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

Gani Aldashev* Esteban Jaimovich† Thierry Verdier‡

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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 on the use of funds interacts with the competitive structure of the non-profit sector under alternative informational regimes. Increasing transparency on 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

The amount and variety of public goods provided by the non-profit sector has been increasing significantly in modern economies over the past few decades (Bilodeau and Steinberg, 2006; Iossa and Saussier, 2018).[1] A general trait of this sector is that non-profit firms source one of their main inputs (i.e., donations) by mobilizing funds from private donors. Next, non-profits put those funds, alongside with other complementary inputs (such as labor), to the production of specific public goods, according to the specific social mission addressed by each organization.

The non-profit sector exhibits three noteworthy features that shape several key aspects of its structure. First, the funding side and the ultimate beneficiary side are connected to each other only indirectly, through non-profit organizations. This lack of direct connection severs the flow of informational feedback about non-profits' performance towards the funding side, and thus lies in sharp contrast with the feedback typically provided by markets in the private-good sector. Second, non-profits are complex organizations, with layers of internal hierarchies and specialization in tasks (e.g., setting up the mission, fundraising, and carrying out the projects). The presence of such internal hierarchies in turn implies the need to motivate and monitor the lower layers of the organizations. Third, the non-profit sector as a whole represents a rather heterogeneous set of organizations. In particular, it comprises a large variety of fully decentralized organizations which differ vastly in terms of their core missions, output they produce, and their ultimate beneficiaries.[2]

The non-profit sector is thus characterized by a peculiar intermediated nature: donors provide one of the main inputs (funds) but they have essentially no control on how their donations are put to use. While this problem may resemble, in principle, a standard principal-agent situation, there are two key differences in the context with non-profits. 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 to do with output observability: non-profits'

[1] For instance, in the United States, non-profits account for 71 per cent of total private employment in the education sector in 2019. For health care, social assistance, and arts & recreation sectors, this share stands at 44 per cent, 42 per cent, and 16 per cent, respectively (Salamon and Newhouse, 2019).

[2] For example, 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.

final output is inherently difficult to measure.

These informational failures have called for the need to establish specific schemes that help preventing rent-seeking and misappropriation by agents who may be attracted to the non-profit sector by the prospects of monetary rewards, rather than by a sense of altruism. One such key mechanism has involved a growing push for transparency concerning the use of funds by non-profits: the funders increasingly request that the non-profits clarify how their donations to these organizations are used. 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 especial emphasis on the structure of their spending, their cost-effectiveness, and in providing metrics of accountability and transparency. Analogous organizations operate in other developed countries: Charity Intelligence Canada provides similar metrics for Canadian non-profits; in the U.K., the Charity Commission for England and Wales maintains an online register of charities which provides the financial information (including the spending items) about all registered charities, etc.

Voicing support for enhancing transparency within a sector so highly sensitive to moral hazard and highly reliant on trust seems obvious. 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 are far from straightforward, and 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 output and diversity of missions. Concerns about those shortcomings by non-profit watchdogs have been recently raised by practitioners and by academics. Some call for a more critical approach to transparency and the effects it generates: for instance, Nicholas Kristof argues that the excessive emphasis on the expense ratio (one of the metrics used to rank charities on the basis of their spending structure) pushes non-profits to under-invest in administration and efficiency (Chronicle of Philanthropy, 2014). Similarly, Meer (2017) argues that the current excessive reliance on overhead cost ratio in evaluating non-profits induces nonprofits to forgo hiring skilled workers. More generally, scholars in social innovation and non-profit literature have identified this problem as "the nonprofit starvation cycle" (see Gregory and Howard, 2009; Lecy and Searing, 2015; Schubert and Boenigk, 2019).[3]

[3] According to this view, excessive emphasis on metrics on non-profits performance leads to donors setting expectations about how much of their donations should go directly to the projects that they fund. As a result,

Anecdotal evidence and several practitioners have thus raised caution about the impact of excessive emphasis on performance metrics on the overall operation of the non-profit sector. We still lack, however, a rigorous and thorough analysis of these issues. More generally, we still lack a tractable framework to study how informational asymmetries within non-profits interact with the competitive structure of the sector, especially under different informational-transparency regimes. Our paper aims at closing this key gap.

