The Dark Side of Transparency: Mission Variety and Industry Equilibrium in Decentralized Public Good Provision

Gani Aldashev* Esteban Jaimovich† Thierry Verdier‡

February 2023

Abstract

We study the implications of transparency policies on decentralized public good provision by the non-profit sector. We present a model where imperfect monitoring of the use of funds interacts with the competitive structure of the non-profit sector under alternative informational regimes. Increasing transparency regarding the use of funds may have ambiguous effects on total public good provision and on donors' welfare. On the one hand, transparency encourages all non-profit firms to engage more actively in curbing fund diversion. On the other hand, it tilts the playing field against non-profits facing higher monitoring costs, pressing them to give up on their missions. This effect on the extensive margin implies that transparency policies lead to a reduction in the diversity of social missions addressed by the non-profit sector. We show that the negative impact of transparency on social missions variety and on donors' welfare is highest for intermediate levels of asymmetry in monitoring costs.

Keywords: non-profit organizations, charitable giving, organizational economics, transparency.

JEL codes: L31, D64, D43, D23.

*ECARES, SBS-EM, Université libre de Bruxelles (ULB). Mailing address: 50 Avenue Roosevelt, CP 114, 1050 Brussels, Belgium. Email: gani.aldashev@ulb.be.

†University of Surrey. Mailing address: School of Economics, Guildford, Surrey, GU2 7XH, UK. Email: e.jaimovich@surrey.ac.uk.

‡Paris School of Economics, Ecole des Ponts-ParisTech, PUC Rio and CEPR. Mailing address: PSE, 48 Boulevard Jourdan, 75014 Paris, France. Email: thierry.verdier@psemail.eu.

1 Introduction

Non-profit organisations have increasingly taken on a leading role as providers of collective goods. The non-profit sector exhibits several specificities that shape its market structure. One is that the funding side and the beneficiary side are connected to each other only indirectly through non-profits. This lack of direct connection severs the flow of information about non-profits' performance back to the funding side, which contrasts sharply with the feedback provided by markets in the private-good sector. Another important feature is the relative complexity of non-profit organizations with various layers of internal hierarchies and specialization in tasks (e.g., setting up the mission, fundraising, and carrying out the projects), combined with a deep problem non-contractibility of final output. This results in a strong need to motivate and monitor the lower layers of those organizations working on the ground to deliver output to beneficiaries. Finally, the non-profit sector represents a rather heterogeneous set of decentralized organizations, which differ vastly in terms of their core missions and their final beneficiaries.[1]

The non-profit sector is thus characterized by a peculiar intermediated nature: donors provide one of the main inputs (funds) but have essentially no control on how their donations are ultimately put to use in the production of social goods. This problem may resemble, in principle, a standard principal-agent situation. There are, however, three crucial differences in the context with non-profits that merit a separate analysis relative to the standard for-profit sector. The first is that donors usually comprise a large number of dispersed small agents who cannot easily exert control on non-profits' actions. The second is that the output typically produced by non-profits exhibits a large social good component, and hence relies strongly on the presence of altruistic motives by different agents. The third is to do with output observability: non-profits' final output is inherently difficult to measure.[2]

These informational failures have called for the need to establish specific schemes that help in preventing rent-seeking and misappropriation by agents who may be attracted to the non-

[1]The Charity Navigator (www.charitynavigator.org) lists over 9,000 non-profit organizations that are active in the US across 38 different subcategories. Examples of these subcategories are 'Wildlife Conservation', 'Environmental Protection and Conservation', 'Medical Research', 'Foodbanks and Food Distribution', 'Humanitarian Relief Supplies', etc.

[2]In a sense, if non-profits' output could be easily and accurately measured, one could think that for-profit firms could "sell" units of social output contributions to altruistic private agents who would pay for it, as opposed to these agents donating part of their income in the form of gifts to non-profit organizations.

profit sector by the prospects of monetary rewards, rather than by a sense of altruism. In the United States, this had led to the creation of several well-known watchdogs; e.g., GuideStar USA, Charity Watch, Charity Navigator, and GiveWell. These organizations provide online information about non-profits based in the U.S., placing special emphasis on the structure of their spending, their cost-effectiveness, and in providing metrics of accountability and transparency. Charity Intelligence Canada provides similar metrics for Canadian non-profits. In the U.K., the Charity Commission maintains an online register that provides the financial information about all registered charities, and it also conducts inquiries and issues public reports when finding cases of misconduct in charities.

Voicing support for enhancing transparency within a sector so prone to moral hazard and highly reliant on trust seems perfectly reasonable. Yet, the general equilibrium implications of such push for transparency in the context of a large and diverse sector like that one formed by non-profits remain largely underexplored. In fact, most of the metrics used by watchdogs that evaluate non-profits performance tend to be overly standardized, and simply ignore two key issues: actual social output and diversity of missions.

Concerns about those shortcomings have been raised time and again by practitioners and academics. Some have called for a more critical approach to transparency and the effects it generates. The twice Pulitzer-winning journalist Nicholas Kristof has argued that online watchdogs have led to a massive increase in non-profits' effort on accountability, deviating effort from actual impact (Chronicle of Philanthropy, 2014). Large philanthropic organizations like the Gates Foundations have been criticized for overemphasizing accountability over social benefits, and imposing a costly administrative burden that can prove overwhelming for smaller recipients based in developing countries, shifting as a result funding towards recipients based in developed countries – The Economist (2021). It has also been claimed that their approach has led to focus charitable giving mostly on social actions that can be more easily measured (such as vaccination campaigns), at the expense of those where measuring output proves harder (e.g., women empowerment).[3]

Anecdotal evidence and several practitioners have thus raised caution about the effects of excessive emphasis on performance metrics on the overall operation of the non-profit sector. We lack, however, a tractable framework to study how informational asymmetries within non-profits interact with the competitive structure of the sector, especially under different

[3]Related concerns have been raised by Meer (2017), arguing that there is a tenuous connection between charity rating agencies' with excessive standardised metrics and actual effectiveness of charities.

informational-transparency regimes. Our paper aims at closing this key gap.

In our model, the contractual imperfections associated to the provision of public goods are at the heart of the story. Non-profits are managed by altruistic agents who exhibit an intrinsic motivation towards a social mission. Non-profits compete for funding from a large pool of impurely altruistic donors who choose a mission to give to. A crucial aspect in the model is that, whereas setting up the social mission and raising funds are tasks typically set at the top of the organizations, the actual on-the-ground action is relegated to lower levels of the hierarchy. The actors at that lower level are often simply seeking monetary rewards, as it is hard to find a mechanism that would select them purely based on their intrinsic altruism. As a consequence of this, the actual use of collected funds is subject to potential diversion by grassroots. Managers can curb such diversion, albeit at a cost, by closer monitoring of grassroots' actions. In the model, the cost of monitoring differs across non-profits. Heterogeneity in monitoring cost generates unequal benefits across non-profits. Importantly, those unequal benefits are magnified as transparency increases. The reason for this is that when donors receive information about the extent of funds diversion across non-profits, this will impact on their willingness to contribute to each of them, which in turn further influences non-profits' incentives to strengthen monitoring.

We show that there is an ambiguous effect of greater transparency regarding the use of funds on the total public good provision and the welfare of donors, and that the overall effect hinges crucially on the degree of heterogeneity of monitoring costs. More specifically, increasing transparency gives rise to two opposite forces on the internal allocation of resources and the resulting diversion of funds. The first is a *competitive effect*: greater transparency encourages all non-profit managers to devote more resources to monitoring and curbing rent-seeking inside their organizations. This is because donors tend to reward "cleaner" non-profits with a greater share of the donations pool. The second is a *strategic-interaction effect*: in the presence of heterogeneities in monitoring costs, greater transparency dampens the incentives to counter rent-seeking in the case of social entrepreneurs facing higher monitoring costs. This effect arises because monitoring acts as a strategic substitute for competition for funds, and hence greater monitoring by one non-profit manager indirectly curbs the incentives of other managers to prevent rent-seeking in their organizations. Transparency generates thus unequal effects across social missions: it rewards missions that can be more effectively monitored, at the expense of those facing higher monitoring costs.

From the donors' perspective, there are also two corresponding opposed effects. On the one hand, transparency implies that donors are better off because they expect lower misuse of funds by the non-profits active in the market. On the other hand, under more transparency, the strategic-interaction effect noted above leads to a lower diversity of non-profits in equilibrium. As a consequence, donors face a narrower set of charitable causes among which they can choose to give. We show that the second (negative) effect dominates the first (positive) when asymmetries in monitoring costs lie at an intermediate level.

1.1 Related literature

The problem of non-contractibility of output in sectors producing public goods has been a crucial theme in the public economics literature. Glaeser and Shleifer (2001) have argued that it is the issue of output non-contractibility that creates scope for non-profit firms to arise, as these organizations provide a way to commit to restricting diversion of funds. Nevertheless, evidence suggests that funds diversion is still a problem that is largely present in non-profits, especially at lower layers of the organization ranks and with local partners outside the rich world.[4] Mechanisms to cope with agency problems in such contexts have been studied by Besley and Ghatak (2005), showing the crucial role of matching mission preferences of principals and agents to improve efficiency. Besley and Malcomson (2018) analyze the effects of competition between non-profits in the presence of non-contractible quality. Output non-contractibility is also at the heart of our model, and we study how it maps into equilibrium provision of public goods under information disclosure.

A growing number of studies have analysed self-selection into the non-profit/public sector under various informational regimes or financing schemes – e.g., Delfgaauw and Dur (2008, 2010), Auriol and Brilon (2014), Scharf (2014), Krasteva and Yildirim (2016), Besley and

[4] A large number of studies document rent extraction and funds diversion, especially by local non-profit partners. For instance, Platteau and Gaspart (2003) argue that the risk of misappropriation of funds by local NGO is a frequent problem, stating that the most common forms of misappropriation include "falsifying of accounts, invoice over-reporting, under-performance by contractors using low-quality materials, etc." Similarly, in their study of the Ugandan NGO sector, Barr et al. (2003) note that "the fluidity of the NGO sector and the focus on non-material services (e.g., 'talk' and 'advocacy') enable unscrupulous individuals to take advantage of the system [...]" and that "[Some] accounts speak of crooks and swindlers attracted to the sector by the prospect of securing grant money." See also Mansuri and Rao (2013) on various cases of rent-extraction by local NGOs and community-based groups, Tvedt (1998) and Bano (2008) on evidence of Southern NGOs acting as "empty shells", or Dang and Owens (2020) on evidence on misreporting by NGOs.

Ghatak (2017), Aldashev et al. (2018), Valasek (2018). This literature has been centered around motivational heterogeneity and how self-selection is affected by alternative institutional characteristics. We abstract from the motivational heterogeneity and self-selection, and instead focus on how asymmetries in agency costs across different types of social missions may generate strategic behavior across non-profits in different informational environments.

Various articles have proposed industry-equilibrium models of the non-profit sector, and used them to study the effect of competition on fundraising expenditures and variety of non-profits from the social welfare perspective – see, e.g., Rose-Ackerman (1982), Castaneda et al. (2008), Aldashev and Verdier (2010), and Heyes and Martin (2017). These papers rely on symmetric models of competition, and thus do not address the distortions in provision of public goods caused by the asymmetry in monitoring costs across missions. Moreover, they do not take into account how the informational environment becomes a key determinant of the equilibrium industry structure and its degree of horizontal differentiation.

Our results also relate to the IO literature on information disclosure, and how transparency on some quality dimension may affect competition and consumer surplus.[5] This line of research has underscored a variety of contexts where information disclosure may actually have unintended perverse welfare effects. For instance, transparency may lead to excessive price or quality competition in monopolistically competitive industries (Dranove and Satterthwaite, 1992). It has also been shown that it may stimulate reporting better quality through welfare reducing restrictions of access of patients, as in the case for hospital report cards (Dranove, et al. 2003). In the public sector, it may result in rationing and reduced efficiency owing to binding capacity constraints of high quality suppliers (Lizzeri and Gavazza, 2007). Furthermore, when goods feature multiple characteristics, firms might underprovide certain characteristics when consumers become more informed about others, and this might decrease welfare (Bar-Isaac, Caruana and Cuñat, 2012). We expand on this literature by analyzing the role of information disclosure in the context of the market for charitable giving driven by social altruism and fundraising competition. Our model highlights a new extensive margin effect related to the market structure of the non profit sector: the negative impact

[5] See, e.g., Matthews and Postlewaite (1985), Dranove and Satterthwaite (1992), Albano and Lizzeri (2001), Dranove et al. (2003), Gavazza and Lizzeri (2007), Bar-Isaac, Caruana and Cuñat (2010, 2012), and also Dranove and Jin (2010) for a survey of this literature. For more recent work using an information design approach and optimal rating, see Hopenhayn and Saeedi (2019), Zapechelnyuk (2020), and Vatter (2022).

of transparency on social missions variety, and how that impacts on donors' welfare.[6]

Lastly, our paper also contributes to the recent literature embedding the incomplete-contracts approach to the theory of the firm into an industrial-organization perspective [see, e.g., Legros and Newman (2013, 2014) and Alfaro et al. (2016)]. This research line has focused so far only on the private-good sector. Our paper extends this approach to the case of the competitive provision of public goods.

The rest of the paper is organized as follows. Section 2 introduces the environment and agents in the model. In section 3, we present a model of strategic interaction between non-profits within a monopolistically competitive industry structure under two different informational regimes: i) uninformed donors, ii) full transparency. Section 4 allows for the entry decision by non-profits and solves for the equilibrium number of firms. Section 5 provides our analysis of the impact of transparency on welfare. Section 6 concludes.

2 Environment and Agents

The non-profit sector comprises N firms, indexed by $i = 1, 2, ..., N$. Each non-profit firm targets a specific social mission (e.g., women's empowerment, child malnutrition, animal rights, etc.). Henceforth, we will think of N as a large number. This will allow us to carry out the analysis assuming that each single firm will disregard the (negligible) impact that their individual choices have on the *aggregate* behavior of the non-profit market.

2.1 Technology and Organizational Structure of Non-Profits

Each non-profit is founded by a social entrepreneur. Social entrepreneurs are in charge of the general management of non-profits, but that they do not directly work on the actual execution of their organizations' missions on the ground. Instead, owing to specialization advantages, each social entrepreneur needs to hire one grassroot worker ("local partner") to

[6] Three other papers related to our work are Schmidt (1997), Carlin et al. (2012), and Hermalin and Weisbach (2012). Schmidt (1997) studies the conditions under which increased product competition lowers managerial slack. Carlin et al. (2012) show that comparative performance considerations tends to make the disclosure of firms' private information less likely via tougher competition environments. Hermalin and Weisbach (2012) analyze how the bargaining between firms' shareholders and managers is affected by greater corporate disclosure requirements. A key difference of our work is the focus on the provision of public goods, where the disconnection between the funding side and the beneficiaries becomes crucial.

help her fulfill the non-profit's mission. Following the seminal article by Besley and Ghatak (2005), we assume that social entrepreneurs are mission-oriented, driven by a sense of pure altruism towards some specific social cause. With regards to the grassroot workers, we instead assume these are self-interested agents who only care about their private payoffs.

Non-profit firms collect donations from private donors who enjoy giving for a social cause. Social entrepreneurs next allocate these funds within their non-profits, given the running costs and the implicit provision costs. We denote by D_i the total amount of donations received by non-profit i. Grassroot workers receive a fixed up-front wage that we normalize to zero. Throughout the model, we assume that there is always a sufficient supply of grassroots willing to work in the non-profit sector.

Grassroots can divert (or misuse) a fraction $t_i \in [0,1]$ of the total funds that the social manager channels to the fulfilment of the non-profit's mission. To counter this, social entrepreneurs can mitigate the diversion of funds by exerting a costly monitoring effort.[7] We denote by $\varepsilon_i \in [0,1]$ the intensity of monitoring by the social entrepreneur of the non-profit i, and assume that it has a simple linear technology:

$$t_i = 1 - \varepsilon_i. \tag{1}$$

Expressed in monetary terms, the effort ε_i over the grassroot worker translates into a constant marginal cost $v_i > 0$. Hence, the total cost of monitoring the grassroot worker equals $v_i \varepsilon_i$, and must be paid before use of funds takes place, out of the total collected donations D_i. For example, this might involve planning a certain number of visits to the locations where the non-profits' projects take place, or setting up reporting requirements on the reports that the grassroot workers have to file in.

Let $\mathcal{N}$ denote the set of non-profits operating in the market. We assume that each non-profit $i \in \mathcal{N}$ draws a cost parameter v_i from the following binary distribution:

Assumption 1 *Each social entrepreneur $i \in \mathcal{N}$ draws a specific monitoring marginal cost $v_i \in \{v_A, v_B\}$, where: i)* $\Pr(v_i = v_A) = \Pr(v_i = v_B) = \frac{1}{2}$*; ii) $v_B = 1$; iii) $v_A = k > 1$.*

Assumption 1 generates two different subsets of nonprofits: i) those with high monitoring marginal cost ($v_A = k$), ii) those with low monitoring marginal cost ($v_B = 1$). Since we assume that N is a large number, the size of each subset will be equal to $N/2$.

