-West standard errors with maximum lag (1) and (7), reported in Table 2, are very similar to the heteroscedasticity-robust standard errors.

[10] The 10 per cent increase during the immediate aftermath when expressed as a percentage of the baseline £168,167 donated per day to all charities is a 9.4 per cent increase (10 x £157,836/£168,167). The larger 381 percent increase in donations to *DEC* expressed as a percentage of the same baseline is 23.4 percent (381 x £10,331/£168,167). Hence, when expressed in terms of a common denominator, the increase in donations to *Other* charities is two-fifths the magnitude of the increase to *DEC*.

Aggregating the data to the weekly level prior to the estimation of (1) makes negligible changes to these results: Results for the aftermath phase are 1.595 (.083) and −.062 (.024), the standard errors change a little because there are fewer weeks of data (sample size is 265 weeks) than days (sample size is 1,884 days) as a result of aligning the data to the disasters. The respective Newey-West standard errors with maximum lag (1) are (.095) and (.033). Corresponding results for the other phases and at five-week and twenty-week aggregations are available in Appendix B.

B. Further analysis of the effect of DEC appeals on Other charities

This section presents further results about the effect of the DEC appeals on *Other* charities. First, we vary the definition of *Other* charities and investigate whether the time-shifting is similar across causes. Second, we investigate whether the time-shift in donations to *Other* charities is driven by the same donors who respond to the disaster appeal.

To check whether the focus on donations to only DEC and its thirteen member charities masks a shift in donations to disaster relief from other charities that would be seen with a broader definition of all the charities that may be involved in disaster relief, we split the group of *Other* donations into "other international" (i.e. charities classified as international, excluding DEC and its member organisations) and "non-international" (i.e. all other charities).[11] The results for these two categories are presented in Table 3, Panel a. As might be expected, there is an increase in donations to "other international" during the aftermath phase. But there is also an increase in donations to "non-international"; the behavioral pattern presented above for *Other* donations remains when we focus on "non-international" others. As a second check, Row 3 in Panel a selects ten of the largest UK-based charities that are unambiguously not involved in disaster relief, such as Cancer Research UK, and confirms the same pattern among this group.

Table 3, Panel b repeats the analysis for narrower categories within non-international – religious, health, social services, education, environment and other. The

[11] We use the classification provided by the National Council of Voluntary Organisations who assign a category from the International Classification of Non-Profit Organisations (ICNPO) to each registered charity based on their main (self-reported) activity. International is defined as "organizations promoting greater intercultural understanding between peoples of different countries and historical backgrounds and also those providing relief during emergencies and promoting development and welfare abroad". For further information on ICNPO categories see Salamon and Anheier (1996).

results show a common increase in donations during the aftermath phase across all categories, that is greatest (and statistically significant) for health, social services and other. There is also time-shifting across all categories. Donations are below baseline during the adjustment phase and, to a lesser extent, the settling phase, with statistically significant effects for religious giving, health and other. However, considering these disaggregated categories across the entire twenty-week response phase, some differences emerge. Specifically, there is evidence of a shift away from donations to health, which are five percent lower (p = .020) during the response period compared to baseline. This suggests that the degree of shifting in donations across charities may vary, depending on their purpose. We return to this in the next Section.

Table 3, Panel c explores an important aspect of individual heterogeneity in responses by splitting donors into two groups – "disaster donors" (67 per cent of the sample) who donate to *DEC* at least once during any of the response periods, and "non-disaster donors" who never give to any of the appeals.[12] The results indicate that the increase in *Other* donations occurs only among the donors who respond to disaster appeals. It cannot be explained by time-shifting behavior among donors who do not respond to disaster appeals. Similar results obtain if we split the individuals between "international donors" and "non-international donors".

C. Telethons

This section addresses the question of whether the finding of an overall lift in donations is unique to the DEC appeals. We look at responses to the two largest, annual fundraising telethon appeals in the UK. BBC Children in Need raises money to help disadvantaged children and young people in the UK. Comic Relief/Sports Relief raises money to combat poverty and disadvantage in the UK and Africa. Both appeals feature one-night telethons that raise £50 - £100 million, an amount similar to most DEC appeals. Both appeals occur annually, at a regularly scheduled time of the year. Such telethons differ from DEC appeals primarily in that they aim to raise awareness of an on-going need, rather than draw attention to a dramatic increase in that need.

[12] These two groups are almost identical in terms of average donations during baseline (mean donations = £203.60 per month vs. £204.10, respectively; median: £81 vs. £75). Disaster donors make more donations per month (3.2 versus 2.1).

The estimation strategy is the same as above (specification 1) but focuses on a shorter response period of ten weeks (informed by the data). Figure 3 plots the estimated coefficients on the indicators for the weeks before/after the dates of the appeals for donations to "telethons" and donations to "other" charities (detailed results are available upon request). The focus of the fundraising appeal is the one-night telethon, but the effect on donations to the telethon charities persists for some time after this and donations are significantly higher than baseline for four weeks after the appeal. In weeks 6 – 9 donations are below baseline, but are neither individually nor jointly significant. The results indicate that telethon appeals lift total donations. As was the case with the DEC appeals, donations to other charities also increase following the appeal, but in this case, there is no evidence of time-shifting. Instead our findings indicate that the telethons increase donations both to the charities running the appeal and to all other charities. As with the earlier results about the effect of DEC appeals on donations to different charitable purposes, these results indicate that the degree of shifting may vary for different charities.

4. Explaining the response pattern

The evidence in Section 3 is that disaster appeals (1) lift donations to the appeal (*DEC*) charities, (2) lift total donations (*DEC* + *Other* charities), and (3) shift donations to *Other* charities through time. The evidence is also that (4) the increased total amount given to *DEC* and *Other* in the aftermath comes from both the extensive and intensive margins, (5) the response in *Other* donations comes only from donors who respond to the disaster appeal and (6) there is a difference in degree in the response across different categories of *Other* donations.

A plausible behavioral explanation for why donors increase *DEC* donations (finding 1) is that the appeal temporarily heightens the salience of disaster relief among some donors, who may feel a stronger sense than before that they should give to this particular cause. This is akin to the reminder effect identified by Huck and Rasul (2010), Sontag and Zizzo (2015), and Damgaard and Gravert (2018).[13] Finding (3) can be explained by the heightened salience of disaster relief spilling over to increase the

[13] The effect of the *DEC* appeal lasts longer than the reminder effects in these studies, but this is consistent with the fact that *DEC* appeals are large-scale and sustained.

salience of giving to all charity, including *Other* charities—a halo effect. We model this formally via a price-theoretic model of salience with two charities (*DEC* and *Other*), other spending, and two time periods. The more general significance of this lift-shift model is that it establishes a framework for using fundraising appeals to identify the elasticities of substitution between the warm glow derived from donations both to different charities and across time.