In our model, the contractual imperfections that exist in the public-good sector are at the heart of the story. Non-profits are founded and managed by altruistic individuals who exhibit an intrinsic motivation towards a social mission. Non-profits compete among themselves for funding from a large pool of impurely altruistic donors who choose a social 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 non-profits' organizational hierarchies, 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 based purely on their sense of altruism. As a consequence of this, the actual use of collected funds is subject to potential diversion by lower echelons within non-profit firms. Founders/managers can curb such diversion, albeit at a cost, by closer monitoring of lower echelons' actions. In the model, the cost of monitoring may differ across non-profit firms. Such 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 in turn will influence their willingness to contribute to each of them, which then further influences non-profits' incentives to strengthen monitoring. Through this feedback mechanism, transparency leads to trade-offs between variety of missions fulfilled by non-profits versus "cleanliness" of non-profits. Thus, our model combines the industrial-organization aspects of the public-good sector (the total quantity of public goods provided and their distribution across firms) and the organizational aspects of its participants (the internal resources devoted to monitoring and the diversion of funds).

Our central findings are twofold. First, we show that there is an ambiguous effect of more transparency on the use of funds on the total public good provision and the welfare

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the competing non-profits end up trying (and struggling) to economize on indirect expenses, often worsening the output of their projects. Ultimately, some worthy nonprofits end up being "starved" of funding, and leaving the charitable sector.

of donors. Second, we highlight that the sign of this effect depends crucially on the degree of heterogeneity of monitoring costs of the non-profits. Higher transparency generates two opposite forces on the internal allocation of resources and the resulting diversion of funds. The first is *the competitive effect*: more transparency encourages a non-profit manager to devote more resources to monitoring and curbing rent-seeking inside her organization. This is because donors are more inclined to give to a non-profit when the (expected) diversion of funds is lower, and thus reward "cleaner" non-profits with more donations. The competitive effect will then induce *all* non-profits to monitor rent-seeking more intensely. The second is *the strategic-interaction effect*: more transparency encourages managers of *some* non-profits to reduce the internal resources devoted to preventing rent-seeking. This effect arises because more monitoring by one non-profit manager indirectly curbs the incentives of other managers to prevent rent-seeking in their organizations, and monitoring acts as a strategic substitute for competition for funds. More precisely, the non-profits with higher cost of monitoring might decide to cut on this effort under more transparency. Hence, the overall effect of higher transparency on total provision of public goods can be positive or negative, depending on the relative strength of the two effects. Furthermore, transparency generates unequal effects across social missions: it reward those missions that can be more effectively monitored, at the expense of those with a higher monitoring cost.

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) one if the difference in the cost of monitoring (between low-cost and high-cost non-profits) is at an intermediate level. This surprising result arises because of the general-equilibrium aspect. Offered the option to observe or not the level of funds diversion, any rational donor always prefers transparency, when facing this choice *individually*. However, the regime with full transparency offers this option not individually, but to all the donors collectively. Hence, a randomly chosen donor may be better off in a context in which *no one* can observe the level of diversion, because 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.

The rest of the paper is organized as follows. The next sub-section discusses briefly the related literature. In section 2, we present a simple model of strategic interaction between non-profits and highlight the effect of increased transparency on non-profit competition and the equilibrium level of public good provision. Section 3 expands the model to the case of a monopolistically competitive non-profit industry structure. Section 4 models the entry decision by non-profits. Section 5 provides our analysis of the impact of transparency on welfare and discusses policy implications. Section 6 analyzes a variant of the model in which a continuum of atomistic donors coexist alongside a large donor. Finally, section 7 concludes. The proofs of results and a robustness check are relegated to the appendix.