[7] In our model monitoring effort is a cost that must be committed before donations are collected. In that sense, it could be thought of as a fixed cost (albeit of variable size) decided before hiring a grassroot and collecting donations, but paid out of the collected donations.

The part of donation D_i that is neither spent on monitoring nor misappropriated by the grassroot worker, is what ultimately remains available to fulfil the non-profit's mission. We denote this amount by $\widetilde{D}_i$, and call it 'net available donations'. Bearing in mind (1), net available donations $\widetilde{D}_i$ can be expressed as a function of ε_i, namely:

$$\widetilde{D}_i(\varepsilon_i) = (D_i - v_i\varepsilon_i)\,\varepsilon_i. \tag{2}$$

We assume that the total output generated by non-profit i, denoted by V_i, is an increasing and concave function of $\widetilde{D}_i$. Henceforth, we let $V_i(\widetilde{D}_i)$ be given by $V_i(\widetilde{D}_i) = \widetilde{D}_i^{\frac{1}{2}}$.[8] Thus, using the expression in (2), we can then write:

$$V_i(\varepsilon_i) = \left(D_i\varepsilon_i - v_i\varepsilon_i^2\right)^{\frac{1}{2}}. \tag{3}$$

Given that the social entrepreneurs are pure altruists, the payoff of the social entrepreneur running non-profit i is given by $V_i(\cdot)$ in (3).

2.2 Donors

There is a continuum of small donors with mass equal to Δ. Each donor has 1 unit of resource to allocate to donations. Δ equals thus the exogenously given size of the donation market.[9] In line with the public and experimental economics (e.g., Tonin and Vlassopoulos, 2010; Orenok et al., 2013) , we model small donors as impurely altruistic agents: they receive a warm-glow utility from the act of giving to a non-profit. Despite their impurely altruistic nature, we assume that donors are not oblivious to the rent-seeking behavior inside the non-profit sector: donors *only* get warm-glow utility from the part of their donation that they *expect* to be non-diverted. Formally, when donor j gives to non-profit i, he derives warm-glow utility only from the fraction $(1 - \tau_{j,i})$ of his donation, where $\tau_{j,i} \in [0, 1]$ denotes the level of diversion t_i expected by j to occur within firm i. Notice that donors may be *imperfectly* informed about the level of rent seeking within the non-profits, which is reflected by the possibility that $\tau_{j,i} \neq t_i$.[10]

[8] None of our main insights depend crucially on the production function exhibiting a square-root specification, and the model could be easily generalised to a encompass $V_i(\widetilde{D}_i) = \widetilde{D}_i^{\alpha}$, with $\alpha \in (0, 1)$. The key reason for fixing $\alpha = \frac{1}{2}$ is that it allows us to obtain closed-form solutions for most of our relevant expressions.

[9] Section B.3 in the online appendix shows how results extend to a framework with endogenous donations.

[10] There is vast support to the notion that donors tend to be quite poorly informed in terms of how donations are ultimately put to use by non-profits – see Goldseker and Moody (2017) and Bagwell et al.

We also assume that donors are heterogeneous in terms of their warm-glow motives. Each donor j receives a "taste shock" $\sigma_{j,i}$, for $i = 1, 2, ...N$, which reflects how intensely j cares about i's mission. Henceforth, we assume that the taste shocks $\sigma_{j,i}$ are all independently drawn from a probability distribution with the following density function:

$$f(\sigma_{j,i}) = \frac{\exp(-\sigma_{j,i}^{-1})}{\sigma_{j,i}^2}, \qquad \text{for } \sigma_{j,i} \geq 0. \tag{4}$$

Notice that (4) is a specific case of the Fréchet distribution.[11]

We assume that preferences of donor j are given by:

$$U(\{d_{j,i}\}_{i\in\{1,..,N\}}) = \sum\nolimits_{i=1}^{N} \sigma_{j,i} (1 - \tau_{j,i}) \, d_{j,i}, \tag{5}$$

where $d_{j,i}$ denotes the amount donated by donor j to non-profit i. The utility function (5) combines two crucial features: (i) donors only care about the parts of the donations that they expect not to be misappropriated by the grassroot workers $(1-\tau_{j,i})$; and (ii) the donors' heterogeneity in the intensity of the warm-glow for different social missions $(\sigma_{j,i})$.[12]

Given the perfect substitutability across social missions implied by (5), in the optimum, each donor will donate all of her unit resource to a single non-profit. That is, $d_{j,i}^* = 1$ for non-profit i and $d_{j,l}^* = 0$ for all $l \neq i$, where $\sigma_{j,i} (1 - \tau_{j,i}) \geq \sigma_{j,l} (1 - \tau_{j,l})$ for all l.

Consider thus a generic non-profit firm $i \in \mathcal{N}$. The probability that j donates to i is:

$$\Pr(j \text{ donates to } i) = \int_0^\infty \left[\prod\nolimits_{l\in\mathcal{N}, l\neq i} F\left(\frac{(1-\tau_{j,i})\,\sigma_{j,i}}{(1-\tau_{j,l})} \right) \right] f(\sigma_{j,i}) \, d\sigma_{j,i}.$$

Using (4), and the fact that $F(\sigma) = \exp(-\sigma^{-1})$, the above expression simplifies to:

$$\Pr(j \text{ donates to } i) = \frac{1 - \tau_{j,i}}{(1-\tau_{j,i}) + \sum_{l\in\mathcal{N}, l\neq i} (1-\tau_{j,l})}. \tag{6}$$

(2013), who provide support for this assumption on the basis of numerous interviews with donors. Relatedly, Metzger and Guenther (2019) show that donors' knowledge about the net impact of their donations is often quite limited. In a sense, this lack of knowledge is exactly what motivates the appearance of watchdogs such as Charity Navigator, GuideStar, GiveWell, whose mission is to inform unaware small donors.

[11] The use of a Fréchet distribution is purely for analytical tractability, as it yields closed-form solutions for any generic value of N. Similar results are obtained in the case when $N = 2$ based on other standard probability distributions, such as uniform, Pareto, or exponential, albeit closed-form solutions cannot be in general obtained with those types of distributions for $N > 2$. In Online Appendix B.2 we allow for varying degrees of preference heterogeneity by working with a generalized Fréchet distribution.

[12] In Online Appendix B.1, we present an extension in which donors care both about funds diversion and the overheads cost ratio, defined as $v_i\varepsilon_i/D_i$. This extension leads to even starker results than our benchmark model in terms of the asymmetric impact of transparency across non-profits, since both funds diversion and the overheads cost ratio tend to be greater for firms facing higher monitoring cost.

3 Optimal Monitoring Effort Analysis

In this section, we study donors' choices and monitoring effort by non-profits under two different informational regimes: i) uninformed donors; ii) fully informed donors. We carry out the analysis in this section for a given N. In the next section, we proceed to endogenise N by allowing entry into the non-profit sector.

3.1 Equilibrium with Uninformed Donors

We first study the case in which donors are unable to observe the level of rent-seeking that takes place within each single organization. We also assume that donors cannot observe whether the cost parameter of non-profit i is $v_i = v_A$ or $v_i = v_B$, and hence they are unable to form an expectation about ε_i based on the specific value of v_i. Within such an informational context, in equilibrium, donors will rely on the average behaviour in the sector when taking their optimal decisions, and their expectations will thus be given by:

$$\tau_{j,i} = \tau_j = \frac{\sum_{s=1}^{N} t_s}{N}, \quad \text{for all firms } i = 1, 2, .., N. \tag{7}$$

When (7) holds, the donation probability (6) boils down to $\Pr(j \text{ donates to } i) = 1/N$, for any generic non-profit $i \in \mathcal{N}$. Consequently, all non-profits receive the same amount of donations: $D_i = \Delta/N$. Social entrepreneur i then chooses ε_i by solving:

$$\max_{\varepsilon_i \in [0,1]} : V_i(\varepsilon_i) = \left[\left(\frac{\Delta}{N} - v_i \varepsilon_i \right) \varepsilon_i \right]^{\frac{1}{2}}, \quad \text{where } v_i \in \{v_A, v_B\}. \tag{8}$$

This problem yields:

$$\varepsilon_i^* = \begin{cases} \dfrac{\Delta}{2 v_i N} & \text{if} \quad \Delta/2N < v_i, \\ 1 & \text{if} \quad \Delta/2N \geq v_i. \end{cases} \tag{9}$$

The expression in (9) shows that monitoring intensity is (weakly) increasing in the level of aggregate donations, Δ. This is the result of social entrepreneurs intending to protect donations from being diverted away from the mission while simultaneously try not sacrifice too much of the donations on costly monitoring. In addition, monitoring intensity is always (weakly) greater for firms with lower v_i. This is because the opportunity cost of a unit of monitoring intensity increases with v_i.

3.2 Equilibrium with Fully Informed Donors

We now study the case in which donors are fully informed about the level of monitoring effort inside in each non-profit present in the market. In this alternate informational context, in equilibrium, donor j will then set rent-seeking expectations for each of the non-profit firm in the market as equal to the actual level of funds diversion. As a result:

$$\tau_{j,i} = t_i, \quad \text{for all firms } i = 1, 2, .., N. \tag{10}$$

Using now (6) together with (10), it follows that D_i is given by:

$$D_i = \frac{\varepsilon_i}{E}, \quad \text{where } E \equiv \varepsilon_i + \sum\nolimits_{l \in \mathcal{N}, l \neq i} \varepsilon_l. \tag{11}$$

Consequently, a social entrepreneur i's optimization problem is now:

$$\max_{\varepsilon_i \in [0,1]} : V_i(\varepsilon_i, E) = \left[\left(\frac{\varepsilon_i}{E} \Delta - v_i \varepsilon_i \right) \varepsilon_i \right]^{\frac{1}{2}}, \quad \text{where } v_i \in \{v_A, v_B\}. \tag{12}$$

Recall that N is assumed to be a large number. Therefore, when solving (12), non-profit manager i takes E as given. This generates the following best-response functions:

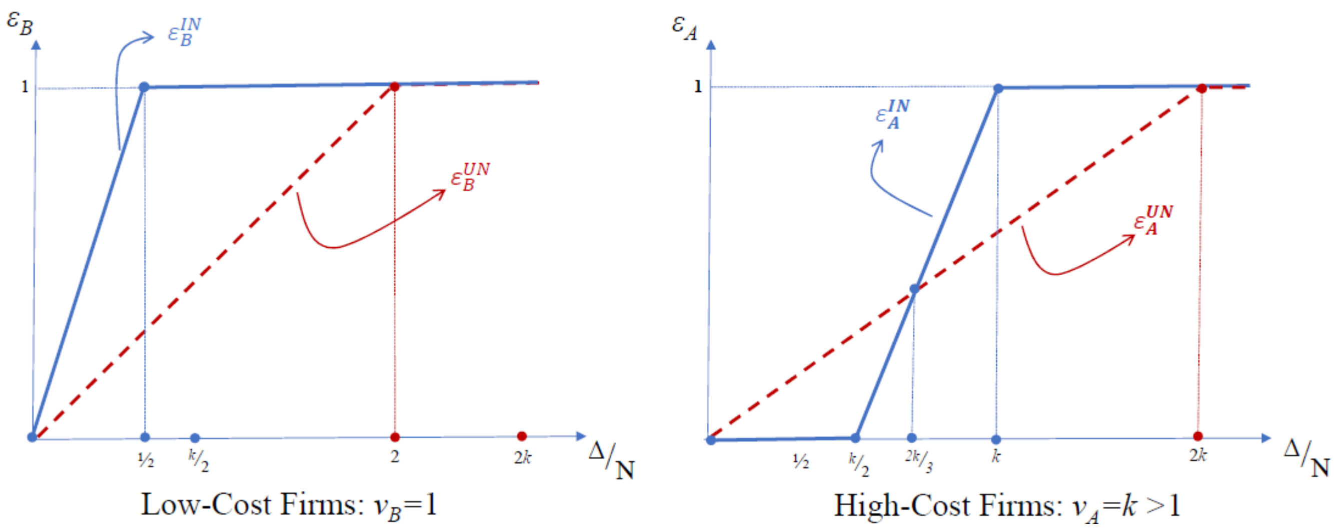
$$\varepsilon_i^{br}(E; \Delta, v_i) = \begin{cases} 0 & \text{if} \quad \Delta/E < v_i, \\ [0,1] & \text{if} \quad \Delta/E = v_i, \\ 1 & \text{if} \quad \Delta/E > v_i. \end{cases} \tag{13}$$

The best-response functions elicited in (13) yield corner solutions for ε_i. The level of monitoring effort in firm i depends on the aggregate level of donations (Δ), the firm's monitoring cost parameter (v_i), and the aggregate level of monitoring intensity in the non-profit market (E). Note that the level of E is itself endogenous, and will be determined by the Nash equilibrium of the best-response functions by all non-profit managers. Henceforth, we restrict the analysis to symmetric equilibria in pure strategies by types of firms.[13]

Figure 1 depicts graphically the equilibrium levels of monitoring effort as functions of the average level of donation per non-profit firm (Δ/N). We plot with solid (blue) lines the equilibrium monitoring efforts that prevail in the regime with fully informed donors. (The formal derivation of the results in Figure 1 for full information can be found in the Online

[13] This restriction will be without loss of generality once we endogenise N in the next section. As it will become clear later on, once we allow for entry into the non-profit market, the model will always deliver equilibria where symmetric equilibria in pure strategies will be played by all types of firms.

Figure 1. Equilibrium monitoring effort as function of average donation per firm



Appendix A.) For the sake of comparison, we use dashed (red) lines for the equilibrium monitoring efforts under the regime with uninformed donors – these are given by the expressions in (9). To avoid cluttering, we split the figure in two panels: the panel on the left displays low-cost firms ($v_B = 1$), while the panel on right displays high-cost firms ($v_A = k$).

An interesting observation that emerges from Figure 1 is that while the non-profits with monitoring cost $v_B = 1$ will always end up exerting higher monitoring effort in the regime with informed donors, this is no longer the case for those with $v_A = k$. In particular, we can observe that ε_A^{IN} lies below ε_A^{UN} for values of Δ/N below $\frac{2}{3}k$. Even more strikingly, when Δ/N is smaller than $\frac{1}{2}k$, monitoring effort by high-cost firms falls to zero, meaning that they cease to operate in equilibrium. The underlying reason for the asymmetric impact of transparency on monitoring effort is to do with the tension between two opposing strategic forces. On the one hand, transparency generates a *positive* competitive effect, which fosters monitoring effort so as to curb funds diversion and thus attract more donors. On the other hand, fiercer competition for informed donors brings about a *negative* interaction effect across non-profits: stronger monitoring intensity by all other non-profits (materialised in a greater E) lowers, for a given non-profit, the marginal return from monitoring intensity in terms of its capacity of attracting donations. Given the difference in monitoring cost across firms, those facing a higher cost turn out to be relatively more sensitive to this negative interaction effect.

The above result carries an important warning message: full transparency may fail to induce stronger efforts to curb rent-seeking by *all* non-profits. In the presence of heterogeneity in monitoring costs, competition for donations may become so tough for the organizations with the higher monitoring cost that they may end up reducing their monitoring intensity (rather than increasing it). This strategic-substitution effect could in fact become so strong that such non-profits may end up abandoning their mission and exiting the market. This cleansing mechanism has arguably a positive aspect: it leads the entire non-profit market being catered to by firms less susceptible to funds misuse. Nevertheless, in a context of diverse social missions, it comes at the expense of leaving out some social problems unserved.

4 Entry into the Non-Profit Market

We now let N be endogenously determined as a result of equilibrium entry decisions by the set of *potential* social entrepreneurs. Social entrepreneurs face an opportunity cost of running a non-profit firm equal to 1. We assume as well that, at the moment of setting up their non-profits, social entrepreneurs do not know the value of the monitoring cost parameter $v_i \in \{v_A, v_B\}$ that applies to their firms. The value of v_i is drawn according to Assumption 1, and each manager learns its value only *after* setting up the non-profit firm.[14]

We will, henceforth, assume that the pool of potential social entrepreneurs is large enough so as to ensure that the entry condition in the non-profit market always binds in equilibrium. Consequently, in equilibrium, the following condition must hold:

$$(V_A + V_B)/2 = 1, \tag{14}$$

where V_i denotes the payoff of social entrepreneur i with monitoring cost $v_i \in \{v_A, v_B\}$. The LHS of (14) yields the expected value for the social entrepreneur of setting up a non-profit, while the RHS is equal to the cost of doing so.[15] To keep the analysis consistent with Section 3, we consider that condition (14) leads always to a large value of N in equilibrium.