We first present the model and then discuss – and formalise – the notion of a halo effect. We also explain how the model can be used to think about transaction costs, another explanation for finding (3); simply that donors making an unplanned donation to *DEC* face a reduced transaction cost of making, at the same time, a donation to *Other* charities that had previously been planned for the future. Since finding 3 is consistent with both a constraint-based transaction cost explanation and a preference-based halo effect explanation, we present additional evidence on the degree of "bunching" (i.e. people making their donations to *Other* charities on the same day as donations to *DEC*) that might allow us plausibly to differentiate between the two explanations.

A lift-shift model

Consider quasilinear utility $U(\tilde{c}, \tilde{g}) = \tilde{c} + \theta\, \tilde{g}^{\eta}$ defined over own consumption (*other spending*) $\tilde{c}$ and the warm glow characteristic $\tilde{g}$. The warm glow characteristic (henceforth "warm glow") is a commodity that enters the consumer's utility function (Cornes & Sandler, 1984). A donation is expenditure on warm glow. The hedonic price of the characteristic is how much the consumer must donate (in pounds) to produce a unit of warm glow. $\tilde{c}$ and $\tilde{g}$ are two-period aggregates: $\tilde{c} = c_1 + c_2$ and $\tilde{g} = (\frac{1}{2}\, g_1^{\delta} + \frac{1}{2}\, g_2^{\delta})^{1/\delta}$, the latter a CES aggregation. $\tilde{g}$ is a commodity group (Deaton and Muellbauer, 1980) composed of warm glow g_1 and g_2 at time periods $t = 1, 2$. Each of these is a (second) CES aggregation of warm glow, ω_{s_t} and ω_{r_t}, corresponding to charities *S* and *R* (*DEC* and *Other*, respectively): $g_t = (\frac{1}{2}\, \omega_{s_t}^{\mu} + \frac{1}{2}\, \omega_{r_t}^{\mu})^{1/\mu}$, $t = 1, 2$. Hence, g_1 and g_2 describe warm glow across the time dimension, and ω_{s_t} and ω_{r_t} describe warm glow across charity space. Below we will show how the preference parameters $\theta > 0$ and $0 < \eta < 1$ determine a donor's allocation of their income between *other spending* and *charity* (total expenditure on charity then produces warm glow $\tilde{g}$), the intertemporal elasticity of substitution $\rho = 1/(1 - \delta)$ determines the split of total expenditure on charity across the two time periods, and the elasticity of

substitution $\sigma = 1/(1-\mu)$ determines the split of the charity budget within each time period between *DEC* and *Other*.

Expenditure on charity—donations of s_t and r_t pounds to charities *S* and *R*—produces warm glow ω_{s_t} and ω_{r_t} according to $\omega_{s_t} = \alpha_{s_t} s_t$ and $\omega_{r_t} = \alpha_{r_t} r_t$,. The parameters α_{s_t} and α_{r_t} can be thought of as salience parameters: They represent the extent to which donations produce warm glow, e.g. because donations make people feel good, fulfil a sense of duty, or act in accordance to a social norm. We model the effect of the DEC fundraising appeal as an increase in the salience parameter α_{s_t}, i.e. an increase in the extent to which donations to *DEC* produce warm glow. Assume $\alpha_{s_t} > 0$ and $\alpha_{r_t} > 0$, i.e. focus on donors giving to both *DEC* and *Other* charities, consistent with empirical finding (5); in practice either may be equal to zero for some donors. The budget constraint $\tilde{c} + s_1 + r_1 + s_2 + r_2 = \tilde{y}$ (aggregate income across both periods) can be rewritten in terms of the warm glow characteristics: $\tilde{c} + (1/\alpha_{s_1})\,\omega_{s_1} + (1/\alpha_{r_1})\,\omega_{r_1} + (1/\alpha_{s_2})\,\omega_{s_2} + (1/\alpha_{r_2})\,\omega_{r_2} = \tilde{y}$. Define the hedonic prices of warm glow as $p_{s_t} \equiv 1/\alpha_{s_t}$ and $p_{r_t} \equiv 1/\alpha_{r_t}$.[14] An equivalent interpretation of heightened salience is that a fundraising appeal reduces the price p_{s_t} in terms of foregone *other spending* necessary to achieve a unit of ω_{s_t} warm glow from donating to *DEC*.

The characteristics approach to warm glow enables price-theoretic results to be applied to the investigation of the effects of fundraising appeals. The preferences we have described are a nested CES aggregation (Keller, 1976) of warm glow characteristics. The effective prices of aggregate warm glow g_1 and g_2 in the respective time periods are:

$$p_{g_t} = (p_{s_t}{}^{1-\sigma} + p_{r_t}{}^{1-\sigma})^{1/(1-\sigma)}, \quad t = 1, 2 \tag{2}$$

(see Diewert, 2014). The effective price of two-period aggregate warm glow $\tilde{g}$ is:

$$p_{\tilde{g}} = (p_{g_1}{}^{1-\rho} + p_{g_2}{}^{1-\rho})^{1/(1-\rho)} \tag{3}$$

[14] We assume unconstrained lending and borrowing at no interest between the time periods. This not only simplifies the interpretation of the results to come, but is reasonable because time differences between our $t = 1$ and $t = 2$—the immediate aftermath of the appeal and the adjustment/settling period—are measured in weeks.

where p_{g_1} and p_{g_2} are from (2). Total expenditure on charity are the donations:

$$\tilde{d}^* = \tilde{g}^* \; p_{\tilde{g}} \tag{4}$$

where optimal $\tilde{g}^* = \kappa \; p_{\tilde{g}}^{1/(\eta-1)}$, $\kappa \equiv (1/\eta\theta)^{1/(\eta-1)}$ is a constant and $\gamma \equiv 1/(\eta - 1)$ is the price elasticity of $\tilde{g}^*$.