1.1 Related literature

Our paper contributes to two fields in economics: public economics and organizational economics. In the public economics literature focusing on the private provision of public goods, several important contributions focus on the problem of non-contractibility of output in the public good provision. Glaeser and Shleifer (2001) argue that the non-contractibility of the output creates scope for non-profit firms to arise, because these organizations provide a way to commit to restricting diversion of funds. Nevertheless, as the well-documented problem of funds diversion in non-profits firms indicates, the non-profit status alone seems to be insufficient for such goal: in many non-profits there remains substantial scope for fund diversion, especially at lower layers of the organization ranks, which is the focus of our work. Besley and Ghatak (2005) study how the effort provision by workers in mission-oriented organizations is affected by the structure of the incentives (in particular, the role of matching the mission preferences of principals and agents). Besley and Malcomson (2018) analyze the effects of competition between the (incumbent) non-profit and (entrant) for-profit providers, in the presence of non-contractible quality. Non-contractibility of output is also at the heart of our model, and we contribute to this line of research by analyzing how a key asymmetry in one of the aspects of non-contractibility (i.e. the agency cost within the non-profit) maps into equilibrium provision of public goods under information disclosure.

A growing number of articles have studied the self-selection into the non-profit/public-good 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 Ghatak (2017), Aldashev et al. (2018), Valasek (2018). The key point of this literature has been centered around the motivational heterogeneity of potential workers/entrants into the non-profit/public-good sector and how sorting into this sector is affected by alternative institutional characteristics. We abstract from the motivational heterogeneity and self-selection, and instead focus on how heterogeneities in agency costs across different types of public goods provision may generate strategic behavior across non-profits in different informational environments.

A number of authors constructed industry-equilibrium models of the non-profit sector. Rose-Ackerman (1982), Castaneda et al. (2008), Aldashev and Verdier (2010), and Heyes and Martin (2017) focus on the effect of competition in the non-profit sector on the fundraising expenditures and the number and variety of non-profits, from the social welfare perspective. 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, which is central for our paper. Moreover, these contributions do not take into account how the informational environment becomes a key determinant of the equilibrium industry structure and its degree of horizontal differentiation.

A few recent empirical papers have explicitly focused on the effects of transparency and increased performance measurement in the non-profit sector. In a laboratory experiment, Metzger and Guenther (2019) study the demand by donors for information about their donations' welfare impact, the beneficiary characteristics, and the administrative costs of the non-profits to which the donation is made. Surprisingly, they find that the demand for information about the welfare impact of donations is relatively small; however, those donors that are willing to obtain the information increase their donations to high-impact projects and cut donations to low-impact projects. In another laboratory experiment, Exley (2020) finds that donors may use charity performance metrics as an excuse to avoid giving. Hence, performance measurement might have the unintended consequence that (at least partially) counterbalances the positive effects of such policies. Relying on observational data, Dang and Owens (2020) apply the forensic economics methods (the Benford's law) to the financial accounts of the UK non-profits and find that the non-profits with a high share of charitable spending report their data more accurately only when their effort on oversight (proxied by the governance-related overhead costs) is sufficiently high. We contribute to this strand of literature by building a theoretical framework that can help thinking about the policy and welfare implications of these findings.

In organizational economics, several key studies focus on the industry equilibrium with endogenous organizational aspects. Over the last decade, the pathbreaking incomplete-contracts approach to the theory of the firm (pioneered by Grossman and Hart, 1986) has been successfully embedded into the industrial-organization analysis, giving rise to the so-called "organizational industrial organization" sub-field (see, e.g., Legros and Newman, 2013; Alfaro et al., 2016; and Legros and Newman, 2014, for a detailed review). These analyses allow us to understand the interplay between the organizational-design aspects of modern corporations and the industry structure and competition. This research line, however, has focused so far only on the private-good sector, whereas the similar analysis of the public-good sector has not yet been constructed. Our paper builds an analytical framework of "organizational industrial organization" of the competitive provision of public goods in an economy.