4.1 Equilibrium with Uninformed Donors

From (8) and (9), it follows that in a regime with uninformed donors the payoff obtained by social entrepreneur with $v_i \in \{v_A, v_B\}$ will be

[14] Our main results would qualitatively remain valid if social entrepreneurs knew their v_i, and differ in terms of their outside option value. In a sense, what is crucial to our model is that non-profits are founded by social entrepreneurs deeply motivated by some specific cause, regardless of how relatively costly it is to carrying it out, and hence will not choose their firm's mission based on the value of v_i attached to it.

[15] The equilibrium expressions for V_A and V_B in (14) will depend on the prevailing informational regime.

$$V_i^* = \begin{cases} \dfrac{\Delta}{2\sqrt{v_i}N} & \text{if } v_i > \dfrac{\Delta}{2N}, \\ (\Delta/N - v_i)^{\frac{1}{2}} & \text{otherwise} \end{cases} \tag{15}$$

Using (15) while bearing in mind (14), we obtain the following result:

Proposition 1 *When (7) holds true, there exists a unique equilibrium satisfying condition (14), and the equilibrium is characterized by a number of active non-profits by $N^*(k)$, where $\partial N^*/\partial k < 0$ for all $k > 1$.*

In addition, in the equilibrium, all non-profit managers with cost $v_i = v_A$ exert a level of monitoring effort $\varepsilon_A^*(k) < 1$ with $\partial \varepsilon_A^*/\partial k < 0$ for all $k > 1$, whereas all non-profit managers with cost $v_i = v_B$ exert monitoring effort $\varepsilon_B^* = 1$, regardless of the level of k.

Proposition 1 describes how the equilibrium number of non-profit firms varies with k. A higher value of the monitoring cost (k) for high-cost firms lowers the *expected* return of setting up a non-profit, turning thus entry into the non-profit market less attractive. Proposition 1 also shows that firms facing the higher monitoring cost ($v_i = k$) set $\varepsilon_A^* < 1$. On the other hand, non-profits facing the lower monitoring cost ($v_i = 1$) always set monitoring effort $\varepsilon_B^* = 1$. Consequently, the regime with uninformed donors will always exhibit a positive level of funds diversion in equilibrium, which will take place in those non-profits facing the higher level of marginal cost of monitoring.

4.2 Equilibrium with Informed Donors

Figure 1 shows that, whenever Δ/N is greater than $k/2$, some of social entrepreneurs who chose to found a non-profit will end up exerting zero monitoring effort in equilibrium. That means that some non-profits will ex-post remain *inactive* in equilibrium. We will denote henceforth by $\widehat{n} \leq N$ denote the number of non-profits that remain active after learning their monitoring cost parameter $v_i \in \{v_A, v_B\}$ in the regime with informed donors. The next proposition describes how the variety of *active* non-profits depends on the parameter driving the asymmetry of monitoring cost (k).

Proposition 2 *When (10) holds true, there is a unique equilibrium, and its main features in terms of the type of non-profits that remain active in the market depends on the degree of cost asymmetry across firms (k). More precisely:*

1. *When $k > 5$, the $N/2$ social entrepreneurs who draw $v_i = v_B$ set $\widehat{\varepsilon}_B = 1$, while the $N/2$ who draw $v_i = v_A$ set $\widehat{\varepsilon}_A = 0$. The number of non-profits active in equilibrium is:*

$$\widehat{n} = \frac{\Delta}{5}. \tag{16}$$

2. *When $k \leq 5$, all the social entrepreneurs in the non-profit sector set $\widehat{\varepsilon}_i = 1$. The number of non-profits active in equilibrium is:*

$$\widehat{n} = \frac{16}{(k-5)^2 + 16k}\Delta. \tag{17}$$

Proposition 2 portrays two main results. Firstly, it shows that the number of active non-profits $\widehat{n}$ is non-increasing in k, which echoes our previous result regarding $N^*(k)$ in Proposition 1. Secondly, it shows that unless the degree of cost asymmetry across firms is sufficiently narrow, the regime with full transparency will feature some non-profits remaining inactive in equilibrium. In particular, when $k > 5$, only those social entrepreneurs who receive a draw $v_i = v_B$ will end up (actively) running a non-profit and receiving positive donations in equilibrium.[16] This equilibrium switch contrasts quite drastically with the case with uninformed donors, where *all* potential social entrepreneurs will always remain active in equilibrium. The discrepancy between the equilibrium outcomes illustrates again the tension between a competitive effect and a strategic-interaction effect present in our model. The former tends to foster monitoring effort by all non-profits, whereas the latter depresses monitoring effort by non-profits that find it harder to rein in the diversion of funds. When k is sufficiently high the strategic-interaction effect ends up nullifying the competitive effect for high-cost non-profits, thus driving them out of the market.[17]

[16]The threshold for k splitting the two equilibrium cases in Proposition 2 is tied to the value of the sunk cost to enter the non-profit sector. If a social entrepreneur would incur a sunk cost $\phi > 0$, then *case 1* in Proposition 2 would hold for $k < 1 + (2\phi)^2$, whereas *case 2* would prevail when $k \geq 1 + (2\phi)^2$. When the sunk cost is $\phi = 1$, our model leads then to a threshold equal to 5. None of our main results depends on fixing the sunk cost equal to one.

[17]The interplay between these two opposing forces will also have non-monotonic implications regarding the monitoring-cost-to-donation ratio, $v_i\varepsilon_i/D_i$. Under full transparency, the competitive effect will push to an increase of that ratio by encouraging firms to raise ε_i. On the other hand, the strategic-interaction effect will lead, in equilibrium, to (positive) selection of firms in the non-profit sector: those with lower v_i tend to stay in the market. The selection effects dominates when k is sufficiently large.

5 Equilibrium Comparison Between Regimes

We are now ready to contrast a number of welfare properties between the equilibrium outcomes in the two informational regimes. We start by comparing the number of active non-profits. This is important as greater non-profit diversity means that a larger variety of social issues end up being addressed by social entrepreneurs. Secondly, we study the total amount of non-profit output generated in each regime, regardless of the variety of non-profit firms. Finally, we investigate the donors' welfare under each of the two regimes.

5.1 Number of active non-profits

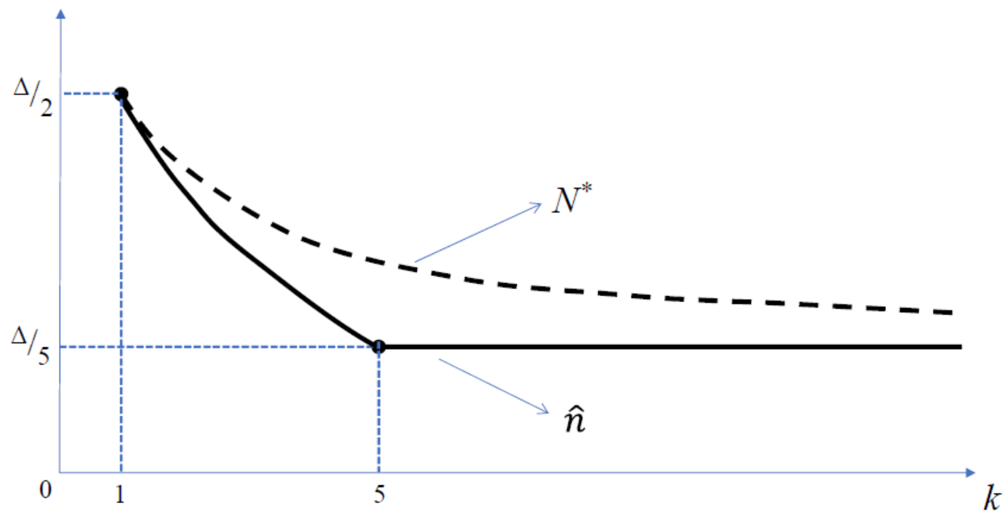
We use the results in Proposition 1 and Proposition 2 to compare the total number of non-profits operating in the market under the two regimes. The result in the next proposition are illustrated in Figure 2 for different levels of k: the solid line and the dashed line indicate, respectively, the number of active non-profits in informed and uninformed regime.

Proposition 3 *The number of active non-profits is always smaller under full transparency than in the regime with uninformed donors; that is,* $\widehat{n} < N^*$.

What are the reasons underlying $\widehat{n} < N^*$? For values of k large enough (ie. larger than 5), this rests primarily on the fact that under full transparency, the social entrepreneurs who receive a high-cost draw ($v_i = k$) choose ex-post to remain inactive. This changes when k lies below 5. In that range, all social entrepreneurs entering the non-profit market remain *active* after learning the value of v_i. There is, however, an upward distortion in the level of monitoring effort exerted by non-profit managers in the regime with informed donors. Full transparency induces a *rat race* among non-profit managers, as they all try to curb funds diversion in their own firms in order to attract a larger share of donors. This rat race leads (in equilibrium) to a fruitless competition for additional donors on the aggregate, ultimately hurting the level of net output generated by each non-profit.[18]

[18] A related rat race in the charitable market is present in Kratseva and Yildirim (2016). Different from our model, their rat race arises within a context with ex-ante symmetric non-profits that play mixed strategies in terms of investment in productivity, and where only one firm ends up catering to the whole market of informed donors. In Kratseva and Yildirim (2016), as the size of informed donors rises, all non-profits always increase investment. In our model, the rat race in the non-profit market distorts the allocation of funds within non-profits between mission execution vs. monitoring. Furthermore, since non-profits are heterogeneous in their technologies, the rat race impacts non-profits unevenly, and not all them will necessarily end up raising their level of monitoring when information improves.

Figure 2. Equilibrium number of active non-profits as function of k



An interesting feature of Figure 2 is the fact that the difference between N^* and $\widehat{n}$ is non-monotonic in k. The gap between N^* and $\widehat{n}$ grows with k when $k < 5$, whereas on the other hand it decreases with k when $k > 5$. Intuitively, as k rises within the interval $k \in (1, 5)$, the rat race distortion mentioned above becomes more severe to those social entrepreneurs with $v_i = k$, discouraging entry into the non-profit market. On the other hand, when $k > 5$, all social entrepreneurs with $v_i = k$ remain inactive in the regime with full transparency. Consequently, in that range, the level of k does not matter anymore for the number of entrants into the market. Conversely, in the regime with uninformed donors, all non-profits remain always active in equilibrium, and therefore the expected payoff of a social entrepreneur entering the market monotonically decreases with k.

5.2 Aggregate output in the non-profit sector

We show now that the value of k is also key for determining which regime yields greater aggregate output, and that the output gap between the two regimes is non-monotonic in k.

Proposition 4 *Let V^{UN} and V^{IN} denote the aggregate level of non-profit output in the equilibrium with uninformed and informed donors, respectively. Then,*

i) $V^{UN} > V^{IN}$ for all $k \in (1, 5)$. Furthermore, $\partial(V^{UN} - V^{IN})/\partial k > 0$ for all $k \in (1, 5)$.

ii) $V^{IN} > V^{UN}$ for all $k \geq 5$. Furthermore, $\partial(V^{IN} - V^{UN})/\partial k > 0$ for all $k \geq 5$.

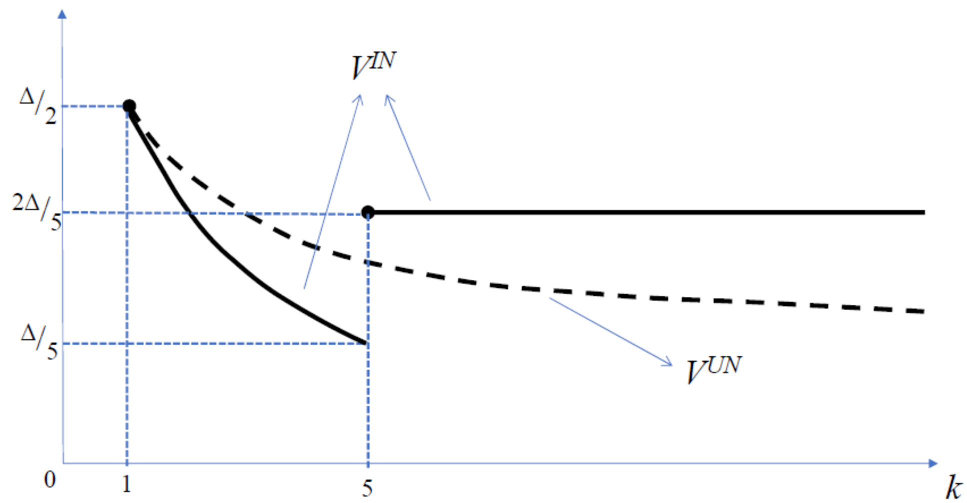
Figure 3 displays the results of Proposition 4. The non-monotonicity of the difference between V^{UN} and V^{IN} may at first seem counter-intuitive. This is, however, the result of an implicit trade-off that arises, in the presence of heterogeneities in monitoring costs, between the rat-race distortion in monitoring spending induced by transparency and the fact that informed donors channel their donations to cleaner non-profits.[19]

For relatively low levels of the monitoring cost, $V^{UN} > V^{IN}$. In those cases, non-profits with $v_i = v_A = k$ will find it worthwhile to keep funds diversion at relatively low levels, even when donors remain uninformed about the level of diversion. As a result, the main effect of transparency will be felt on the rat race for donors, leading to a level of aggregate spending on monitoring that is unnecessarily high. The severity of the rat race distortion worsens when k is greater, which is why the gap between V^{UN} and V^{IN} widens with k while $k < 5$. The situation changes drastically once $k \geq 5$. In those cases, only the social entrepreneurs with $v_i = v_B = 1$ remain active in the non-profit market, and thus the rat race distortion vanishes completely. The sudden switch to an equilibrium where all the donations are managed by non-profits with $v_i = v_B = 1$ leads to the result $V^{IN} > V^{UN}$ when $k = 5$. Furthermore, since rent-seeking in the regime with uninformed donors gets worse with higher k, the gap between V^{IN} and V^{UN} expands as k increases further.

Our analysis suggests that when considering promoting institutions that increase transparency in use of funds, policy-makers should be mindful about the degree of heterogeneity in monitoring efficiency across non-profits. When monitoring cost asymmetries are relatively mild, transparency comes both at low cost of variety loss and aggregate output loss, while it tends to increase monitoring effort. When monitoring cost asymmetries are very large, transparency also comes at a low cost of variety loss, while it substantially increases aggregate non-profit output by cleansing the sector from firms suffering from high levels of funds diversion. It is for *intermediate* levels of monitoring cost asymmetries that the trade-off between enhanced transparency and output/variety loss becomes hardest to resolve. In those situations, variety loss owing to transparency tends to be largest, while aggregate output behavior becomes especially sensitive to whether high-cost non-profits stay and increase monitoring or simply give up on their missions altogether.

[19] Note that when $k = 1$ aggregate output is equal for both informational regimes. This means that our results rest on the interplay between information available to donors and asymmetries in monitoring costs across non-profits.

Figure 3. aggregate non-profit output as a function of k



5.3 Donors' Welfare

We can now compute the welfare of a generic donor under each informational regime. We compute the expected utility *before* the idiosyncratic taste shocks $\{\sigma_{j,i}\}_{i=1,..,N}$ are drawn. This is analogous to computing the aggregate expected utility of the unit continuum of donors. Hence, the analysis that follows could alternatively be interpreted as resulting from a utilitarian view of donors welfare.

If a donor (situated behind the veil of ignorance) could freely choose the informational regime, he would be confronted with a trade-off. On the one hand, the regime with informed donors induces the set of *active* firms to exert stronger monitoring over the grassroot workers. This, in turn, raises donors' utility by reducing the expected misuse of donations $\tau_{j,i}$ in (5). On the other hand, since the regime with informed donors leads to a smaller number of active non-profits, it will offer a narrower variety of social missions to choose from. As a consequence, informed donors will end up giving (in expectation) to non-profits with a smaller realization of the taste parameter $\sigma_{j,i}$, relative to the regime with uninformed donors.

Consider first the regime with informed donors. In equilibrium, social entrepreneurs always choose a corner solution for ε_i (i.e., either no monitoring, $\varepsilon_i = 0$, or monitoring at full intensity, $\varepsilon_i = 1$). Thus, from donor j's viewpoint, the utility he expects to obtain from giving to his selected non-profit is given by:

$$\mathrm{E}_{IN}(U_j) = \int_0^\infty \sigma_{j,IN}^{\max} \, d\widetilde{F}\left(\sigma_{j,IN}^{\max}\right) \, d\sigma_{j,IN}^{\max}, \qquad (18)$$

$$\text{where: } \sigma_{j,IN}^{\max} \equiv \max\{\sigma_{j,1}, \sigma_{j,2}, .., .\sigma_{j,\widehat{n}}\} \quad \text{and} \quad \widetilde{F}\left(\sigma_{j,IN}^{\max}\right) = e^{-\widehat{n}(\sigma_{j,IN}^{\max})^{-1}}.$$

In (18) $\widetilde{F}\left(\sigma_{j,IN}^{\max}\right)$ is the cdf of the extreme value $\sigma_{j,IN}^{\max}$, and its shape follows from the Fréchet distribution (4). In a regime with informed donors, all *active* non-profits (which amount to $\widehat{n}$) will set in equilibrium $\varepsilon^* = 1$. As a result, a generic donor j will choose to give his unit donation to the non-profit carrying the highest taste shock ($\sigma_{j,IN}^{\max}$). Donors also know that no rent-seeking will ever take place in equilibrium in this regime, so their expected utility in (18) attaches no discount on the donation.