Total donations across the two periods $\tilde{d}^*$ are split across time and charity space as follows:

$$s_1^* = \tilde{d}^* \quad \tau \quad \phi_1 \tag{5}$$

$$r_1^* = \tilde{d}^* \quad \tau \quad (1 - \phi_1) \tag{6}$$

$$s_2^* = \tilde{d}^* \quad (1 - \tau) \quad \phi_2 \tag{7}$$

$$r_2^* = \tilde{d}^* \quad (1 - \tau) \quad (1 - \phi_2). \tag{8}$$

where $\tau = p_{g_1}^{\,1-\rho} / (p_{g_1}^{\,1-\rho} + p_{g_2}^{\,1-\rho})$ is the share of two-period total donations $\tilde{d}^*$ spent at $t = 1$, and $\phi_t = p_{s_t}^{\,1-\sigma} / (p_{s_t}^{\,1-\sigma} + p_{r_t}^{\,1-\sigma})$ is the share of time t donations d_t^* spent on charity S. Note that $\tau\,(\alpha_{s_1}, \alpha_{r_1}, \alpha_{s_2}, \alpha_{r_2}, \sigma, \rho)$ is a function of the two salience parameters (both indexed by time) and the two elasticities of substitution (charity-space and intertemporal), and $\phi(\alpha_{s_t}, \alpha_{r_t}, \sigma)$ is a function of the two salience parameters at time t and the elasticity of substitution.

The effects of a fundraising appeal can be analysed by deriving the comparative statics of (5)-(8). A fundraising appeal by <u>one</u> charity S at $t = 1$ induces three effects. First, the appeal directly lowers the price ($\downarrow p_{s_1}$) of obtaining the characteristic ω_{s_1} (relative to the price of obtaining ω_{r_1}). This changes the share ϕ_1 of time period $t = 1$ donations (d_1) going to S: $\partial \log \phi_1 / \partial \log \alpha_{s_1} = -(1 - \phi_1)(1 - \sigma)$. The share going to S will increase iff ω_{s_1} and ω_{r_1} are substitutes. The change in the share ϕ_1 is what drives "shift" in the charity space. We define "shift" to mean a donation pattern in which net donations move in opposite directions: $s_1 \uparrow \; r_1 \downarrow$ or $s_1 \downarrow \; r_1 \uparrow$.

Second, $\downarrow p_{s_1}$ lowers the price p_{g_1} of obtaining warm glow at $t = 1$ relative to obtaining warm glow at $t = 2$. This applies to donations to charity R, not just to charity S. This result follows from the equations for τ, (5), and (6). The equation for τ can be

used to describe how $\downarrow p_{g_1}$ changes the share of two-period total donations $\tilde{d}^*$ that are donated at $t = 1$; this drives shift in the time dimension.

Finally, $\downarrow p_{g_1}$ also lowers the price $p_{\tilde{g}}$ of obtaining aggregate two-period warm glow $\tilde{g}^*$, relative to other spending $\tilde{c}$. Recall $\tilde{g}^* = \kappa\ p_{\tilde{g}}{}^{\gamma}$, and it follows trivially from (4) that $\partial \log \tilde{d}^* / \partial \log p_{\tilde{g}} = (\gamma + 1)$. If $\gamma < -1$, then a $\downarrow p_{\tilde{g}}$ causes an increase in expenditures $\tilde{d}^*$: The donor reallocates their income away from other spending to increase <u>total</u> two-period expenditure on charities in response to the $\downarrow p_{\tilde{g}}$, driving the "lift".

Lift in total two-period donations, along with shift in the time dimension from $t = 2$ to $t = 1$, both caused by a single charity *S* fundraising appeal at $t = 1$, can combine to increase donations to the *Other* charity *R* more than a shift in charity space takes donations away from *R*. To determine the values of the preference parameters γ, ρ, and σ for which this can happen we investigate the comparative statics of (5)-(8) in response to a fundraising appeal by charity *S* that remains salient over two time periods. Specifically, we model a fundraising appeal as a two-tuple $(\partial \log \alpha_{s1}, \partial \log \alpha_{s2}) = (\partial \log \lambda, \xi\ \partial \log \lambda)$, where $\partial \log \lambda$ models the strength of the appeal at $t = 1$ and $0 < \xi < 1$ models the exponential decay rate of the appeal's salience at $t = 2$. In this way, a fundraising appeal is modelled as a single exogenous intervention that plays out over two time periods.

For example, the comparative statics for first period *Other* donations are:

$$\frac{\partial \log r_1^*}{\partial \log \lambda} = -(\gamma + 1)\left[\tau \phi_1 + (1 - \tau)\phi_2 \xi\right] - (1 - \rho)(1 - \tau)(\phi_1 - \phi_2 \xi) + (1 - \sigma)\phi_1. \quad (9)$$

The first term on the right-hand side is the effect of lift in two-period total donations from the *DEC* appeal on first period *Other* donations (positive if $\gamma < -1$), the second term is the effect of the time dimension shift from $t = 2$ to $t = 1$ (positive if $\rho > 1$ and $\phi_1 - \phi_2 \xi$ is positive), and the last term is the charity space shift (within $t = 1$) from *Other* donations to *DEC* (negative if $\sigma > 1$). The right-hand side forms a boundary in the (σ, ρ) parameter space: To one side of the boundary the (σ, ρ) pairs map to $\partial \log r_1^* / \partial \log \lambda > 0$, and on the other side they map to $\partial \log r_1^* / \partial \log \lambda < 0$. In this way (9) maps the (σ, ρ)-preference parameters describing the underlying warm glow characteristics to

qualitative response patterns in donations to *R* at $t = 1$. Similarly, the comparative statics of s_1^*, s_2^* and r_2^* yield boundaries in (σ, ρ) parameter space.

Figure 4 illustrates how the four comparative static boundaries partition the (σ, ρ) parameter space into multiple sets, each set corresponding to a specific qualitative donation response pattern. The shaded area is the set of (σ, ρ) parameters consistent with the donation pattern in response to the DEC appeal observed in Section 3. In this set, all the values of the elasticity of substitution are $\sigma > 1$: The two warm glow characteristics are substitutes. We state this formally:

Proposition. In a two-period model with quasilinear utility and two warm glow characteristics in which the price elasticity of the two-period aggregate of the warm glow characteristics is $\gamma < -1$, the decay rate in the fundraising appeal's salience is $\xi < 1$ and the baseline salience with which donations produce warm glow is time-invariant, the qualitative donation pattern we observed ($s_1 \uparrow r_1 \uparrow$ and $s_2 \uparrow r_2 \downarrow$) implies the two warm glow characteristics are substitutes.[15]

Corollary. The donation response pattern we observed also implies $\rho > 1$: The time period 1 and 2 warm glow aggregate characteristics g_1 and g_2 are intertemporal substitutes.