Besides the "organizational IO" literature, three other papers are closely related to our work. Schmidt (1997) studies the conditions under which increased competition (in the product market) reduces managerial slack. Carlin et al. (2012) show that the presence of comparative performance considerations implies that tougher competition tends to make the disclosure of firms' private information less likely. Hermalin and Weisbach (2012) analyze the bargaining between firms' shareholders and managers and how this bargaining is affected by greater corporate disclosure requirements. The key difference of our work is again the focus on the provision of public goods (where the disconnection between the funding side and the beneficiaries is crucial), whereas these papers focus on the private-good sector of the economy (where such disconnection is either absent or marginal).

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. To highlight the effects of transparency in the use of funds, we assume that the output of the non-profit sector affects the well-being of donors without affecting their incomes.[4]

2.1 Technology and Organizational Structure of Non-Profits

Each non-profit is founded and managed by a social entrepreneur. We assume that 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, because of specialization advantages or the need to know the local context, each social entrepreneur needs to hire one grassroot worker ("local partner") so as to help her fulfill the non-profit's mission. Henceforth, we refer to a social entrepreneur as "she", and to her local partner as "he".

The social entrepreneurs have intrinsic motivation, driven by a sense of pure altruism towards their missions. In other words, they care about the social output generated by the organization that they manage. With regards to the grassroot workers, we instead assume these are self-interested agents who only care about their private payoffs.[5]

Non-profit firms collect donations from private donors who enjoy giving for a social cause (donors' behaviour will be described in the next subsection). 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 this wage lies above the grassroot workers' outside option, so that there is always a sufficient supply of them in the non-profit sector. In addition, a grassroot worker can divert (or misuse) a fraction $t_i \in [0, 1]$ of the total donations D_i that the social manager channels to the fulfilment of the non-profit's mission. To counter this, social entrepreneurs have access to internal control mechanisms that they can use to prevent such rent-seeking within their organizations. In particular, we assume that social entrepreneurs

[4] This assumption may be justified on the grounds that most donors give to social causes that will not directly or significantly impact their income sources. Alternatively, one could think of a setup where non-profits' production occurs in less developed countries whereas the donors are located in developed economies.

[5] Considering all grassroots as self-interested agents who display no intrinsic motivation whatsoever towards to fulfillment of the non-profit's social mission is, of course, a strong assumption. However, none of our main results would be altered if we assumed that a fraction of the grassroot workers display some sense of social-mindedness, provided such intrinsic social-mindedness is unobservable or unknown to social entrepreneurs at the moment of hiring the grassroot workers.

can mitigate the diversion of funds by exerting a costly monitoring effort.

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 up-front (i.e., 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 ($v_B = 1$). Given that we work within a framework where N is a large number, Assumption 1 entails that the size of each subset will be equal to $N/2$.

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 $\widetilde{D}_i$.[6] Henceforth, we let $V_i(\widetilde{D}_i)$ be given by $V_i(\widetilde{D}_i) = \widetilde{D}_i^{\frac{1}{2}}$. Thus, using

[6] Notice that the concavity of V_i with respect to $\widetilde{D}_i$, does *not* actually imply that V_i is also concave with respect to the *total* amount of received donations D_i. Given that $\widetilde{D}_i = (D_i - v_i\varepsilon_i)\,\varepsilon_i$, and that the value of ε_i will be an equilibrium outcome of the model, the response of V_i with respect to D_i will be mediated by how $\widetilde{D}_i$ endogenously responds to D_i.

the expression in (2), we can then write:[7]

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

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 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.

We model 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 $\tau_{j,i} \neq t_i$.[8]

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.

We assume that preferences of donor j are given by:

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

[7] The model could be extended to a encompass a more general concave function $V_i(\widetilde{D}_i) = \psi\, \widetilde{D}_i^{\alpha}$, with $\alpha \in (0, 1)$ and $\psi > 0$. The main reason for fixing $\alpha = \frac{1}{2}$ is that it allows us to obtain neat closed-form solutions for most of the main results of the paper.