Consider now the regime with uninformed donors. Since donors are *symmetrically* uninformed about the exact level of funds diversion taking place within each non-profit, they choose to give to the non-profit that carries the highest taste shock (from a set of N^* active non-profits). Differently from the full-transparency regime, social entrepreneurs with $v_i = v_A = k$ choose interior solutions for ε_A^* (thus, allowing for positive rent-seeking in equilibrium). Then, the *expected* utility that a generic uninformed donor j obtains is:

$$\begin{gathered}\mathrm{E}_{UN}(U_j) = \frac{1}{2}\int_0^\infty \left(\varepsilon_A^*\,\sigma_{j,UN}^{\max} + \varepsilon_B^*\,\sigma_{j,UN}^{\max}\right) d\widetilde{F}\left(\sigma_{j,UN}^{\max}\right), \\ \text{where: } \; \sigma_{j,UN}^{\max} \equiv \max\{\sigma_{j,1}, \sigma_{j,2}, .., .\sigma_{j,N^*}\} \quad \text{and} \quad \widetilde{F}\left(\sigma_{j,UN}^{\max}\right) = e^{-N^*(\sigma_{j,UN}^{\max})^{-1}}.\end{gathered} \tag{19}$$

In the case of (19), $\widetilde{F}\left(\sigma_{j,UN}^{\max}\right)$ is the cdf of the extreme value $\sigma_{j,UN}^{\max}$, while ε_A^* and ε_B^* are defined in Proposition 1. Note that j knows that his donation will go to a non-profit with $v_i = v_A$ (resp. $v_i = v_B$) with probability $\frac{1}{2}$, in which case the warm-glow utility received from the donation is $\varepsilon_A^*\,\sigma_{j,UN}^{\max}$ (resp. $\varepsilon_B^*\,\sigma_{j,UN}^{\max}$).

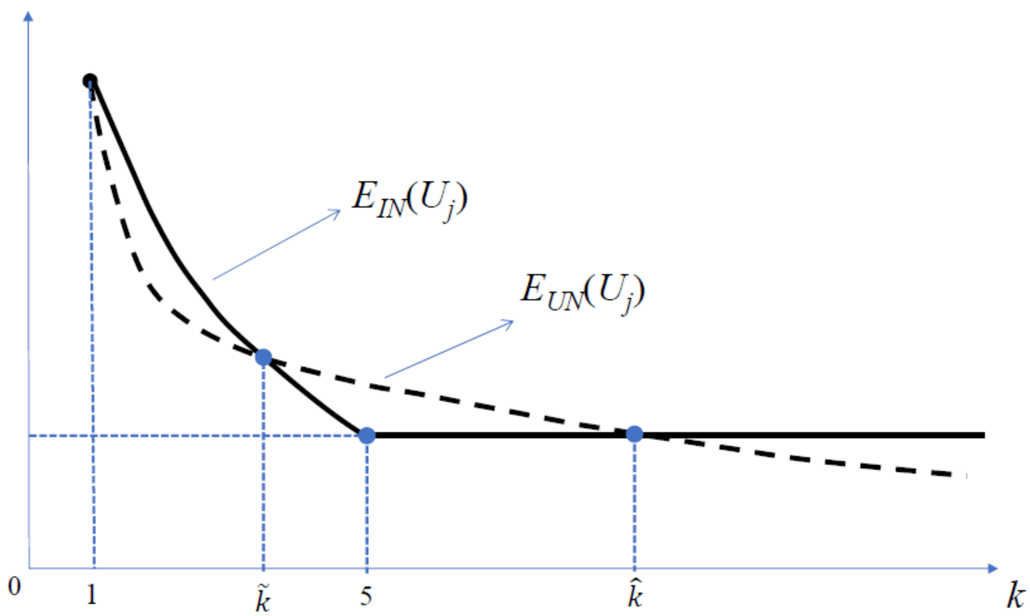
Lemma 1 *The expected utility of a donor j in the two regimes compares as*

$$\mathrm{E}_{IN}(U_j) \gtreqless \mathrm{E}_{UN}(U_j) \quad \Leftrightarrow \quad \frac{\widehat{n}}{N^*} \gtreqless \frac{1+\varepsilon_A^*}{2}, \tag{20}$$

where N^* and ε_A^* are defined in Proposition 1, and $\widehat{n}$ is defined in Proposition 2.

Condition (20) showcases the trade-off faced by a generic donor behind the veil of ignorance. On the one hand, full transparency leads to a smaller variety of *active* non-profits in equilibrium (i.e., $\widehat{n}/N^* < 1$). On the other hand, the average level of monitoring effort by *active* non-profits in a regime with uninformed donors – which is given by $(1+\varepsilon_A^*)/2$ – is lower than one, whereas it is always equal to one under full transparency. Which of the two forces (variety versus efficiency) dominates is crucial in governing the welfare comparison between the two regimes. The following proposition finally ties this condition (20) to the value of the marginal cost of monitoring in the less efficient non-profits (k).

Figure 4. Donors' welfare as a function of k



Proposition 5 *There exist thresholds $\widetilde{k} \in (1, 5)$ and $\widehat{k} > 5$, such that:*

i) Donors' welfare is higher in the regime with full transparency for $k \in (1, \widetilde{k})$ and for $k > \widehat{k}$.

ii) Donors' welfare is higher in the regime with uninformed donors for $k \in (\widetilde{k}, \widehat{k})$.

iii) Donors are indifferent between the two regimes when $k = \widetilde{k}$ and $k = \widehat{k}$.

Proposition 5 shows that donors would prefer to remain uninformed when $\widetilde{k} < k < \widehat{k}$. The intuition for this result is clear if one recalls Figure 2. The loss of non-profit variety in the full-transparency regime is widest when $k = 5$. As a result, for intermediate levels of k (i.e., for values of k around 5) the loss of variety in the regime with informed donors does not compensate for the lower levels of rent-seeking that it features. As the asymmetry of monitoring costs declines, the welfare loss resulting from the loss of non-profit variety shrinks faster than the decline in the ratio of monitoring efforts by *active* non-profits, implying that $\mathrm{E}_{IN}(U_j) > \mathrm{E}_{UN}(U_j)$ when $k < \widetilde{k}$. On the other hand, for values of $k > \widehat{k}$, the equilibrium level of monitoring effort ε_A^* becomes too low in order to compensate for the larger variety of non-profits that donors can choose from in the uninformed regime.

Our results on donors' welfare rest on a general equilibrium consideration. A generic donor may prefer a regime where all donors remain uninformed about funds diversion *not* because ignorance is intrinsically appealing. In fact, any rational donor who is offered the option to observe (or not) the level of funds diversion would always choose observability, if facing this choice *individually*. However, full transparency offers observability to *all* the donors at the same time. In such a situation, a generic donor may turn out to be better off when *no one* can observe the level funds diversion, as this leads to an equilibrium where each donor will be able to pick the recipient of his donation from a more diverse set of non-profits.

5.4 Social Planner: Constrained Optimal Donors' Welfare

The previous subsection has shown that donors are not necessarily better off in a regime where full information becomes available to *all* of them. We study now whether a social planner who is able to observe firms' monitoring efforts may be able to raise donors' welfare above that achieved by the previous two regimes. We consider a setup in which the social planner can impose the levels of monitoring efforts $\{\varepsilon_i\}_{i=1,\ldots N}$ on each non-profit i in the sector. We restrict, however, the planner's intervention capacity in two dimensions. First, although he may impose a specific ε_i for each firm, those firm-specific effort levels remain unobservable to donors (i.e., the social planner has no technology to credibly communicate ε_i to donors). Second, entry decisions will be determined by condition (14), given the effort levels that will optimally be imposed by the social planner. We can interpret this framework as one in which a social planner may influence non-profits' monitoring effort, but cannot run the non-profits by himself, and hence must abide by the equilibrium entry condition.

In the optimum, the social planner will choose the same effort level for each firm facing identical monitoring costs. He may wish, however, to discriminate across firms with different monitoring costs. We denote henceforth by ε_A^{sp} and ε_B^{sp} the level of monitoring effort chosen for each type of non-profit. The social planner will solve:

$$\max_{\varepsilon_A^{sp},\varepsilon_B^{sp}\in[0,1]} : N^{sp}\cdot\left(\varepsilon_A^{sp}+\varepsilon_B^{sp}\right)/2, \tag{21}$$

$$\text{subject to} : \left[V_A^{sp}(\varepsilon_A^{sp},N^{sp})+V_B^{sp}(\varepsilon_B^{sp},N^{sp})\right]/2=1, \tag{22}$$

$$k\varepsilon_A^{sp}\leq\Delta/N^{sp}\quad\text{and}\quad\varepsilon_B^{sp}\leq\Delta/N^{sp} \tag{23}$$

The function to be optimised by the social planner in (21) stems from an underlying problem with analogous structure as that one in the uninformed regime in (19), except for the number of active firms N^{sp} and monitoring effort levels ε_A^{sp} and ε_B^{sp}. This is because donors will still remain ignorant about whether a given non-profit has exerted monitoring effort ε_A^{sp} or ε_B^{sp}. Each donor will then optimally choose to give their gifts to the non-profit with the highest idiosyncratic preference shock, and assign a probability one-half to monitoring effort levels ε_A^{sp} and ε_B^{sp}. The constraint (22) will pin down equilibrium entry decisions by social entrepreneurs, given the levels of effort that the social planner will impose to each type of firm.[20] Finally, the constraints in (23) are feasibility constraints: the social planner cannot impose on a firm a level of monitoring effort whose monetary cost is greater than the donations received by the firm.[21]

Proposition 6 *The social planner problem yields:* $\varepsilon_B^{sp} = 1$ *for any* $k > 1$ *and*

$$\varepsilon_A^{sp} = \begin{cases} 1 & \text{for any } k < \underline{k} \\ \varphi(k) & \text{for any } k \geq \underline{k} \end{cases},$$

where $\underline{k} \in (1, \widetilde{k})$[22], *and* $\varphi(k)$ *satisfies the following properties: i)* $\varphi(\underline{k}) = 1$*; iii)* $\varphi'(k) < 0$*; ii)* $\lim_{k\to\infty} \varphi(k) = 0$*; iii)* $\varepsilon_A^*(k) < \varphi(k) < 1$ *for all* $k > \underline{k}$*, where* $\varepsilon_A^*(k)$ *is the equilibrium level of monitoring effort by high-cost firms in the informed regime as defined in Proposition 1.*

To interpret Proposition 6 note that the social planner is seeking to strike a balance between mission variety and (average) monitoring effort. The planner will do so by leveraging on the monitoring effort of high-cost firms. The trade-off faced by the planner rests on the fact that imposing a level of ε_A above the level consistent with profit maximisation comes at a cost in terms of entry (and variety) in the non-profit market. As the degree of cost asymmetry (k) grows, the cost of raising ε_A above the payoff-maximising level worsens in terms its impact on entry. As a result, the optimal level of ε_A dictated by the social planner will be non-increasing in k (and strictly decreasing in it for $k \geq \underline{k}$).

Contrasting the results in Proposition 6 vis-a-vis those in Proposition 2 it follows that the regime with fully informed donors turns out to deliver the social planner's (constrained) optimal solution when $k \leq \underline{k}$. However, when k lies above $\underline{k}$, the social planner can actually raise donors' welfare above the level that arises under the informed regime. The reason behind the potential inefficiency (from donors' viewpoint) of the regime with full transparency lies in that high-cost firms swing amongst two extreme reactions in the equilibrium with

[20]Note that the equilibrium entry decision equation (22) keeps the assumption that social entrepreneurs do not know the exact monitoring cost function of their missions before choosing to set up their non-profits.

[21]The feasibility constraints in (23) do not need to be explicitly laid out when firms optimally choose their own ε_i, as they will always be satisfied by firms' optimum plans.

[22]Recall that $\widetilde{k} \in (1, 5)$ is the threshold characterized in Proposition 5, such that equilibrium expected donors' welfare are equalized under the two informational regimes (ie. $\mathrm{E}_{IN}(U_j) = \mathrm{E}_{UN}(U_j)$).

transparency. When k is small (ie. below 5), they set monitoring effort at maximum so as to compete for the pool of informed donors. Instead, when k is large (ie. above 5), they completely give up on their missions as the cost to keep up with low-cost firms' efforts proves too high to them. The social planner is able to raise donors' welfare by "smoothing out" those two extreme reactions. In particular, by choosing an interior level of ε_A^{sp} when $k > \underline{k}$, the social planner can avoid the strong negative effects on mission variety caused by the extreme reactions that arise in the equilibrium with informed donors whenever $k > \underline{k}$.[23]

Lastly, section 5.3 has shown that the uninformed regime is preferable by donors to the regime with full transparency for intermediate levels of cost asymmetry. Proposition 6 implies, however, that the social planner's solution will always yield higher welfare to donors than the uninformed regime. The reason is that, in the uninformed regime, high-cost firms will under-provide monitoring effort because they do not internalise the positive impact that reducing diversion of funds has on donors' utility. Instead, relative to the equilibrium with uniformed donors, the social planner will optimally choose sacrifice some degree of mission variety in order to raise the average level of monitoring effort in the sector.

6 Conclusion

We have analyzed the implications of transparency policies in the non-profit sector in a context of imperfect monitoring and funds diversion. Increasing transparency regarding the use of funds has an ambiguous effect on the total public good provision and on donors' welfare. On the one hand, transparency encourages non-profits to devote more resources to curbing rent-seeking inside the organization. On the other hand, it makes it harder for non-profits facing higher cost of monitoring to withstand fiercer competition for donors, which may in turn drive them out of the market and leave some social missions unserved. From the donors' perspective, there are also two corresponding opposing effects: transparency is desirable because of the reduction in diversion for the non-profits active in the market, but it leads to a narrower set of charitable causes among which they can choose.

[23] In a sense, from donors' viewpoint the rat race that arises under transparency generates two externalities with opposite effects. On the positive side, it induces active firms to over-spend in lowering the diversion of funds. On the negative side, such over-spending will hurt firms' payoffs, which in turn reduces entry and mission variety. When the asymmetry of costs across firms lies above $\underline{k}$, the extreme reactions in the regime with full transparency fail strike the optimal balance between those two externalities.

Starting with the observation that the cost of monitoring in each non-profit sub-sector or mission is differentially determined by the technological or natural characteristic of the context in which non-profits have to operate, our analysis suggests several policy implications concerning the regulation and funding of the non-profit sector. A first takeway is that policies encouraging or imposing transparency in the use of funds in the non-profit sector have to be evaluated taking into account their full general equilibrium impacts. These policies will have, to a certain extent, the desired effect of generating more output among some non-profits. However, this positive effect may be significantly mitigated, as the unintended strategic-interaction effect starts to play out, and that the output by non-profits in areas with high cost of monitoring may as well decline. The welfare effect of such a policy may be then lopsided, and the distortion gets strongest when the cost asymmetry is intermediate.

These insights specifically fit into the broader debate about the new architecture of foreign aid that features more reliance on NGOs and community-driven development (e.g., Smillie, 1995, Platteau and Gaspart, 2003; Easterly, 2008; Mansuri and Rao, 2013). In spite of their very good motives, development transparency initiatives may end up hurting the provision of public goods in sectors/areas where exerting monitoring is more costly. This is crucial, for example, when NGOs focusing on empowerment of certain beneficiary groups (minorities, women) have to compete for funds with NGOs engaging in projects with highly visible or easily measured output (child fostering, vaccination). For the same reasons, transparency may end up deviating resources away from missions whose final beneficiaries are located in geographically remote rural areas of under-developed countries, favouring instead recipients based in the more accessible rich world. As a result, evaluations of transparency initiatives that do not consider resulting changes in the donation/NGO market structure are likely to over-estimate the welfare gains of this type of initiatives.

Lastly, our results should not be read as stating that transparency initiatives should be avoided, but rather that these initiatives should be paired with increased public funding towards projects with a higher cost of monitoring. For instance, some public funds can be earmarked for such sectors as empowerment of minorities, long-run reconstruction project (as compared to emergency relief), and development education. These supplementary policies can help to avoid the loss of project diversity that more intense competition under transparency might trigger.