Proofs of the proposition and corollary are available in Appendix C. Note that although the graph in Figure 4 illustrates the claims of the proposition and corollary for specific parameter values (see the notes to the figure), the proofs are general: They hold for $\gamma < -1$ and $\xi < 1$ (as stated in the proposition) and for baseline $\alpha_s < \alpha_r$ or $\alpha_s > \alpha_r$.

Discussion

The lift-shift model allows us to formalise the behavioral concept of a halo effect in terms of standard preference parameters. Specifically, the DEC appeal causes heightened salience of donating to *DEC*, which then "spills over" and increases the salience of donating to the larger class of goods to which *DEC* warm glow belongs; the warm glow from donating to all charities in general across the two time periods. If the lift in total two-period donations and the intertemporal substitution in warm glow

[15] Time-invariant baseline salience means $\alpha_{s_1} = \alpha_{s_2}$ before the fundraising appeal, and also $\alpha_{r_1} = \alpha_{r_2}$. This assumption enables the four boundaries from the comparative statics to be written in closed form. The assumption implies that absent the fundraising appeal, the shares of donations going to charities *S* and *R* are not changing over time (i.e., $\phi_1 = \phi_2$), and that the share of two-period total donations spent at $t = 1$ and at $t = 2$ are equal ($\tau = ½$). Both implications are reasonable when differences between time periods are measured in weeks, and, in any event, can be effectively secured in empirical work by using a flexible set of time dummies.

toward $t = 1$ are large enough, donations to the *Other* non-fundraising charity *R* can increase at $t = 1$, even if the warm glow characteristics from donating to the two charities are substitutes. Finding (6) that the increase in *Other* varies by category indicates variation in the degree of substitution between *DEC* and different categories of *Other*. This variation is easily allowed for by the lift-shift model.[16]

A halo effect explanation of forward-shifting donations to *Other* (finding 3) does not require that the *DEC* appeal directly heightens the salience of donations to *Other*, i.e. does not require that $\uparrow\alpha_{r_1}$. What is necessary is that the two warm glow characteristics belong to the same commodity group in charity space and time. However, it is possible that a *DEC* appeal could directly heighten *Other* salience, either by providing a direct reminder effect for donating to *Other* and/or by inducing *Other* charities to launch their own simultaneous fundraising appeals. Recalling that in the lift-shift model heightened salience is equivalent to a reduction in the hedonic price, it is clear that what matters is the relative hedonic price.[17] Any donation response pattern that derives from a reduction in p_{s_1} (with no change in $p_{r_1} \equiv 1/\alpha_{r_1}$) can also be derived with a (larger) reduction in p_{s_1} along with a reduction in p_{r_1}.

Accordingly, forward-shifting donations to *Other* can be explained by either channel: an indirect halo effect or a direct (DEC appeal-to-α_{r_1}) salience channel. Forward-shifting of *Other* donations coming only from donors who respond to the disaster appeal (finding 5) is an obvious implication of a halo effect. Finding 5 is more difficult to reconcile with a direct salience channel, operating strongly, because there is a sizeable group who give to *Other* and not to *DEC* (around one-third of CAF donors fit this pattern): sizeable enough so that a strongly operating salience channel directly

[16] Different degrees of substitution also can account for the absence of time-shifting in donations to *Other* charities following the telethons. The response pattern to telethons in Table 4 is $tel_1 \uparrow r_1 \uparrow$ and $tel_2 \downarrow$ $dr_2 = 0$, and the (σ, ρ) pairs in Figure 4 consistent with this lie on the $dr_2 = 0$ line to the north-west of the $ds_2 = 0$ curve, indicating complements. However, the absence of time-shifting may be a less clear indicator of preferences to the extent that telethons can be anticipated and planned for. If so, the warm glows from telethon and *Other* could be substitutes, but the combination of between-charity and intertemporal substitution that would normally reveal this might not be observed if the forward-shifting already has been built into the baseline donations to *Other*. We are grateful to a reviewer who suggested that we think about anticipation. An implication for future research would be to investigate multi-time period experimental designs that compare pre-announced and surprise appeals.

[17] We are grateful to a reviewer who pointed out that this is the case because in the model, (hedonic) relative prices are what matter.

heightening the salience of *Other*, would have been expected to produce detectable forward-shifting from some donors among this group.[18]

The model can also be used to think through a transaction cost explanation of finding (3). Transaction costs can be included in the model as a fixed cost K incurred only when the first donation is made. Transaction costs are also consistent with finding (5) since it follows that only the donors who respond to the DEC appeal make donations to *Other* charities at $t = 1$. The model further predicts that K would be paid for out of other spending, and that donated amounts would not change except for their timing.[19]

Transaction costs are plausibly relevant for many donors. However, two pieces of evidence indicate that they cannot explain all of the time-shifting in *Other*. First, transaction costs imply "bunching" of multiple donations on the same day, but the majority of the increase in *Other* donations are not bunched. Focusing on potential bunchers who give to both *DEC* and *Other* in the five-week immediate aftermath period, 37 per cent of the additional *Other* donors make their *Other* donation on the same day as they make their donation to *DEC*, compared to 63 percent who do not make their *Other* donation together with a *DEC* donation on the same day (for details see Appendix B).[20] Second, part of the increase in the total amount donated to *Other* is explained by a four percent increase in the average amount donated to *Other* charities (see Table B6 in the online appendices). This intensive margin response cannot be explained by transaction costs. With a halo effect, an intensive margin response to *Other* arises because of the lift and the intertemporal substitution to $t = 1$. Our interpretation of the mixed evidence is that an alternative explanation to transaction costs is required to explain the majority of the response. The halo effect is consistent with all findings (1) through (6).

5. Conclusions

Donation responses of over 100,000 people to two types of major fundraising appeals—disaster appeals and telethons—indicate that such appeals lift total donations: Increased

[18] It is possible that these donors were not aware of the DEC appeals but we think this is unlikely since DEC appeals are transmitted across national television and radio for a sustained period. It would also have to be the case that donors were unaware of any fundraising activity by other charities.
[19] These predictions are because utility is quasilinear; the predictions approximately hold for small income effects.
[20] During baseline, there is also limited bunching. Only one-quarter of donors who make exactly two donations in a month make both donations on the same day. The share for donors making three, four and five donations in a month who make all their donations on the same day is 20 per cent.

donations to appeal charities do not come from reduced donations to other, non-appeal charities. Indeed it is the opposite: Donations to other charities increase during the immediate aftermath of the disaster and telethon appeals, although, in the case of disaster appeals, this immediate increase is entirely negated by a subsequent decrease. This lift and time-shift evidence is significant, relative to that provided by previous papers, because it is derived from data rich in both the charity space (80,000 organizations) and time dimensions (over 1,800 days). Indeed, our findings indicate that such rich data are required to identify the lift and shift patterns.