[8] 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, e.g., Goldseker and Moody (2017), 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.

where $d_{j,i}$ denotes the amount donated by donor j to non-profit i and $\rho > 0$ is a scalar factor.

The utility function (5) combines the two above-mentioned features that we introduce to the standard warm-glow preferences: (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 $(\sigma_{j,i})$.

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 donor j donates to i is given by:

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

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

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

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. In the former case, donors are assumed to be totally unaware of the cost structure of non-profits. They are also unable to observe non-profits' monitoring effort. By contrast, in the fully-informed case, donors are assumed to be able to observe each single non-profit's monitoring effort. 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 uninformed about the level of rent-seeking that takes place within each organization. This can result, for instance, if donors are unable to observe the monitoring effort exerted by each social entrepreneur (i.e., ε_i is publicly unobservable). Furthermore, we assume that, when considering a generic firm i, donors do not know whether $v_i = v_A$ or $v_i = v_B$. As a consequence, donors are unable to form an expectation about ε_i based on the specific value of v_i.[9] Within such an informational context, it becomes natural to assume that donors will form an expectation about each single non-profit monitoring effort by relying on the average behaviour in the sector.[10] Namely,

Assumption 2 $\tau_{j,i} = \tau_j = \frac{\sum_{s=1}^{N} t_s}{N}$, *for all* j *and all firms* $i = 1, 2, .., N$.

When Assumption 2 holds, one can easily observe that the donation probability (6) reduces 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 the intensity of monitoring effort ε_i by solving:

$$\max_{\varepsilon_i \in [0,1]} : V_i(\varepsilon_i) = \left[\left(\frac{\Delta}{N} - v_i \varepsilon_i \right) \varepsilon_i \right]^{\frac{1}{2}}, \quad \text{where } v_i \in \{v_A, v_B\}. \tag{7}$$

This problem yields:

$$\varepsilon_i^* = \begin{cases} \dfrac{\Delta}{2v_i N} & \text{if} \quad \Delta/2N < v_i, \\ 1 & \text{if} \quad \Delta/2N \geq v_i. \end{cases} \tag{8}$$

The expression in (8) shows that monitoring intensity is (weakly) increasing in the level of aggregate donations, Δ. This is the result of social entrepreneurs intending to limit how much of the donations is diverted by the grassroot workers while simultaneously try not sacrifice too much of the donations on costly monitoring. As the level of donations per non-profit increases with Δ, social entrepreneurs raise the level of monitoring (as long as $\varepsilon_i^* < 1$), since the amount of donations saved from diversion per dollar spent on monitoring rises with the gross donations received by each non-profit. In addition, we can also observe from (8) that 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 private donors are fully informed about the level of rent-seeking that takes place in each non-profit present in the market. More specifically, we now substitute Assumption 2 with the following one:

[9] For small donors, this assumption can be justified by the fact that collecting information about the accounts and the internal organization of a non-profit, and understanding how to extract information from these accounts about the net impact of a donation is an arduous task and its cost is prohibitively high for an individual donor in isolation.

[10] We could alternative obtain the statement in Assumption 2 (and, similarly, later on the statement in Assumption 3) as equilibrium result of the model given the information available to donors.

Assumption 3 $\tau_{j,i} = t_i$ *for all* j *and all firms* $i = 1, 2, .., N$.