Appendix: Omitted Proofs

Proof of Proposition 1. Suppose that the equilibrium with uninformed donors satisfies $1 \leq \Delta/2N^* < k$. In that case, in equilibrium, we will have that $\varepsilon_A^* < \varepsilon_B^* = 1$. From this, using (14) and (15), it follows that N^* will stem from the following condition:

$$\frac{1}{2}\left[\left(\frac{\Delta}{N}-1\right)^{\frac{1}{2}}+\frac{\Delta}{2\sqrt{k}N}\right]=1. \tag{24}$$

Solving (24), the following expression obtains for the equilibrium level of N:

$$N^*(k)=\frac{k+2k^{\frac{1}{2}}+\left(k^2+4k^{\frac{3}{2}}-k\right)^{\frac{1}{2}}}{10k}\Delta, \tag{25}$$

Next, note that $\Delta/2N^* < k$ holds true for any $k > 1$ when N^* is given by (25). In addition, it can be observed that $N^*(k)$ is strictly decreasing in k. As a consequence, it follows that the condition $\Delta/2N^* \leq 1$ will also always hold true for any $k > 1$. Thus, for any $k > 1$, the equilibrium must always necessarily verify $\varepsilon_A^* < \varepsilon_B^* = 1$ as initially stated, where using the appropriate expression in (9), we can obtain that ε_A^* is given by:

$$\varepsilon_A^*(k)=\frac{5}{k+2k^{\frac{1}{2}}+\left(k^2+4k^{\frac{3}{2}}-k\right)^{\frac{1}{2}}}, \tag{26}$$

from where it finally follows that $\varepsilon_A^*(k) < 1$ and $\partial\varepsilon_A^*/\partial k < 0$ for all $k > 1$. ■

Proof of Proposition 2. Firstly, recall that there cannot be an equilibrium where $\widehat{\varepsilon}_A = 1$ and $\widehat{\varepsilon}_B = 0$. Secondly, notice that the equilibrium entry condition (14) entails that there cannot exist an equilibrium with endogenous entry in which firms with $v_i = v_B = 1$ play mixed strategies between $\varepsilon_B = 0$ and $\varepsilon_B = 1$. Hence, we can focus the rest of the proof in all the other possible combinations that may arise in equilibrium.

To prove the first part of the proposition, notice that when the Nash equilibrium entails $\widehat{\varepsilon}_A = 0$ for all i with $v_i = k$ and $\widehat{\varepsilon}_B = 1$ for all i with $v_i = 1$, the value of $\widehat{n}$ will stem from $\widehat{V}_B(\widehat{\varepsilon}_B = 1) = 2$, with $\widehat{V}_B(\widehat{\varepsilon}_B = 1) = (\Delta/\widehat{n} - 1)^{\frac{1}{2}}$, from which (16) immediately obtains. For this to be a Nash equilibrium it must be the case that $\widehat{V}_A(\varepsilon_A = 1) < 0$ when $\widehat{n}$ is given by (16). Replacing (16) into $\widehat{V}_A(\varepsilon_A = 1) = (\Delta/\widehat{n} - k)^{\frac{1}{2}}$, we can indeed observe that $\widehat{V}_A(\varepsilon_A = 1) < 0$ when $k > 5$.

For the second part, note that when the Nash equilibrium entails $\widehat{\varepsilon}_i = 1$ for all i, the value of $\widehat{n}$ stems from replacing $\widehat{V}_A = (\Delta/\widehat{n} - k)^{\frac{1}{2}}$ and $\widehat{V}_B = (\Delta/\widehat{n} - 1)^{\frac{1}{2}}$ into (14), leading to

$$(\Delta/\widehat{n}-1)^{\frac{1}{2}}+(\Delta/\widehat{n}-k)^{\frac{1}{2}}=2, \tag{27}$$

from where (17) obtains after some algebra. For this to be a Nash equilibrium it must be that $\widehat{V}_A(\varepsilon_A = 1) \geq 0$ when $\widehat{n}$ is given by (17) and $1 < k \leq 5$, which is indeed the case.

Finally, note that there cannot exist an equilibrium with endogenous entry in which firms with $v_i = v_A = 1$ play mixed strategies between $\varepsilon_A = 0$ and $\varepsilon_A = 1$. This is because, according to (24), firms playing $\varepsilon_A = 1$ in such a mixed-strategy equilibrium would be making a positive (ex-post) profit while those playing $\varepsilon_A = 0$ would be making zero (ex-post) profit, contradicting the equality of (ex-post) profit for both actions required to play mixed strategies in equilibrium. ■

Proof of Proposition 3. For $k > 5$, the proof follows from noting from (25) that $\lim_{k\to\infty} N^* = \frac{\Delta}{5}$, together with $\partial N^*/\partial k < 0$. For $k \in (1, 5]$, the proof follows from noting that, in that range, using (25) and (17), we have that:

$$\frac{N^*}{\widehat{n}} = \Psi(k) \equiv \frac{\left[k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}\right]\left[(k-5)^2 + 16k\right]}{160k}, \tag{28}$$

where from (28) we can observe that $\Psi(k = 1) = 1$ and $\Psi'(k) > 0$ whenever $k > 1$. ■

Proof of Proposition 4. Note first that the equilibrium entry condition (14) implies that $V^{UN} = N^*$ and $V^{IN} = \widehat{N}$. From this, the fact that $V^{UN} - V^{IN} > 0$ for all $k \in (1, 5)$, together with $\partial(V^{UN} - V^{IN})/\partial k > 0$ in that interval and $\lim_{k\to 1}(V^{UN} - V^{IN}) = 0$, follow directly from (25) and (17). To prove the second part of the proposition, note from (25) that $N^*(k = 5) < 2\Delta/5$, and recall that $\widehat{N} = 2\Delta/5$ for all $k > 5$. Given that $\partial N^*/\partial k < 0$, it then follows that $N^* < \widehat{N}$ for all $k > 5$, implying in turn that $V^{UN} < V^{IN}$ for all $k > 5$. Lastly, the fact that $\partial(V^{IN} - V^{UN})/\partial k > 0$ for all $k > 5$ follows directly from $\partial N^*/\partial k < 0$ and the fact that $\widehat{N} = 2\Delta/5$ for all $k > 5$. ■

Proof of Lemma 1. Using the properties of the Fréchet distribution, we can obtain:

$$\frac{E_{IN}(U_j)}{E_{UN}(U_j)} = \frac{\widehat{n}}{N^*\left(\frac{1}{2}\varepsilon_A^* + \frac{1}{2}\varepsilon_B^*\right)},$$

where $\widehat{n}$ is given by (16) and (17), N^* by (25), ε_A^* by (26), and $\varepsilon_B^* = 1$, leading to (20). ■

Proof of Proposition 5. Let first $k > 5$. Plugging (25), (26), and (16), into (20), it follows that $E_{IN}(U_j) > E_{UN}(U_j)$ if and only if the following condition holds:

$$\Upsilon(k) \equiv \frac{5}{4k} + \frac{k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}}{4k} < 1. \tag{29}$$

Notice now from $\Upsilon(k)$ in (29) that: *i)* $\Upsilon'(k) < 0$ for all $k \geq 5$; *ii)* $\Upsilon(5) > 1$, *iii)* $\lim_{k\to\infty} \Upsilon(k) = \frac{1}{2}$. Thus, by continuity, there must exist some finite threshold $\widehat{k} > 5$, such that: $\Upsilon(\widehat{k}) = 1$, $\Upsilon(k) > 1$ for all $5 < k < \widehat{k}$, and $\Upsilon(k) < 1$ for all $k > \widehat{k}$.

Let now $1 < k < 5$. Plugging (25), (26), and (17), into (20), it follows that $E_{IN}(U_j) > E_{UN}(U_j)$ if and only if the following condition holds true:

$$\widetilde{\Upsilon}(k) \equiv \frac{\Upsilon(k)}{5}\left[\left(\frac{k-5}{4}\right)^2 + k\right] < 1, \tag{30}$$

where $\Upsilon(k)$ is defined in (29). Note now that $\widetilde{\Upsilon}(k)$ in (30) satisfies the following conditions: *i)* $\widetilde{\Upsilon}(5) > 1$; *ii)* $\widetilde{\Upsilon}(1) = 1$; *iii)* $\exists\, k_{\min} \in (1,5)$ such that $\widetilde{\Upsilon}(k)$ reaches a global minimum within the interval $[1,5]$. Thus, by continuity, there must exist some threshold $\widetilde{k} \in (k_{\min}, 5)$ such that: $\widetilde{\Upsilon}(\widetilde{k}) = 11$, $\widetilde{\Upsilon}(k) > 1$ for all $\widetilde{k} < k < 5$, and $\widetilde{\Upsilon}(k) < 1$ for all $1 < k < \widetilde{k}$. ■

Proof of Proposition 6. Consider first the solution of (21), subject to (22) and (23), when $k = 1$. In that specific case, condition (22) yields $N^{sp} = \Delta\varepsilon^{sp}/[(\varepsilon^{sp})^2 + 1]$, which is non-decreasing in ε^{sp} whenever $\varepsilon^{sp} \in [0,1]$. This, in turn, implies that the product $N^{sp} \cdot \varepsilon^{sp}$ will be maximised when $\varepsilon^{sp} = 1$, and hence the solution of social planner's problem when $k = 1$ will be $\varepsilon_A^{sp} = \varepsilon_B^{sp} = 1$. Next, it should be straightforward to note that, when $k > 1$, it will never be optimal to set $\varepsilon_A^{sp} > \varepsilon_B^{sp}$. Note, also that this in turn implies that $\varepsilon_B^{sp} < 1$ cannot hold true with $k > 1$. To prove this suppose that $v_B = v_A = k > 1$. In that case, we would have that $N^{sp} = \Delta\varepsilon^{sp}/\left[(\varepsilon^{sp})^2 k + 1\right]$, implying that the product $N^{sp} \cdot \varepsilon^{sp}$ will be maximised when $\varepsilon^{sp} = 1$. But, then, $\varepsilon_B^{sp} < 1$ cannot be optimal if $v_B < k$.

Setting thus $\varepsilon_B^{sp} = 1$, we can observe that (22) yields in this case for $\varepsilon_A \in [0,1]$

$$N^{sp}(k, \varepsilon_A) = \frac{5 + 3\varepsilon_A - k\varepsilon_A^2 + k\varepsilon_A^3 + 4\left(5\varepsilon_A - \varepsilon_A^2(1+k) + k\varepsilon_A^3\right)^{\frac{1}{2}}}{k^2\varepsilon_A^4 + 6k\varepsilon_A^2 + 25}, \tag{31}$$

provided $\varepsilon_A \leq 5/k$, so as to satisfy the relevant (23) when (31) holds. The social planner will then aim at solving:

$$\max_{\varepsilon_A \in [0,1]} \; : \; N^{sp}(k, \varepsilon_A) \cdot (1 + \varepsilon_A)/2 \tag{32}$$

$$s.t \; : \; k\varepsilon_A^{sp} \leq \frac{\Delta}{N^{sp}(k, \varepsilon_A)}, \quad \text{with } N^{sp}(k, \varepsilon_A) \text{ given by (31).}$$

Given that $V_A(\varepsilon_A) = [(\Delta/N)\,\varepsilon_A - k\varepsilon_A^2]^{\frac{1}{2}}$ and $V_B(\varepsilon_B = 1) = [(\Delta/N) - 1]^{\frac{1}{2}}$, it can be shown that $N^{sp}(k, \varepsilon_A)$ will reach a maximum at some $\varepsilon_A = \widetilde{\varepsilon}_A(k)$, where $0 < \widetilde{\varepsilon}_A(k) <$

$5/k$.[24] In addition, we can observe that $\widetilde{\varepsilon}'_A(k) < 0$, since $\partial\left(\partial V_A/\partial\varepsilon_A\right)/\partial k < 0$ whenever $\partial V_A/\partial\varepsilon_A \geq 0$. As a result, it follows that the solution of (32) must have unique maximum in $\varepsilon_A^{sp} = \min\{\varphi(k), 1\}$, where $\varphi(k)$ is a continuous function of k and it verifies $\varphi(k) > \widetilde{\varepsilon}_A(k)$.

As a next step, note that necessary and sufficient condition for $\varepsilon_A^{sp} = 1$ would be that

$$2\left.\frac{\partial N^{sp}(k,\varepsilon_A)}{\partial\varepsilon_A}\right|_{\varepsilon_A=1} + N^{sp}(k,\varepsilon_A = 1) \geq 0, \tag{33}$$

where the LHS of (33) stems from differentiating (32) w.r.t. ε_A, and compute it at $\varepsilon_A = 1$. To verify for which k (33) holds true, it proves easier to differentiate $\ln N^{sp}(k,\varepsilon_A) + \ln(1+\varepsilon_A)$ and evaluate it at $\varepsilon_A = 1$, which yields:

$$\Xi(k) \equiv \frac{1}{8}k + \frac{7}{8} - \frac{4k^2+12k}{k^2+6k+25} \geq 0. \tag{34}$$

It can be verified that $\Xi(1) > 0$, $\Xi'(1) < 0$, and that there exists $\underline{k} > 1$ such that $\Xi(\underline{k}) = 0$ and $\Xi'(\underline{k}) < 0$. As a result, (34) will hold true for all $k < \underline{k}$. Also, it must be that $\underline{k} \leq \widetilde{k}$, as it otherwise would contradict $E_{UN}(U_j) > E_{IN}(U_j)$ for $k \in \left[\widetilde{k}, \widehat{k}\right]$, and the social planner is replicating the informed-donors regime whenever $k < \underline{k}$. Next, by continuity, it follows that the solution of (21) must be such that $\varepsilon_A^{sp} \to 1$ when k approached $\underline{k}$ from the right. In addition, since $\Xi'(\underline{k}) < 0$, it must thus be the case that $\partial\varepsilon_A^{sp}/\partial k$ for $k = \underline{k} - \epsilon$, with $\epsilon > 0$ and sufficiently small. It can also be show that, whenever $\varepsilon^{sp} < 1$, we have $\varepsilon^{sp} = \varphi(k)$ with $\varphi'(k) < 0$ – see formal proof of this in Lemma A.2 in Online Appendix A.

To complete the rest of the proof, note now that $\varphi(k) > \varepsilon_A^*$, where ε_A^* is given by (26) follows from the fact that $\varepsilon_A = \varepsilon_A^*$ maximises V_A given N, hence at $\varepsilon_A = \varepsilon_A^*$ it must be that $\partial V_A/\partial\varepsilon_A = 0$. On the other hand, the solution of (32) when the solution is interior yields a value of ε_A for which $\partial V_A/\partial\varepsilon_A < 0$, since $\partial V_A/\partial\varepsilon_A \geq 0$ would contradict the FOC in the case of an interior solution. Lastly, $\lim_{k\to\infty}\varphi(k) = 0$ follows straightforwardly from the fact that as $k \to \infty$ the function $V_A(\varepsilon_A) = \left[(\Delta/N)\,\varepsilon_A - k\varepsilon_A^2\right]^{\frac{1}{2}}$ will collapse to $V_A = 0$ with $\varepsilon_A \to 0$. ■

[24] To see this, note that since $N^{sp}(k,\varepsilon_A)$ stems from (22), its derivative w.r.t. to ε_A will be given by:

$$\frac{\partial N^{sp}(k,\varepsilon_A)}{\partial\varepsilon_A} = -\frac{(\partial V_A/\partial\varepsilon_A)}{(\partial V_A/\partial N) + (\partial V_B/\partial N)},$$

from where it follows that $sg\{\partial N^{sp}(k,\varepsilon_A)/\partial\varepsilon_A\} = sg\{\partial V_A/\partial\varepsilon_A\}$. Notice also: *i)* $\partial V_A/\partial\varepsilon_A > 0$ for $\varepsilon_A \to 0$, *ii)* $V''_{\varepsilon_A,\varepsilon_A} < 0$, *iii)* $V_A = 0$ for $\varepsilon_A = 0$ and for $\varepsilon_A = \Delta/Nk$. Furthermore, when $V_A = 0$, equation (22) entails $N^{sp} = \Delta/5$, which in turn implies that $V_A = 0$ when $\varepsilon_A = 5/k$. All this together means V_A must reach a maximum at some $\varepsilon_A = \widetilde{\varepsilon}_A \in \left(0, \frac{5}{k}\right)$. Lastly, noting that $\partial N^{sp}(k,\varepsilon_A)/\partial\varepsilon_A|_{\varepsilon_A=\widetilde{\varepsilon}_A} = -V''_{\varepsilon_A,\varepsilon_A}\left[(\partial V_A/\partial N) + (\partial V_B/\partial N)\right] < 0$, means that $N^{sp}(k,\varepsilon_A)$ must also reach a maximum at $\varepsilon_A = \widetilde{\varepsilon}_A$.

References

[1] Albano, G. L. & Lizzeri, A. (2001). Strategic certification and provision of quality. *International Economic Review*, 42, 267–283

[2] Aldashev, G. & Verdier, T. (2010). Goodwill bazaar: NGO competition and giving to development. *Journal of Development Economics*, 91, 48-63.

[3] Aldashev, G., Jaimovich, E., & Verdier, T. (2018). Small is beautiful: Motivational allocation in the nonprofit sector. *Journal of the European Economic Association*, 16, 730-780.