The empirical results are important for social welfare analyses of fundraising. Until now, it has not been possible to discount the possibility that successful fundraising campaigns merely shift donations from other charities (altering the mix of public goods) or from the future (altering the timing). The evidence here is that accounting for shifting in charity space and time has limited effect on the demand side of welfare analyses for these two types of fundraising appeal and for this type of donor. Future work could investigate whether other fundraising appeals/small-scale donors exhibit less lift and more shift.[21] On the supply side, work investigating small-scale donations has produced evidence that some kinds of appeals impart social pressure and thereby reduce donor welfare (e.g., DellaVigna, List, and Malmendier, 2012; Andreoni, Rao, and Trachtman, 2017). Unfortunately, direct welfare effects of disaster appeals on donors are not possible to measure with the CAF data.

A second contribution of the paper is to build a heightened salience explanation of fundraising appeals into a dynamic, two-period lift-shift model with two sources of warm glow: One from the appeal charity and the second from other charities. The model allows us to formalize the construct of a halo effect/behavioral spill-over: Heightened salience of one good leads to heightened salience of the larger class of goods to which the one good belongs. A halo effect explanation is consistent with all the observed empirical facts; this is not the case for a transaction cost explanation, although the evidence does not rule out that transaction costs may be relevant for some donors.

[21] Adena and Huck (2019) investigate small donations in response to an opera house's appeal to fund workshops for disadvantaged children, and find evidence consistent with the donations to the appeal charity being substitutes across time. The model in Section 4 indicates that evidence of donation substitution across time is sufficient to conclude that the underlying warm glow in the two time periods are intertemporal substitutes.

The model predicts the re-allocation of donations across charity space and time as a function of the overall lift, the elasticity of substitution between warm glows and the intertemporal elasticity of substitution of warm glow. The more general significance of this is that it provides an identification framework useful for future lift and shift studies. We show that it is possible to bound the elasticity of substitution and the intertemporal elasticity if qualitative donation movements (i.e., increase or decrease) to two charities are observed in response to a fundraising appeal launched by just one. A counter-intuitive result is that an immediate increase in donations to both the appeal and non-appeal charities is not sufficient to conclude that the two underlying warm glows are complements. The reason is that the simultaneous increase can be driven by overall lift and by forward-shifting in donations to non-appeal charities. The substitutability only becomes clear when we observe what happens in the subsequent time period. A research design with a time dimension is recommended to identify substitution/complementarity between warm glow characteristics in the presence of both overall lift and time-shifting.

Using the model to interpret the forward-shifting of donations to *Other*, non-appeal charities implies that the warm glow from donating to *DEC* and the warm glow from donating to *Other* are substitutes, and that warm glow is intertemporally substitutable. Although there was previous lab evidence consistent with warm glow being intertemporally substitutable (Tonin and Vlassopoulis, 2014), we are not aware of previous evidence of intertemporal substitutability based on naturally-induced donation behaviour.

A feature of the model is that heightened salience caused by fundraising appeals is isomorphic to a price effect. Accordingly, a test of the model would be to use standard price changes to measure the elasticity of substitution, the intertemporal elasticity, and the overall lift, and then investigate whether the qualitative donation responses predicted by those parameter values obtain in response to a fundraising appeal. If the model passes the test, it would enable the use of fundraising appeals to identify substitution/complementarity between the warm glow derived from donating to different charities/over time. Furthermore, if the change in the salience of donations in producing warm glow with respect to fundraising appeals can be quantified, then the degree of substitution/complementarity between the warm glow from different charities, and the degree of intertemporal substitutability, can be point identified.

This possibility would open up a broader research and policy agenda moving beyond a focus on giving to charity in aggregate at a single point in time to investigations of giving to different types of charities and the across-time dynamics of those donations. Policies such as the U.K.'s 2000 *Millennium Gift Aid* (for international relief) and the Netherland's 2012 *Law on Giving* (for arts and culture) indicate an appetite for targeted and/or temporary incentives. Tax price analyses of these incentives can be used to estimate substitution/complementarity between charities and across time, but only after the policy is implemented, and only based on the limited set of targeted incentives that have been introduced. Fundraising appeals potentially generate many more opportunities to identify between-charity and across time substitution/complementarity. The lift-shift model provides a framework for how the results from such studies could inform the design of a much richer set of targeted, and time-varying, policies.

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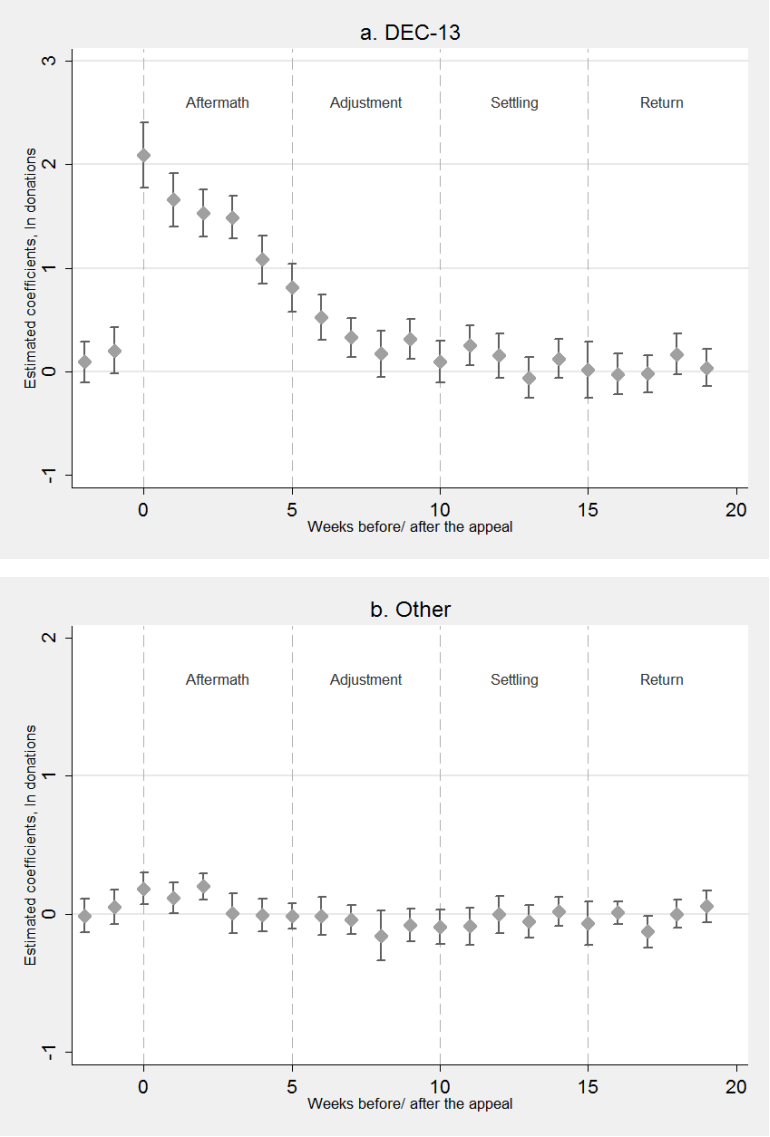
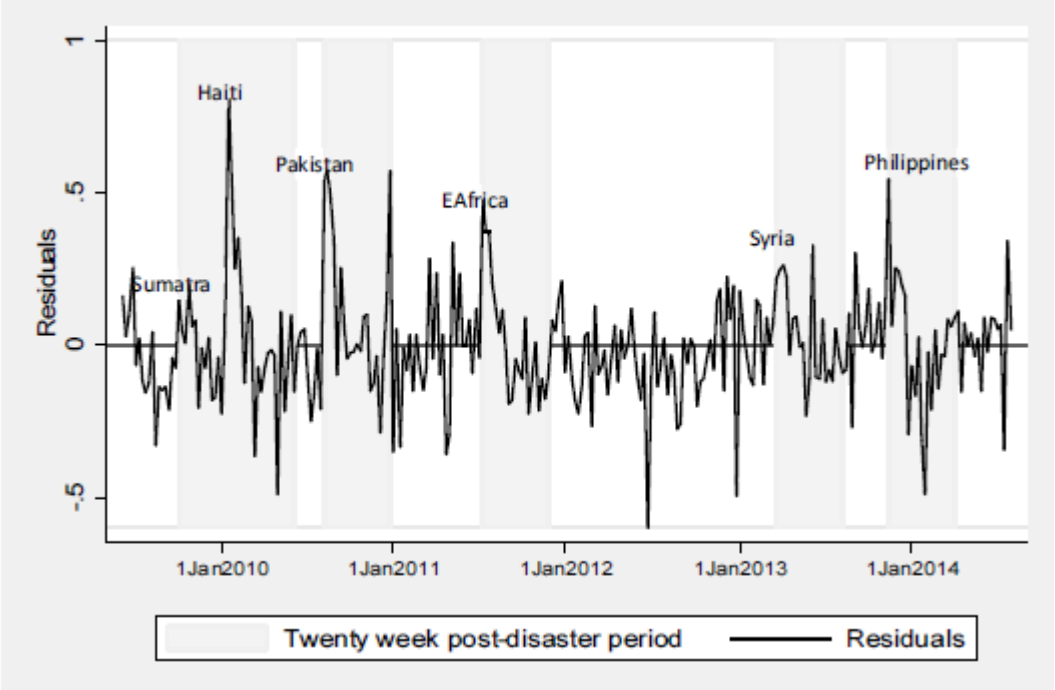
Figure 1: Estimated response to DEC appeals, by week



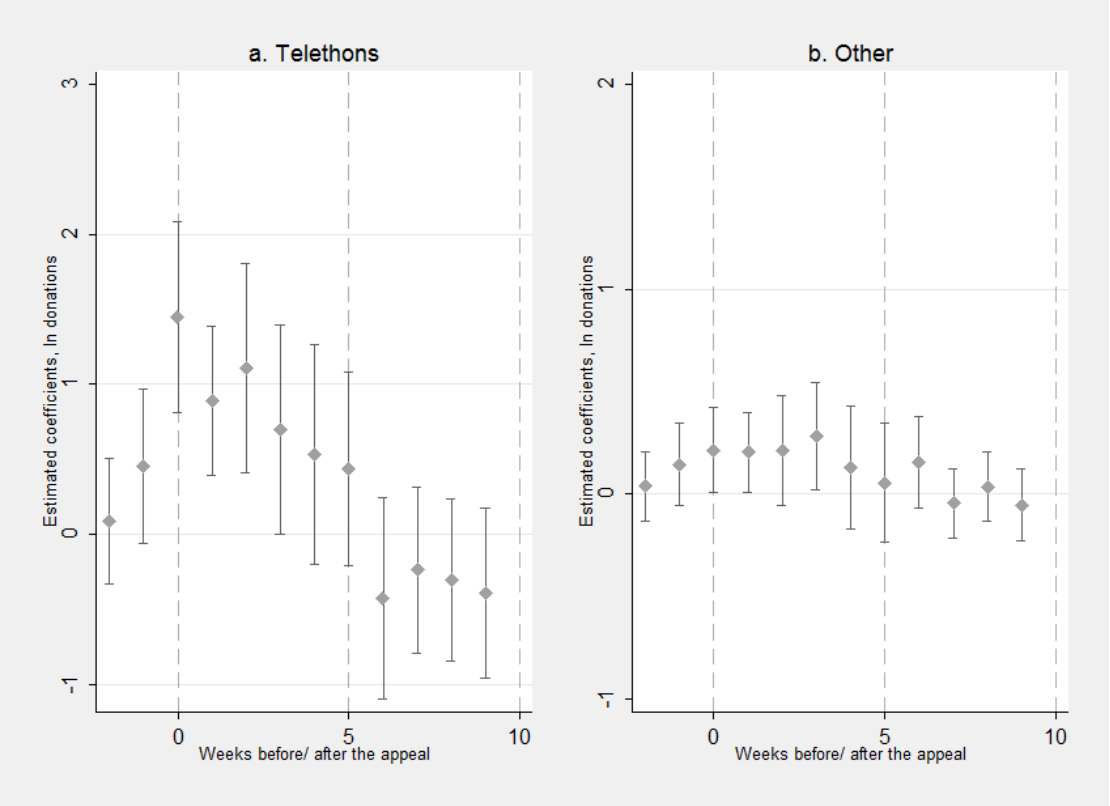
Notes to figure: DEC is donations to the Disasters Emergency Committee (DEC) and its thirteen member charities. Other is donations to all other charities. The figure plots the estimated coefficients and 95 percent confidence intervals from a regression of (ln) donations on indicators for weeks before/after disaster appeals, controlling for systematic time effects. The coefficients capture the average deviation in (ln) donations relative to baseline (non-appeal) periods over the six disaster appeals that occurred 2009-2014. Note that Panel a's vertical scale is larger than Panel b's to capture the much larger percentage increases in donations to DEC.