[4] Alfaro, L., Conconi, P., Fadinger, H., & Newman, A. F. (2016). Do prices determine vertical integration? *Review of Economic Studies*, 83(3), 855-888.

[5] Auriol, E., & Brilon, S. (2014). Anti-social behavior in profit and nonprofit organizations. *Journal of Public Economics*, 117, 149-161.

[6] Bagwell, S., de Las Casas, L., van Poortvliet, M., and Abercrombie, R. (2013). *Money for good: Understanding donor motivation and behaviour*. London: New Philanthropy Capital.

[7] Bano, Masooda (2008). "Dangerous correlations: Aid's impact on NGO performance and ability to mobilize members in Pakistan." *World Development,* 36, 2297-2313.

[8] Bar-Isaac H., Caruana G., & Cuñat V. (2010). Information gathering and marketing. *Journal of Economics and Management Strategy*, 19, 375–401.

[9] Bar-Isaac H., Caruana G., & Cuñat V. (2012). Information gathering externalities in product markets. *Journal of Industrial Economics*, 60, 162–185.

[10] Barr, Abigail, Marcel Fafchamps, and Trudy Owens (2003). *Non-Governmental Organizations in Uganda*. Report to the Government of Uganda. Available at: http://www.csae.ox.ac.uk/reports/pdfs/rep2003-01.pdf

[11] Besley, T. & Ghatak, M. (2005). Competition and incentives with motivated agents. *American Economic Review,* 95, 616-636.

[12] Besley, T. & Ghatak, M. (2017). Profit with Purpose? A Theory of Social Enterprise. *American Economic Journal: Economic Policy,* 9, 19-58.

[13] Besley, T., & Malcomson, J. M. (2018). Competition in public service provision: The role of not-for-profit providers. *Journal of Public Economics*, 162, 158-172.

[14] Carlin, B. I., Davies, S. W., & Iannaccone, A. (2012). Competition, comparative performance, and market transparency. *American Economic Journal: Microeconomics*, 4(4), 202-37.

[15] Castaneda, M. A., Garen, J., & Thornton, J. (2008). Competition, contractibility, and the market for donors to non-profits. *Journal of Law, Economics, & Organization*, 24(1), 215-246.

[16] Chronicle of Philanthropy (2014). "Inspiring people to make a difference." Available at https://www.philanthropy.com/article/Inspiring-People-to-Make-a/152645.

[17] Dang, C. T., & Owens, T. (2020). Does transparency come at the cost of charitable services? Evidence from investigating British charities. *Journal of Economic Behavior & Organization*, 172, 314-343.

[18] Delfgaauw, J., & Dur, R. (2008). Incentives and workers' motivation in the public sector. *Economic Journal*, 118(525), 171-191.

[19] Delfgaauw, Josse, and Robert Dur (2010). Managerial talent, motivation, and self-selection into public management. *Journal of Public Economics*, 94, 654–660.

[20] Dranove, D. & Satterthwaite M/ (1992). Monopolistic Competition when Price and Quality are Imperfectly Observable. *The RAND Journal of Economics*, 23, 518-534.

[21] Dranove, D., D. Kessler, M. McClellan & M. Satterthwaite (2003). Is More Information Better? The Effects of Health Care Quality Report Cards. *Journal of Political Economy*, 111, 555-88.

[22] Dranove, D. & Jin, G. Z. (2010). Quality disclosure and certification: Theory and practice. *Journal of Economic Literature*, 48, 935–963.

[23] Easterly, W. (ed.) (2008). *Reinventing Foreign Aid.* Cambridge, MA: MIT Press.

[24] Economist (2021). The Gates Foundation's approach has both advantages and limits. Available at https://www.economist.com/international/2021/09/16/the-gates-foundations-approach-has-both-advantages-and-limits (September 16th 2021).

[25] Gavazza A., & Lizzeri A . (2007). The Perils of Transparency in Bureaucracies. *American Economic Review*, 97, 300-305.

[26] Glaeser, E. & Shleifer, A. (2001). Not-for-profit entrepreneurs. *Journal of Public Economics*, 81, 99-115.

[27] Goldseker, S., & Moody, M. (2017). *Generation Impact: How Next Generation Donors Are Revolutionizing Giving*. Hoboken, NJ: John Wylie & Sons.

[28] Hermalin, B. E., & Weisbach, M. S. (2012). Information disclosure and corporate governance. *Journal of Finance*, 67(1), 195-233.

[29] Heyes, A., & Martin, S. (2017). Social labeling by competing NGOs: A model with multiple issues and entry. *Management Science*, 63(6), 1800-1813.

[30] Hopenhayn, H. & Saeedi, M. (2019). Optimal Ratings and Market Outcomes. NBER WP #26221.

[31] Korenok, O., Millner, E. L. and Razzolini, L. (2013). "Impure Altruism in Dictators' Giving." *Journal of Public Economics*, 97, 1-8.

[32] Krasteva, S., & Yildirim, H. (2016). Information, competition, and the quality of charities. *Journal of Public Economics*, 144, 64-77.

[33] Legros, P., & Newman, A. F. (2013). A price theory of vertical and lateral integration. *Quarterly Journal of Economics*, 128(2), 725-770.

[34] Legros, P., & Newman, A. F. (2014). Contracts, ownership, and industrial organization: Past and future. *Journal of Law, Economics, & Organization*, 30(S1): 82-117.

[35] Mansuri, G., & Rao, V. (2013). *Localizing development: Does participation work?* Washington, DC: The World Bank.

[36] Meer, J. (2017). Are overhead costs a good guide for charitable giving? *IZA World of Labor*, January: 329

[37] Metzger, L., & Günther, I. (2019). Making an impact? The relevance of information on aid effectiveness for charitable giving. A laboratory experiment. *Journal of Development Economics*, 136, 18-33.

[38] Platteau, J.-Ph., & Gaspart, F. (2003). The risk of resource misappropriation in community-driven development. *World Development*, 31, 1687–1703.

[39] Rose-Ackerman, S. (1982). Charitable giving and "excessive" fundraising. *Quarterly Journal of Economics*, 97(2), 193-212.

[40] Scharf, K. (2014). Impure prosocial motivation in charity provision: Warm-glow charities and implications for public funding. *Journal of Public Economics*, 114, 50-57.

[41] Schmidt, K. M. (1997). Managerial incentives and product market competition. *Review of Economic Studies*, 64(2), 191-213.

[42] Smillie, Ian (1995). *The Alms Bazaar: Altruism Under Fire - Non-Profit Organizations and International Development*. London, UK: IT Publications.

[43] Tonin, M. and Vlassopoulos M. (2010). "Disentangling the sources of pro-socially motivated effort: A field experiment." *Journal of Public Economics*, 94, 1086–1092.

[44] Tvedt, T. (1998). *Angels of Mercy or Development Diplomats? NGOs and Foreign Aid.* Oxford: James Currey.

[45] Valasek, J. (2018). Dynamic reform of public institutions: A model of motivated agents and collective reputation. *Journal of Public Economics*, 168, 94-108.

[46] Vatter B. (2022). Quality Disclosure and Regulation: Scoring Design in Medicare Advantage. Mimeo, Stanford University

[47] Zapechelnyuk, A. (2020). Optimal Quality Certification. *American Economic Review: Insights*, 2, 161–176.

Online Appendix A: Additional Proofs

A.1 Formal Derivation of Results in Figure 1 for Full Information Case

Let N be large and suppose (10) holds true. Then, in equilibrium: *i)* If $\frac{\Delta}{N} \geq k$, $\widehat{\varepsilon}_i = 1$ for all $i \in \mathcal{N}$. *ii)* If $\frac{k}{2} < \frac{\Delta}{N} < k$, all non-profits with $v_i = v_B = 1$ set $\widehat{\varepsilon}_B = 1$, while all non-profits with $v_i = v_A = k$ set $\widehat{\varepsilon}_A = (2\Delta/Nk) - 1$. *iii)* If $\frac{1}{2} \leq \frac{\Delta}{N} \leq \frac{k}{2}$, all non-profits with $v_i = v_B = 1$ set $\widehat{\varepsilon}_B = 1$, while all non-profits with $v_i = v_A = k$ set $\widehat{\varepsilon}_A = 0$. *iv)* If $\frac{\Delta}{N} < \frac{1}{2}$, all non-profits with $v_i = v_B = 1$ set $\widehat{\varepsilon}_B = 2\Delta/N$, while all non-profits with $v_i = v_A = k$ set $\widehat{\varepsilon}_A = 0$.

Proof. Notice first that $v_B = 1 < v_A = k$ implies that, in any equilibrium, $\varepsilon_A^* \leq \varepsilon_B^*$ must necessarily be verified. Hence, given the best-response functions elicited in (13), there can be four different equilibrium classes. From this, we can observe the results in cases 1 and 3 follow straightforwardly from (11) and (13), recalling that Assumption 1 implies there are $N/2$ non-profits with $v_i = v_B = 1$ and $N/2$ non-profits with $v_i = v_A = k$. Next, to obtain the result in case 2, note that $\widehat{\varepsilon}_A = (2\Delta/Nk) - 1$ stems from solving the following equation:

$$\frac{\widehat{\varepsilon}_A}{\frac{N}{2}(1+\widehat{\varepsilon}_A)}\Delta - k\widehat{\varepsilon}_A = 0,$$

where notice that $E = \frac{N}{2}(1+\widehat{\varepsilon}_A)$ when all firms with $v_i = v_A$ set $\varepsilon_i = \widehat{\varepsilon}_A$ and all those with $v_i = v_B$ set $\varepsilon_i = 1$. The fact that case 2 holds for $k/2 < \Delta/N < k$ follows from noting that $(2\Delta/Nk) - 1 = 0$ when $\Delta/N = k/2$, whereas $(2\Delta/Nk) - 1 = 1$ when $\Delta/N = k$. Finally, to obtain the result in case 4, note now that $\widehat{\varepsilon}_B = 2\Delta/N$ results from

$$\frac{\widehat{\varepsilon}_B}{\frac{N}{2}\widehat{\varepsilon}_B}\Delta - \widehat{\varepsilon}_B = 0,$$

where notice that $E = \frac{N}{2}\widehat{\varepsilon}_B$ when all firms with $v_i = v_A$ set $\varepsilon_i = 0$ and all those with $v_i = v_B$ set $\varepsilon_i = \widehat{\varepsilon}_B$. The fact that this case holds for $\Delta/N < \frac{1}{2}$ follows from noting that $2\Delta/N = 1$ when $\Delta/N = \frac{1}{2}$. ■

A.2 Formal Proof of Social Planner's Comparative Statics in *k*

Lemma 2 *Whenever $\varepsilon^{sp} < 1$, we have $\varepsilon^{sp} = \varphi(k)$ with $\varphi'(k) < 0$.*

Proof. We know that there exists $\underline{k} > 1$, such that $\varphi(\underline{k}) = 1$ and for which $\varphi'(\underline{k}) < 0$. As a consequence, by continuity, for $\varphi'(k) > 0$ to be true for some value of $k > \underline{k}$, there must exist some $k_M > \underline{k}$ such that $\varphi'(k_M) = 0$. We next prove that this is not possible, hence it must be that $\varphi'(k) < 0$ for all $k > \underline{k}$.

Recall that in social planner's optimum $\varepsilon_B^{sp} = 1$. Hence, the value of N^{sp} will be pinned down by $V_A^{sp}(\varepsilon_A^{sp}) + V_B^{sp}(1) = 2$; that is:

$$\left[(\Delta/N)\,\varepsilon_A^{sp} - k\left(\varepsilon_A^{sp}\right)^2\right]^{\frac{1}{2}} + [(\Delta/N) - 1]^{\frac{1}{2}} = 2,$$

for values of $(\Delta/N)\,\varepsilon_A^{sp} - k\left(\varepsilon_A^{sp}\right)^2 \geq 0$, to ensure $V_A^{sp}(\varepsilon_A^{sp}) \geq 0$. The above condition could be re-written as follows:

$$\Delta\varepsilon_A^{sp} - Nk\left(\varepsilon_A^{sp}\right)^2 = \Psi(N) \equiv N\left[2 - \left(\frac{\Delta}{N} - 1\right)^{\frac{1}{2}}\right]^2, \tag{35}$$

where notice that $\Psi'(N) > 0$, since $V_A^{sp}(\varepsilon_A^{sp}) \geq 0$ entails $[(\Delta/N) - 1]^{\frac{1}{2}} \leq 2$.

Solving (35) for N yields a function $N^{sp}(\varepsilon_A^{sp}, k)$, whose derivatives are as follows:

$$\frac{\partial N^{sp}}{\partial \varepsilon_A^{sp}} = -\frac{2N^{sp}k\varepsilon_A^{sp} - \Delta}{\Psi'(N^{sp}) + k\left(\varepsilon_A^{sp}\right)^2} < 0, \tag{36}$$

$$\frac{\partial N^{sp}}{\partial k} = -\frac{N^{sp}\left(\varepsilon_A^{sp}\right)^2}{\Psi'(N^{sp}) + k\left(\varepsilon_A^{sp}\right)^2} < 0. \tag{37}$$

Note that $\partial N^{sp}/\partial\varepsilon_A^{sp} < 0$ stems from the fact that in the social planner's optimum ε_A^{sp} must lie above the level of ε_A that maximises $V_A = \left[(\Delta/N)\,\varepsilon_A - k\left(\varepsilon_A\right)^2\right]^{\frac{1}{2}}$, hence $\varepsilon_A^{sp} > \Delta/(2kN^{sp})$.

Recall now that when the solution ε_A^{sp} is interior, the FOC must hold:

$$\frac{\partial N^{sp}}{\partial \varepsilon_A^{sp}}\left(1 + \varepsilon_A^{sp}\right) = -N^{sp}. \tag{38}$$

Plugging (36) into (38) yields:

$$\frac{2N^{sp}k\varepsilon_A^{sp} - \Delta}{\Psi'(N^{sp}) + k\left(\varepsilon_A^{sp}\right)^2}\left(1 + \varepsilon_A^{sp}\right) = N^{sp},$$

which after some simple algebra leads to:

$$N^{sp}\,k = \frac{N^{sp}\,\Psi'(N^{sp}) + \Delta\left(1 + \varepsilon_A^{sp}\right)}{\varepsilon_A^{sp}(2 + \varepsilon_A^{sp})}. \tag{39}$$

Note now that for the value $k_M > \underline{k}$ with $\varphi'(k_M) = 0$ to exist, it must be the case that the above condition will hold true for a constant level of ε_A^{sp} at $k = k_M$. Differentiating (39) with respect to k, while holding ε_A^{sp} fixed, we obtain:

$$\frac{\partial N^{sp}}{\partial k}k + N^{sp} = \underbrace{\frac{\Psi'(N^{sp}) + N^{sp}\,\Psi''(N^{sp})}{\varepsilon_A^{sp}(2 + \varepsilon_A^{sp})}\frac{\partial N^{sp}}{\partial k}}_{-}. \tag{40}$$

Notice now that the RHS of (40) is negative since $\partial N^{sp}/\partial k < 0$, $\Psi'(N^{sp}) > 0$, and $\Psi''(N^{sp}) > 0$ because $\Psi(N) = \left[2 - (\Delta/N - 1)^{\frac{1}{2}}\right]^2$ is convex in N whenever $2 > (\Delta/N - 1)^{\frac{1}{2}}$. As a consequence, for (40) to possibly hold true, we need that

$$-\frac{\partial N^{sp}}{\partial k}\frac{k}{N^{sp}} > 1.$$

Using (37) the above condition boils down to:

$$\frac{k\left(\varepsilon_A^{sp}\right)^2}{\Psi'(N^{sp}) + k\left(\varepsilon_A^{sp}\right)^2} > 1,$$

which cannot possibly hold true since $\Psi'(N^{sp}) > 0$. As consequence, the cannot exist $k_M > \underline{k}$ such that $\varphi'(k_M) = 0$, in turn implying that $\varphi'(k) < 0$ for all $k > \underline{k}$. ■

Online Appendix B: Extensions to Benchmark Model

B.1: Concern for Overheads Ratio

In our benchmark model donors' preferences are given by a warm-glow utility function that depends on the share of the unit donation that is not subject to diversion by the grassroot. One could argue that donors may also care (negatively) about the share of their donation that they expect to be used to pay for monitoring effort (which would be a measure of the overheads cost ratio in the non-profit firm). In this appendix, we present an extension of the model where donors care both about funds diversion and the overheads cost ratio. To that end, we let now $\xi_{j,i}$ denote donor j's expectation of the total monetary amount spent in monitoring $v_i\varepsilon_i$ by firm i. Recall from (5) that $\tau_{j,i}$ denoted the level of diversion t_i expected by j in firm i. We let donor j's preferences be given now by the following warm-glow utility function incorporating both donors' concern for funds misuse and the overhead cost ratio:

$$U(\{d_{j,i}\}_{i\in\{1,..,N\}}) = \sum_{i=1}^{N} \sigma_{j,i} (1-\tau_{j,i}) \left(\frac{\xi_{j,i}}{D_i}\right)^{-(1-\beta)} d_{j,i}, \quad \text{where } \beta \in [0,1]. \tag{41}$$

The exponent $(1-\beta)$ in (41) measures the degree of donors' concern for the expected overhead cost ratio $\xi_{j,i}/D_i$ in firm i, relative their concern for funds diversion in that firm as capture by the term $(1-\tau_{j,i})$. Notice that (41) encompasses our benchmark utility function in the main text (5) as a special case of it when $\beta = 1$ (in this case, donors do not care at all about the overhead cost ratio). As the value of β gets smaller, the (negative) weight placed by donors on the overhead ratio as a negative feature of non-profit i increases.