Figure 2: Residual donations during response and baseline periods



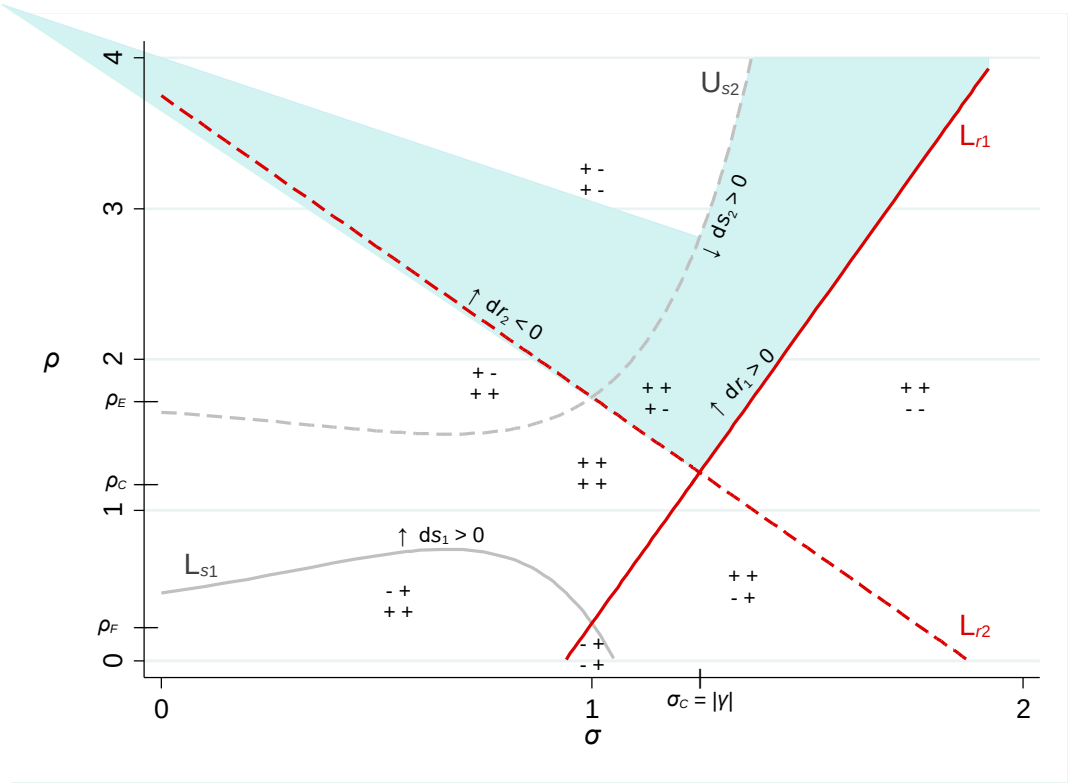
Note to figure: Weekly-averaged residuals from OLS regression including systematic time controls but excluding weekly indicators for the weeks before/after the disaster appeals. The grey bands indicate twenty-week post-appeal periods. The second disaster (Haiti) occurred within 20 weeks of the first disaster (Sumatra) – this explains why the first shaded bar is wider, and why the Haiti spike occurs in the middle of the bar.

Figure 3: Estimated response to telethon appeals, by week



Notes to figure: Telethons are comprised of donations to the ICNPO category of grant-giving charities that includes BBC Children in Need and Comic Relief/Sports Relief. Other is donations to all other charities. The figure plots the estimated coefficients and 95 percent confidence intervals from a regression of (ln) donations on indicators for weeks before/after appeals, controlling for systematic time effects. The six twenty-week post-DEC appeal periods are excluded from the analysis. Note that Panel a's vertical scale is larger than Panel b's to capture the larger percentage increases in donations to telethons.

Figure 4. Warm glow preference parameters mapped to donation response patterns



Note to figure: Figure 4 shows how the four boundaries from the comparative statics of (5)-(8) partition the (σ, ρ) parameter space into multiple sets, each set corresponding to a specific qualitative donation response pattern. The x-axis is the elasticity of substitution σ between the two warm glow characteristics ω_s and ω_r produced by donations to charities S and R. The y-axis is the intertemporal substitution between aggregate warm glow characteristics g_1 and g_2 at time periods $t = 1$ and $t = 2$.

The two curves (for s_1 and s_2) and two straight lines (for r_1 and r_2) are boundaries such that the direction of the donation response is different on either side of the boundary. For example, "↑ d$r_1 > 0$" on the solid red line indicates that for σ, ρ pairs above (↑) the line, the appeal by charity S causes donations to charity R to increase at $t = 1$ (d$r_1 > 0$); for σ, ρ pairs below the line the S appeal would cause r_1 to decrease. The figure is drawn with $\gamma = -1.25$ (price elasticity of two-period aggregate warm glow), $\xi = .5$ (decay rate of the appeal's effectiveness), and $\alpha_s = .05$, $\alpha_r = 1$ (baseline salience parameters; these values produce $\phi \approx .06$, which matches the share of baseline donations going to *DEC* in the CAF data).

Each qualitative donation response pattern is represented by a 2 x 2 matrix of + and – signs that describes the donation response for each charity, in each time period. For example, the donation pattern in response to the DEC appeal observed in Section 3 is represented as:

$$\begin{bmatrix} \Delta s_1 & \Delta s_2 \\ \Delta r_1 & \Delta r_2 \end{bmatrix} = \begin{bmatrix} s_1 \uparrow & s_2 \uparrow \\ r_1 \uparrow & r_2 \downarrow \end{bmatrix} \triangleq \begin{bmatrix} + & + \\ + & - \end{bmatrix}$$

The set of (σ, ρ) pairs consistent with this pattern is indicated by the shaded area in the figure. Note that in this set, all the values of the elasticity of substitution are $\sigma > 1$— the two warm glow characteristics ω_s and ω_r are substitutes—and $\rho > 1$—there is intertemporal substitution between aggregate warm glow characteristics g_1 and g_2.

Table 1: DEC appeals

Date of appeal	Location	Cause	Total donations reported by DEC
10/04/2009	Sumatra	Earthquakes and Typhoons	£9.3 m
01/14/2010	Haiti	Earthquake	£107m
08/03/2010	Pakistan	Floods	£71m
07/06/2011	East Africa	Famine	£79m
03/20/2013	Syria	Civil War	£27m
11/11/2013	Philippines	Typhoon	£95m

Notes to table: All information from Disasters Emergency Committee (http://www.dec.org.uk/).

***Sumatra**: A series of devastating natural disasters (typhoons and quakes) hit Indonesia, the Philippines and Vietnam within a number of days. DEC reported that over five million were affected.*

***Haiti**: An earthquake devastated the capital, Port au Prince, and the surrounding area. DEC reported that 1.5 million people lost their homes, 300,000 were injured and 220,000 died.*

***Pakistan**: Floods swept the country following the worst monsoon rains in the country's history. DEC reported that more than 18 million people were affected.*

***East Africa**: DEC reported that more than 13 million people in Ethiopia, Kenya, Somalia, and the Republic of South Sudan were left in need of food, water and emergency healthcare because of one of the worst droughts in 25 years.*

***Syria:** DEC reported that two years of war left more than nine million people in need of aid. About 1.2 million houses had been damaged. An estimated 6.5 million people were displaced inside Syria, and 2.5 million people had fled to the neighbouring countries of Jordan, Lebanon, Turkey and Iraq.*

***Philippines**: Typhoon Haiyan tore a path of destruction through central Philippines and DEC reported that over 14 million people were affected.*

To put the size of the responses in context, estimated total individual giving in the UK is around £7.0 billion a year, the leading fundraising charity (Cancer Research UK) raises £450 million per year, the two national telethons that we study raise £50-100 million.

Table 2: Main results – estimated responses to DEC appeals

Dependent variable = Ln(donations)

	Aftermath	Adjustment	Settling	Return	Entire response period
	Weeks 0–4	Weeks 5–9	Weeks 10–14	Weeks 15–19	Weeks 0–19
Panel a. Donations to *DEC* and *Other*					
DEC	1.571	.429	.112	.035	.537
(£10,331)	(.060)	(.052)	(.050)	(.051)	(.032)
Newey-West (lag 1)	*(.067)*	*(.053)*	*(.051)*	*(.050)*	*(.033)*
Newey-West (lag 7)	*(.079)*	*(.059)*	*(.055)*	*(.050)*	*(.036)*
Other charities	.100	-.062	-.045	-.026	-.008
(£157,836)	(.028)	(.032)	(.030)	(.028)	(.017)
Newey-West (lag 1)	*(.028)*	*(.030)*	*(.030)*	*(.029)*	*(.017)*
Newey-West (lag 7)	*(.028)*	*(.026)*	*(.027)*	*(.023)*	*(.016)*
Panel b. Total donations (*DEC* + *Other*)					
Total donations	.332	-.016	-.028	-.015	.068
(£168,167)	(.033)	(.032)	(.031)	(.029)	(.018)
Newey-West (lag 1)	*(.035)*	*(.030)*	*(.031)*	*(.030)*	*(.019)*
Newey-West (lag 7)	*(.035)*	*(.026)*	*(.029)*	*(.028)*	*(.018)*

Notes. The table reports the average response (the mean of the estimated weekly coefficients) during different phases of the response period, compared to baseline. All regressions (estimated using OLS) include controls for systematic time effects (indicators for day of week, day of month, month, public holidays and major telethons and a linear trend). N = 1884. Heteroscedasticity-robust standard errors are in parentheses immediately below the coefficients. We also provide Newey-West standard errors, with maximum lag of (1) and (7) for comparison. The £ amounts shown are average daily donations during the baseline periods; these indicate the relative amounts given to different causes.

Table 3: Further analysis of the DEC appeals

Dependent variable = Ln(donations)

	Aftermath	Adjustment	Settling	Return	Entire response period
	Weeks 0–4	Weeks 5–9	Weeks 10–14	Weeks 15–19	Weeks 0–19
Panel a. Sub-categories of *Other* charities					
Other international	.295	-.048	-.045	-.033	.042
(£16,898)	(.039)	(.043)	(.040)	(.037)	(.023)
Non-international	.068	-.067	-.047	-.024	-.018
(£119,033)	(.028)	(.032)	(.031)	(.018)	(.018)
Ten "non-disaster"	.100	-.110	-.046	-.027	-.020
charities (£15,260)	(.048)	(.054)	(.050)	(.048)	(.029)
Panel b. Sub-categories of *Non-international* charities					
Religious	.043	-.026	-.066	-.036	-.021
(£36,154)	(.037)	(.039)	(.038)	(.036)	(.023)
Health	.096	-.161	-.089	-.065	-.055
(£27,587)	(.038)	(.046)	(.042)	(.038)	(.024)
Social Services	.104	-.055	-.050	.005	.001
(£14,660)	(.040)	(.045)	(.046)	(.037)	(.037)
Education	.051	-.059	-.025	-.012	-.011
(£12,931)	(.046)	(.048)	(.051)	(.051)	(.028)
Environment	.038	-.039	.004	.044	.012
(£6,891)	(.059)	(.054)	(.050)	(.049)	(.030)
Other	.071	-.080	-.026	-.012	-.012
(£42,711)	(.037)	(.043)	(.038)	(.041)	(.023)
Panel c. Donations to *Other* charities, by donor type					
Other, Disaster	.154	-.061	-.038	.034	.022
donors only	(.034)	(.035)	(.037)	(.032)	(.020)
Other, Non-dis	.009	-.036	-.037	-.071	-.034
donors only	(.033)	(.039)	(.035)	(.033)	(.020)

Notes. The table reports the average response (the mean of the estimated weekly coefficients) during different phases of the response period, compared to baseline. All regressions (estimated using OLS) include controls for systematic time effects (indicators for day of week, day of month, month, public holidays and major telethons and a linear trend). N = 1884. Heteroscedasticity-robust standard errors are in parentheses. The amounts reported in parentheses are the average daily donations (in pounds) during the baseline periods. Categories of charities based on their purpose follow the International Classification of Non-Profit Organisations (Salamon and Anheier, 1996).
Non-disaster charities comprise the largest charities that we are confident are not involved in disaster relief. Cancer Research UK, Salvation Army, National Society for the Prevention of Cruelty to Children, Macmillan Cancer Relief, Shelter, Age UK, Royal Commonwealth Society for the Blind, Royal National Lifeboats Institution, Marie Curie, British Heart Foundation, Alzheimers, Samaritans, Barnados, World Wildlife Fund.
Disaster donors are those who give to DEC during any of the response periods.