None of the results with uninformed donors will be affected at all when replacing (5) by (41), since in that regime each non-profit will still receive $D_i = \Delta/N$ in equilibrium. We will hence focus henceforth in the equilibrium solution with fully informed donors. In a regime with fully informed donors, we have that we can replace $1-\tau_{j,i} = \varepsilon_i$ and $\xi_{j,i}/D_i = v_i\varepsilon_i/D_i$ in (41). As a result, the total amount of donations going to non-profit i will be given by:

$$D_i = \frac{\left(\frac{v_i\varepsilon_i}{D_i}\right)^{-(1-\beta)} \varepsilon_i}{E}\Delta, \tag{42}$$

where now

$$E \equiv \sum_{j\in\mathcal{N}} \left(\frac{v_j\varepsilon_j}{D_j}\right)^{-(1-\beta)} \varepsilon_j. \tag{43}$$

Hence, from (42) and (43), it follows that $D_i = \varepsilon_i v_i^{-(1-\beta)/\beta} E^{-1/\beta} \Delta^{1/\beta}$, and therefore the optimisation problem faced by firm i in the case of informed donors is:

$$\max_{\varepsilon_i \in [0,1]} : V_i = \left[\left(\frac{\varepsilon_i}{v_i^{(1-\beta)/\beta} E^{1/\beta}} \Delta^{1/\beta} - v_i \varepsilon_i \right) \varepsilon_i \right]^{\frac{1}{2}}, \quad \text{where } v_i \in \{v_A, v_B\}. \tag{44}$$

Similarly to (12), problem (44) will always yield corner solutions –i.e., $\widehat{\varepsilon}_i = 0$ or $\widehat{\varepsilon}_i = 1$– as best-response functions. Namely,

$$\varepsilon_i^{br}(E) = \begin{cases} 0 & \text{if} \quad \Delta/E < v_i, \\ [0,1] & \text{if} \quad \Delta/E = v_i, \\ 1 & \text{if} \quad \Delta/E > v_i. \end{cases} \tag{45}$$

Note now that the best-response functions (45) display the exact same mathematical structure as previously in (13). This means that this alternative version of the model with informed donors and endogenous entry will still yield two broad types of equilibrium: i) one in which only firms with monitoring cost $v_i = v_B$ are active in equilibrium and set $\widehat{\varepsilon}_B = 1$, ii) one in which all firms are active in equilibrium and all set $\widehat{\varepsilon}_i = 1$. Below, we derive the parametric conditions leading to each type of equilibrium.

Case 1: $\widehat{\varepsilon}_B = 1$ **and** $\widehat{\varepsilon}_A = 0$

The best-response functions (45) imply that for this equilibrium to prevail it must be the case that $1 \leq \Delta/E \leq k$. Then, from (42) and (43), it follows that in such a case $E = n_B (D_B)^{(1-\beta)}$ and $D_B = (\Delta/E)^{1/\beta}$, where n_B denotes the number of active firms in the equilibrium (which all have $v_i = v_B$). As a consequence, in an equilibrium where $\widehat{\varepsilon}_B = 1$ and $\widehat{\varepsilon}_A = 0$, each non-profit with monitoring cost $v_i = v_B$ receives an amount of donations given by:

$$D_B = \Delta/n_B. \tag{46}$$

The equilibrium entry condition (14) specific to this case will then read:

$$\frac{1}{2}\left(\frac{\Delta}{n_B} - 1\right)^{\frac{1}{2}} = 1,$$

which in turn yields to

$$n_B = \frac{\Delta}{5}, \tag{47}$$

Notice now when (47) holds in equilibrium, then $E = \Delta/5^{\beta}$, and hence the condition $\Delta/E \geq 1$ is always satisfied for any $\beta \in [0,1]$.

Finally, for (47) to be an equilibrium, we also need to satisfy the non-deviation condition for those non-profits with $v_i = v_A$. This requires $\Delta/E \leq k$, with $E = \Delta/5^\beta$. Hence, it requires

$$k \geq 5^\beta. \tag{48}$$

Case 2: $\widehat{\varepsilon}_B = 1$ **and** $\widehat{\varepsilon}_A = 1$

For this equilibrium to prevail we need to have $k < \Delta/E$. Using (42) and (43) with $\widehat{\varepsilon}_B = 1$ and $\widehat{\varepsilon}_A = 1$, and $v_A = k$ and $v_B = 1$, it follows that in such an equilibrium:

$$E = \frac{N}{2} D_B^{(1-\beta)} + \frac{N}{2} D_A^{(1-\beta)} k^{-(1-\beta)} \tag{49}$$

$$D_A^\beta = \frac{\Delta}{E} k^{-(1-\beta)} \tag{50}$$

$$D_B^\beta = \frac{\Delta}{E} \tag{51}$$

where D_A and D_B are, respectively, the total demand going to type-A and type-B firms. Replacing now (43) into (50) and (51), after some algebra we can eventually obtain the following expressions

$$D_A = \frac{2\Delta}{N} \frac{1}{1 + k^{\frac{1-\beta}{\beta}}} \tag{52}$$

$$D_B = \frac{2\Delta}{N} \frac{k^{\frac{1-\beta}{\beta}}}{1 + k^{\frac{1-\beta}{\beta}}} \tag{53}$$

and also

$$E = \left(\frac{N}{2}\right)^\beta \Delta^{1-\beta} \left(1 + k^{\frac{1-\beta}{\beta}}\right)^\beta k^{-(1-\beta)}. \tag{54}$$

By using (54) we can now observe that the condition $\Delta/E > k$ can be written as

$$N < \frac{2\Delta}{[1 + k^{(1-\beta)/\beta}]\, k}.$$

To pin down the equilibrium value of N we can use the equilibrium entry condition, which in this case is given by

$$\frac{[(D_B - 1)]^{\frac{1}{2}} + [(D_A - k)]^{\frac{1}{2}}}{2} = 1,$$

and after plugging (52) and (53) into the above expression, we obtain:

$$\underbrace{\left(\frac{2\Delta}{N} \frac{k^{(1-\beta)/\beta}}{1 + k^{(1-\beta)/\beta}} - 1\right)^{\frac{1}{2}} + \left(\frac{2\Delta}{N} \frac{1}{1 + k^{(1-\beta)/\beta}} - k\right)^{\frac{1}{2}}}_{\Phi(N,k)} = 2. \tag{55}$$

We can define now two thresholds for N, namely:

$$\overline{N}_A(k,\beta) = 2\Delta \frac{1}{\left(1+k^{(1-\beta)/\beta}\right)k} \quad \text{and} \quad \overline{N}_B(k,\beta) = 2\Delta \frac{k^{(1-\beta)/\beta}}{\left(1+k^{(1-\beta)/\beta}\right)}, \tag{56}$$

where note that $\overline{N}_A(k,\beta) < \overline{N}_B(k,\beta)$, since $k > 1$. Notice now from the definition of $\Phi(N,k)$ in (55) that: i) $\lim_{N\to 0}\Phi(N) = +\infty$, and ii) $\Phi(N,k)$ is a continuous decreasing function of N for all $N \in \left(0, \overline{N}_A(k,\beta)\right]$. For this type of equilibrium to prevail we need that the solution of $\Phi(N) = 2$ in (55) is such that $N < \overline{N}_A(k,\beta)$. A necessary and sufficient condition for this to hold is $\Phi\left(\overline{N}_A(k,\beta)\right) < 2$, which bearing in mind (56) leads to

$$\Phi\left(\overline{N}_A(k,\beta)\right) = \left(k^{\frac{1}{\beta}} - 1\right)^{\frac{1}{2}} < 2,$$

which in turn yields

$$k < 5^{\beta}. \tag{57}$$

Equilibrium Number of Active Non-profits

Based on the previous derivations, we can now characterise the number of active non-profits that are observed in equilibrium in a regime with fully informed donors. We do so in the following proposition, which extends the results obtained in Proposition 2, when we incorporate donors' concern for the overhead ratio by means of the utility function in (41).

Proposition B.1 (Proposition 2 bis) *Let us denote by $\widehat{N}$ the number of social managers that choose to enter the non-profit market, and by $\widehat{n}$ the number of those entrants who remain active after learning their monitoring cost parameter $v_i \in \{v_A, v_B\}$. Then,*

1. *When $k > 5^{\beta}$, the $\widehat{N}/2$ social entrepreneurs who receive a draw $v_i = v_B$ choose to set $\widehat{\varepsilon}_B = 1$, while the $\widehat{N}/2$ who receive a draw $v_i = v_A$ choose to set $\widehat{\varepsilon}_A = 0$. The number of non-profits that remain active in equilibrium is $\widehat{n} = \widehat{N}/2 = \Delta/5$.*

2. *When $k \leq 5^{\beta}$, all the $\widehat{N}$ social entrepreneurs who enter the non-profit sector (regardless of the draw v_i they receive) choose to set $\widehat{\varepsilon}_i = 1$. The number of non-profits active in equilibrium is given by $\widehat{n} = \widehat{N} = \Upsilon(k,\beta)$ where: i) $\Upsilon(1,\beta) = \Delta/2$, ii) $\Upsilon(k,\beta) < 16\Delta/\left[(k-5)^2 + 16k\right]$ for all $0 \leq \beta < 1$ and $\Upsilon(k,1) = 16\Delta/\left[(k-5)^2+16k\right]$, iii) $\Upsilon'_k(\cdot) < 0$ and $\Upsilon'_\beta(\cdot) > 0$.*

Proof. The proof of the first part of the proposition follows directly from the above derivations in Case 1.

For the second part of the proof, note firstly that $\overline{N}_A(1,\beta) = \overline{N}_B(1,\beta) = \Delta$, and thus $\Phi(N,1) = 2\left(\frac{\Delta}{N} - 1\right)^{\frac{1}{2}}$, implying $\Upsilon(1,\beta) = \Delta/2$. Secondly, denote $u \equiv k^{(1-\beta)/\beta}$ or $k \equiv u^{\beta/(1-\beta)}$, Then

$$\Phi(N,k) = \Phi(N,u) = \left(\frac{2\Delta}{N}\frac{u}{1+u} - 1\right)^{\frac{1}{2}} + \left(\frac{2\Delta}{N}\frac{1}{1+u} - u^{\frac{\beta}{1-\beta}}\right)^{\frac{1}{2}}$$

and

$$\frac{\partial \Phi}{\partial u} = \frac{\Delta}{N}\frac{1}{(1+u)^2}\left[\left(\frac{2\Delta}{N}\frac{u}{1+u} - 1\right)^{-\frac{1}{2}} - \left(\frac{2\Delta}{N}\frac{1}{1+u} - u^{\frac{\beta}{1-\beta}}\right)^{-\frac{1}{2}}\right] \tag{58}$$

When $k > 1$, $u > 1$ and $\frac{2\Delta}{N}\frac{u}{1+u} - 1 > \frac{2\Delta}{N}\frac{1}{1+u} - u^{\frac{\beta}{1-\beta}}$. Thus, the term in square brackets of the RHS of (58) is negative and consequently $\partial\Phi/\partial u < 0$ for $N \in \left(0, \overline{N}_A(k,\beta)\right]$. Then

$$\Upsilon'_k(k,\beta) = -\frac{1-\beta}{\beta}k^{(1-2\beta)/\beta}\frac{\partial\Phi/\partial u}{\partial\Phi/\partial N} < 0.$$

Next, to prove $\Upsilon'_\beta(\cdot) > 0$, we can define $\vartheta(\beta) \equiv k^{(1-\beta)/\beta}$, and note that $\vartheta'(\beta) < 0$ since $k > 1$. Then, differentiating $\Phi(N,k)$ with respect to β we obtain:

$$\frac{\partial \Phi}{\partial \beta} == \frac{\Delta}{N}\frac{\vartheta'(\beta)}{(1+\vartheta(\beta))^2}\left[\left(\frac{2\Delta}{N}\frac{f(\beta)}{1+f(\beta)} - 1\right)^{-\frac{1}{2}} - \left(\frac{2\Delta}{N}\frac{f(\beta)}{1+f(\beta)} - k\right)^{-\frac{1}{2}}\right], \tag{59}$$

from which, since the term in square brackets of the RHS of (59) is positive, it follows that $\partial\Phi/\partial\beta > 0$. Lastly, note that (55) boils down to (27) when $\beta = 1$, hence the its solution in that case is (17). Combining this with the fact that $\partial\Phi/\partial\beta > 0$ the result $\Upsilon(k,\beta) < 16\Delta/\left[(k-5)^2 + 16k\right]$ *for all* $0 \leq \beta < 1$ immediately follows. ■

Proposition B.1 extends the results of Proposition **2** in a setup where donors care both about funds diversion and the overhead cost ratio. Recall that the smaller the value of $\beta \in [0,1]$, the more intensely donors' reluctance to give to non-profits with higher overheads cost ratio becomes. As we can observe from Proposition B.1 the presence of concern of overhead cost strengthens the asymmetric impact that transparency of use of funds has on different non-profits. Specifically, part 1 of the proposition shows that, as β gets smaller within the interval $[0,1]$, the range of values of k for which the non-profits with high monitoring cost remain inactive expands. In the limit, when $\beta = 0$, the only type of equilibrium that exists is exactly one in which high-cost non-profits always remain inactive. In addition to this, part 2 of the proposition shows that the number of active firms in this version of the model is always strictly smaller than in our benchmark model when $k \leq 5^\beta$.

B.2: Varying Degrees of Donors Heterogeneity/Mission Diversity

Our benchmark model has worked with a specific parametrisation of the Fréchet distribution in (4) that has set the so-called 'shape parameter' equal to one. This simplification has implicitly shut down the possibility of analysing the impact of different degrees in the heterogeneity of donors' idiosyncratic preferences (or, alternatively, different degrees of mission differentiation). We now extend our benchmark model to allow for varying degrees of heterogeneity/differentiation, by generalising the Fréchet distribution generating donors' taste shocks to the following one:

$$f(\sigma_{j,i}) = \exp(-\sigma_{j,i}^{-\theta})/\sigma_{j,i}^{1+\theta}, \quad \text{where } \theta \geq 1. \tag{60}$$

In the benchmark model, we have restricted the analysis to the case in which $\theta = 1$. The parameter θ in (60) mainly governs the variance of σ. Specifically, the larger θ, the smaller the dispersion of the random variable generated by (60). Letting θ rise above one, we can then study the impact of lower diversity of taste donors.

It should be first quite straightforward to note that the equilibrium results in the model with uninformed donors remain unaffected when replacing (4) by the more general expression in (60).[25] As a consequence, we will focus only on the equilibrium results with fully informed donors. When using (60), the amount of donations received by non-profit i will be given by:

$$D_i = \frac{\varepsilon_i^\theta}{E}, \quad \text{where } E = \varepsilon_i^\theta + \sum\nolimits_{l \in \mathcal{N}, l \neq i} \varepsilon_l^\theta, \tag{61}$$

where notice that (61) boils down to (11) when $\theta = 1$.

A large N still implies that each firm takes value of E as given. The resulting optimisation problem faced by firm i will be given by

$$\max_{\varepsilon_i \in [0,1]} : \left[\left(\varepsilon_i^{1+\theta} \cdot (\Delta/E) - v_i \varepsilon_i^2 \right) \right]^{\frac{1}{2}}. \tag{62}$$

Note now that in (62) the exponent $1 + \theta \geq 2$. As a consequence, its solution will be characterised by identical corner solutions for any $\theta \geq 1$. Specifically, (62) will yield as solution the exact same best-response functions as those previously obtained with $\theta = 1$ in (13).[26] This will, in turn, imply that all the equilibrium results obtained in Proposition 2 will all hold true exactly as stated in the benchmark model for any $\theta \geq 1$.

[25] The reason for this is simply because in the uninformed regime the total amount of donations received by any generic non-profit i is given by Δ/N regardless of the specific form of the taste shock function $f(\sigma)$.

[26] The Fréchet distribution also admits $0 < \theta < 1$, which we have ruled out in this extension. For values

Donors' Welfare

The only main result of the model that will be subject to some changes when replacing (4) by its more general version (60) is the donors' welfare comparison developed in Section 5.3. The reason for this is that a higher value of θ tilts the trade-off between 'transparency' and 'mission variety' in favour of the former.

When using (60) we can obtain a generalised expression for the statement in Lemma 1, which would now read as follows:

$$\mathrm{E}_{IN}(U_j) \gtreqless \mathrm{E}_{UN}(U_j) \quad \Leftrightarrow \quad \left(\frac{\widehat{n}}{N^*}\right)^{\frac{1}{\theta}} \gtreqless \frac{1+\varepsilon_A^*}{2}, \tag{63}$$

where, exactly as in (20), $\widehat{n}$ is given by (16) when $k \geq 5$ and by (17) when $k < 5$, N^* is given by (25), and ε_A^* is given by (26).

The difference between (20) and (63) lies in that the latter applies an exponent θ^{-1} on the variety ratio $\widehat{n}/N^*$. Clearly, the larger the value of θ, the greater the value of $(\widehat{n}/N^*)^{\theta^{-1}}$ for a given values of $\widehat{n}$ and N^* since $\widehat{n}/N^* < 1$ given Proposition 3. Bearing in mind that ε_A^* is also independent of θ, it follows that larger values of θ tend to raise the value of the LHS of (63) towards unity while keeping constant the value of its RHS. This, in turn, tilts donors' welfare in favour of the regime with full transparency. The next proposition formalises this message, generalising the previous results in Proposition 5 to the setting with (60).

Proposition B.2 (Proposition 5 bis) *There exists a cut-off value $\overline{\theta} > 1$, such that:*

1. *For any $1 \leq \theta < \overline{\theta}$, we can define the threshold functions $\widetilde{k}(\theta) \in (1,5)$ and $\widehat{k}(\theta) > 5$, where $\widetilde{k}'(\theta) > 0$, $\widehat{k}'(\theta) < 0$ and $\lim_{\theta\to\overline{\theta}} \widetilde{k}(\theta) = \lim_{\theta\to\overline{\theta}} \widehat{k}(\theta) = 5$, such that a generic donor j: i) prefers a regime with uninformed donors to a regime with full transparency whenever $\widetilde{k}(\theta) < k < \widehat{k}(\theta)$; ii) prefers a regime with full transparency to a regime with uninformed donors for all $1 < k < \widetilde{k}(\theta)$ and for all $k > \widehat{k}(\theta)$.*

2. *For any $\theta > \overline{\theta}$, a generic donor j prefers a a regime with full transparency to a regime with uninformed donors for all $k > 1$.*

---

of $\theta \in (0,1)$, the model will no longer deliver only corner solutions for ε_i. Further extending the model to allow also interior solutions by letting $0 < \theta < 1$ will not change the main insights from the model, but it will make it much less tractable, as with interior solutions we are no longer be able to obtain closed-form solutions for the equilibrium object E.

Proof. Notice first that Proposition 5 combined with (63) implies, by continuity, that for θ sufficiently close to one there must exist a non-empty interval $(\widetilde{k}(\theta), \widehat{k}(\theta))$ within which $\text{E}_{UN}(U_j) > \text{E}_{IN}(U_j)$. Also, given that $\widehat{n}$, N^* and ε_A^* in are all independent of θ, and Proposition 3 means $\widehat{n}/N^* < 1$, we can observe that the LHS of (63) is increasing in θ. As a consequence of this, it follows that $\widetilde{k}'(\theta) > 0$ and $\widehat{k}'(\theta) < 0$. Next, notice that $\lim_{\theta\to\infty} (\widehat{n}/N^*)^{\frac{1}{\theta}} = 1$. Therefore, by continuity, there must exist a value $\overline{\theta} > 1$ such that: $(\widehat{n}/N^*)^{\frac{1}{\theta}} = (1 + \varepsilon_A^*)/2$ and $(\widehat{n}/N^*)^{\frac{1}{\theta}} < (1 + \varepsilon_A^*)/2$ when $\theta < \overline{\theta}$. This, in turn, implies that $\lim_{\theta\to\overline{\theta}} \widetilde{k}(\theta) = \lim_{\theta\to\overline{\theta}} \widehat{k}(\theta) = 5$, completing the proof. ■

Proposition 5 (B.2) showcases how the donors' welfare result presented in the benchmark model extends to the case with different degrees of donors' taste heterogeneity, provided there is enough of this heterogeneity. As we can observe, provided θ is not too large (which imposes enough diversity across donors' preferences for different social missions), there will exist a non-empty range of values of k for which donors are (ex-ante) better off in a regime with uninformed donors. This range is given by $(\widetilde{k}(\theta), \widehat{k}(\theta))$, and shrinks as θ increases, eventually collapsing to an empty set for $\theta > \overline{\theta}$. Intuitively, the larger the degree the taste diversity, the stronger the importance that donors attach to mission variety. Conversely, as the degree of taste diversity declines (i.e., as θ increases), donors welfare tends to become higher in the regime with full transparency. This is because, as θ increases, curbing funds diversion tends to become relatively more important to donors' welfare than widening the number of social missions served by non-profit firms in equilibrium.

B.3: Endogenous Donations

The benchmark model has been developed under the assumption of a fixed number of donors. We extend now our previous results to a setup where donors' participation is endogenous. To maintain the generality of results from Appendix B.2, we keep assuming that taste shocks are governed by (60). Nevertheless, in the sake of brevity, and to focus on the most interesting cases the model delivers, we restrict the attention to $\theta < \overline{\theta}$. As Proposition 5 (B.2) shows, this implies that when $k \in (\widetilde{k}(\theta), \widehat{k}(\theta))$, where $(\widetilde{k}(\theta), \widehat{k}(\theta))$ is a non-empty interval, donors are better off in a regime with uninformed donors.

We assume now that there is an infinite mass of potential donors. Each potential donor will donate one unit of income to a nonprofit, provided the utility they get from the donation is greater than its opportunity cost. To scale donors' utility for different levels of θ, we let now ρ (5) be equal to $\left(\Gamma(1-\theta^{-1})\right)^{-1}$, where $\Gamma(\cdot)$ denotes the gamma function. Donor j faces an opportunity cost ς_j for his unit donation. We assume that the total mass of potential donors whose $\varsigma_j \in [0,\varsigma]$ is equal to ς^{α} with $\alpha \in (0,1)$.[27] As a result, the total mass of donations channeled to the nonprofit market as a function of the expected utility of donors, $E(U)$, will be given by:

$$\Delta\left(E(U)\right) = \left(E(U)\right)^{\alpha}. \tag{64}$$

One caveat to raise about the model with endogenous donations driven by the donors' participation constraint is that, irrespective of the distributional assumption of donors' participation constraints, there always exists an equilibrium where all potential donors expect no one to donate. In particular, since each potential donor has measure zero, when they all expect the pool of donations to be zero, their expected utility as donors will equal zero, and thus no potential donor will wish to donate in equilibrium. We disregard, henceforth, this self-fulfilling coordination failure that leads a complete collapse of entire nonprofit market in equilibrium.

Uninformed Donors Regime with Endogenous Donations

Notice that based on Proposition 1, we can write $N^* = \Omega(k)\,\Delta^*$, where Δ^* denotes now the endogenous mass of active donors in equilibrium, and we let

$$\Omega(k) \equiv \left(k + 2\sqrt{k} + \sqrt{k^2 + 4k^{\frac{3}{2}} - k}\right)/10k.$$

Using the fact that in the uninformed regime, $E^*_{UN}(U) = (N^*)^{\frac{1}{\theta}}\left(\frac{1}{2}\varepsilon^*_A + \frac{1}{2}\varepsilon^*_B\right)$, with $\varepsilon^*_A = \Delta^*/2kN^*$ and $\varepsilon^*_B = 1$, and the expression in (64), we can obtain:

$$E^*_{UN}(U) = (\Omega(k))^{\frac{1}{\theta-\alpha}}\left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\theta}{\theta-\alpha}}. \tag{65}$$

[27] Restricting $\alpha \in (0,1)$ ensures that, for any $\theta \geq 1$, we always have a stable equilibrium in the model with positive aggregate donations . Instead, if $\alpha \geq 1$ the model will fail to exhibit in general a stable equilibrium with positive donations for levels of θ not large enough. More generally, with different distributional assumptions about donors' opportunity costs the model may lead to the presence of multiple equilibria, with different levels of potential donors' participation in the non-profit market. While the presence of such type of multiple equilibria is indeed interesting, we prefer to keep this extension succinct and thus restrict the attention to distributions that do not generate such type of equilibrium multiplicity.

Plugging (65) back in (64), yields level of donations that hold in the equilibrium with uninformed donors and endogenous donations:

$$\Delta^*_{UN} = (\Omega(k))^{\frac{\alpha}{\theta-\alpha}} \left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\alpha\theta}{\theta-\alpha}}. \tag{66}$$

Finally, plugging (66) back into $N^* = \Omega(k)\,\Delta^*$ yields the number of active nonprofits in an equilibrium with uninformed donors and endogenous donations:

$$N^* = (\Omega(k))^{\frac{\theta}{\theta-\alpha}} \left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\alpha\theta}{\theta-\alpha}}. \tag{67}$$

Informed Donors Regime with Endogenous Donations

Recall from the result in Proposition 2 that the number of active non-profits consistent with the zero-profit conditions when donors are informed, $\widehat{n}$, depends on the level of k. Using the fact that in the informed regime $E^*_{IN}(U) = \widehat{n}^{\frac{1}{\theta}}$, together with (16) and (17) for $\Delta = \Delta^*$, and letting $\Delta^* = (E^*_{IN}(U))^{\alpha}$, we can obtain:

$$E^*_{IN}(U) = \begin{cases} \left[\left[(k-5)/4\right]^2 + k\right]^{-\frac{1}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{1}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{68}$$

Plugging (68) back in (64), yields:

$$\Delta^*_{IN} = \begin{cases} \left[\left[(k-5)/4\right]^2 + k\right]^{-\frac{\alpha}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{\alpha}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{69}$$

Lastly, replacing (69) into the corresponding expressions in (16) and (17) yields the number of active nonprofits in an equilibrium with informed donors and endogenous donations:

$$\widehat{n} = \begin{cases} \left[\left[(k-5)/4\right]^2 + k\right]^{-\frac{\theta}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{\theta}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{70}$$

Comparison of Equilibrium Results with Endogenous Donations

One first preliminary result to note is that, whenever donors' expected utility is equal in both informational regimes with exogenous level of Δ, the same result will hold true as well when Δ follows (64).[28] Similarly, we can note that whenever $E_{UN}(U) > E_{IN}(U)$ or $E_{UN}(U) < E_{IN}(U)$ in a setup with a fixed level of Δ, the same qualitative result will hold respectively true as well when Δ follows (64), albeit the gaps between $E_{UN}(U)$ and $E_{IN}(U)$ will widen with endogenous donations. This means that our previous results characterised in Proposition 5 (B.2) will remain valid exactly as they are expressed therein, with the only differences being that the gaps in donors' expected utility across regimes will become more pronounced whenever they are not equal to one another.

The model with endogenous aggregate donations does yield, however, some interesting nuances relative to that with a fixed level of Δ in terms of the number of non-profits active in equilibrium. In particular, the comparison between (67) and (70) yields the following result that extends our previous result in Proposition 3 to a context with endogenous aggregate donations.

Proposition B.3 (Proposition 3 bis) *Consider the number of active non-profits in a context where aggregate of donations are given by (64), and hence N^* is given (67) by and $\widehat{n}$ by (70). For values of $\theta < \overline{\theta}$, there exists thresholds $\underline{k}(\theta) \in (1, \widetilde{k}(\theta))$ and $\overline{k}(\theta) > \widehat{k}(\theta)$, where $\widetilde{k}(\theta)$ are $\widehat{k}(\theta)$ the cut-off values defined in Proposition 5 (B.2), such that $N^* = \widehat{n}$ when $k = \underline{k}(\theta)$ and when $k = \overline{k}(\theta)$, and moreover:*

i) $N^* > \widehat{n}$ for all $k \in \left(\underline{k}(\theta), \overline{k}(\theta)\right)$,

ii) $N^* < \widehat{n}$ for all $k \in (1, \underline{k}(\theta))$ and for all $k > \overline{k}(\theta)$,

Proof. Firstly, recall that when $k = \widehat{k}(\theta)$ the result $E^*_{UN}(U) = E^*_{IN}(U)$ still holds true, implying in turn that $N^*(\widehat{k}(\theta)) > \widehat{n} = 5^{-\frac{\theta}{\theta-\alpha}}$ is still verified at $k = \widehat{k}(\theta)$. On the other hand, notice from (67) that $\lim_{k\to\infty} N^*(k) = (2^\alpha \times 5)^{-\frac{\theta}{\theta-\alpha}} < 5^{-\frac{\theta}{\theta-\alpha}}$. As a consequence, by continuity, there must exist $\overline{k}(\theta) > \widehat{k}(\theta)$ such that: i) $N^*(\overline{k}(\theta)) = \widehat{n}$, ii) $N^*(k) < \widehat{n}$ for all $k > \overline{k}(\theta)$, iii) $N^*(k) > \widehat{n}$ for all $5 \leq k < \overline{k}(\theta)$. Secondly, recall that when $k = \widetilde{k}(\theta)$ the result

[28] To see this formally, note that the model where Δ is determined by (64) collapses to the model in Appendix B.2 with $\Delta = 1$ when $\alpha = 0$. With $\alpha = 0$, we have that $E^*_{UN}(U) = E^*_{IN}(U)$ if and only if

$$(\Omega(k))^{\frac{1}{\theta}} \left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right) = \begin{cases} \left[\left[(k-5)/4\right]^2 + k\right]^{-\frac{1}{\theta}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{1}{\theta}} & \text{if } k \geq 5. \end{cases},$$

and notice next from (65) and (65) that whenever the equality above holds true, we will also have $E^*_{UN}(U) = E^*_{IN}(U)$ for any $0 < \alpha < 1$.

$E^*_{UN}(U) = E^*_{IN}(U)$ still holds true, implying in turn that $N^*(\widehat{k}(\theta)) > \widehat{n}(\widetilde{k}(\theta))$, where recall that $\widetilde{k}(\theta) < 5$ so the first row in (70) applies in this case. From this, combined with the fact that $\Delta^*_{UN} > \Delta^*_{IN}$ for all $k \in [\widetilde{k}(\theta), 5]$, it follows that we will still have $N^*(k) > \widehat{n}(k)$ for all $k \in [\widetilde{k}(\theta), 5]$. Lastly, let

$$\psi(k, \alpha) \equiv \left\{ \left[\left(\frac{k-5}{4} \right)^2 + k \right] \Omega \right\}^{-1} \left(\frac{1}{4k\Omega} + \frac{1}{2} \right)^{-\alpha},$$

and note from (67) and (70) that for any $k \in (1, 5)$: $\widehat{n}/N^* = (\psi(\cdot))^{\theta/(\theta-\alpha)}$, which is in turn a monotonically increasing transformation of $\psi(\cdot)$ since $\alpha < 1$. Notice now that i) $\psi(1, \alpha) = 1$ for any $\alpha \geq 0$, ii) $\partial\psi(1, \alpha)/\partial k > 0$ for any $\alpha > 0$, iii) $\psi(k, \alpha)$ reaches a maximum at some $k > 1$ for any $\alpha > 0$. All this implies, by continuity, that there must exist $\underline{k}(\theta) \in (1, \widetilde{k}(\theta))$ such that: i) $N^*(\underline{k}(\theta)) = \widehat{n}(\underline{k}(\theta))$, ii) $N^* < \widehat{n}$ for all $k \in (1, \underline{k}(\theta))$, iii) $N^*(k) > \widehat{n}$ for all $\underline{k}(\theta) < k \leq 5$. ■

The results in Proposition B.3 extend those obtained previously in Proposition **3** in the main text to a framework with endogenous aggregate donations given by (64), within the context of the generalised Fréchet distribution (60). The main difference that arises when total donations responds positively to donors' expected utility is that it is no longer true that the number of active non-profits is always larger in the regime with uninformed donors. As we can observe, the number of active non-profits is larger in the regime with uninformed donors for the subset $k \in (\underline{k}, \overline{k})$, where $\underline{k} \in (1, \widetilde{k})$ and $\overline{k} > \widehat{k}$. Intuitively, recall that $\widetilde{k}$ and $\widehat{k}$ are the thresholds such that, when $k \in (\widetilde{k}, \widehat{k})$, donors are better off (in expectation) in the uninformed regime. Hence, within that range our previous results in Proposition **3** will remain qualitatively unaltered (and, actually, the gap between $N^*$and $\widehat{n}$ will become quantitatively stronger). On the other hand, as k falls below $\widetilde{k}$ or rises above $\widehat{k}$, the expected utility of donors is becomes larger in the informed regime than in the uninformed one. As a consequence, the pool of donors will also be larger in the informed regime than in the uninformed one in that range. This will, in turn, partly offset the mechanisms leading to $N^* > \widehat{n}$ as presented in Proposition 3. As a matter of fact, when $k \in (1, \underline{k})$ or $k > \overline{k}$, this offsetting effect dominates, leading in the end to $N^* < \widehat{n}$ in those ranges of k.