Using the donation probability (6) in conjunction with Assumption 3, it follows that the amount of donations received by non-profit i is given by:

$$D_i = \frac{\varepsilon_i}{E}, \quad \text{where } E \equiv \varepsilon_i + \sum\nolimits_{l \in \mathcal{N}, l \neq i} \varepsilon_l. \tag{9}$$

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

$$\max_{\varepsilon_i \in [0,1]} : V_i(\varepsilon_i, E) = \left[\left(\frac{\varepsilon_i}{E} \Delta - v_i \varepsilon_i \right) \varepsilon_i \right]^{\frac{1}{2}}, \quad \text{where } v_i \in \{v_A, v_B\}. \tag{10}$$

Recall that N is assumed to be a large number. Therefore, when solving (10), non-profit manager i takes E as given. This generates the following best-response functions:

$$\varepsilon_i^{br}(E; \Delta, v_i) = \begin{cases} 0 & \text{if} \quad \Delta/E < v_i, \\ [0,1] & \text{if} \quad \Delta/E = v_i, \\ 1 & \text{if} \quad \Delta/E > v_i. \end{cases} \tag{11}$$

As we can observe from (11), the best-response functions yield corner solutions for ε_i. The only exception is the knife-edge case when $\Delta/E = v_i$, in which social entrepreneurs are indifferent amongst any admissible level of 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 solution stemming from the best-response functions of all non-profit managers. Henceforth, we restrict the analysis to symmetric equilibria in pure strategies by types of firms.[11]

Lemma 1 *Let* N *be large, and suppose Assumption 3 holds true. Then, in equilibrium:*

1. *If* $\frac{\Delta}{N} \geq k$, $\widehat{\varepsilon}_i = 1$ *for all* $i \in \mathcal{N}$.

2. *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* $\widehat{\varepsilon}_A = (2\Delta/Nk) - 1$

3. *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* $\widehat{\varepsilon}_A = 0$.

[11] 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.

4. *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* $\widehat{\varepsilon}_A = 0$.

The results in Lemma 1 may be compared vis-a-vis those that arise with uninformed donors in (7). An interesting observation that emerges 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, for values of Δ/N below $\frac{4}{3}k$, the level of monitoring effort exerted by firms with $v_A = k$ becomes smaller in the regime with informed donors than in the one with uninformed donors. Even more strikingly, when Δ/N is smaller than $\frac{1}{2}k$, monitoring effort by high-cost firms falls all the way down to zero, meaning that they cease to operate in equilibrium.

The underlying reason for such asymmetric impact of transparency on monitoring effort across non-profits with different monitoring cost is to do with the tension between two opposing strategic forces. On the one hand, transparency generates a *positive* competitive effect, as it fosters monitoring effort so as to curb funds diversion and thus attract more donors. On the other hand, the presence of informed donors also brings about a *negative* interaction effect across non-profits: stronger monitoring intensity by other non-profits (materialised in a greater value of E) lower non-profit i's marginal return from monitoring intensity in terms of its capacity of attracting donations. Given the difference in monitoring cost across non-profits, those facing a higher cost of monitoring 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 susceptibile to funds misuse. Nevertheless, in a context of diverse social missions, it comes at the expense of leaving out some social problems unserved. In the next sections, we analyze this tension in a framework with endogenous entry.

4 Entry into the Non-Profit Market

We let now N be endogenously determined as a result of equilibrium entry decisions by the set of *potential* social entrepreneurs. Suppose that potential non-profit managers have an opportunity cost of running a non-profit firm equal to ϕ which we normalize to 1. 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 non-profit manager learns this value only *after* setting up the non-profit firm.[12]

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:

$$\frac{V_A + V_B}{2} = 1, \tag{12}$$

where V_i denotes the payoff of social entrepreneur i under monitoring cost $v_i \in \{v_A, v_B\}$. The equilibrium expressions of V_A and V_B will depend on the informational regime.

To keep the analysis consistent with Section 3, we consider that the free-entry equilibrium condition (12) always leads to a large value of N (which amounts to assuming that Δ is a large number). This has two implications. Firstly, there will be $N/2$ non-profits with monitoring cost $v_A = k$ and $N/2$ with monitoring cost $v_B = 1$. Secondly, in a regime with informed donors, each individual non-profit manager i will disregard the effect of her own monitoring choice ε_i on the aggregate monitoring effort level, $E \equiv \sum_{l=1}^{N} \varepsilon_l$.

[12] Our main results would still hold true if social entrepreneurs knew the v_i that applies to their non-profit, but they differ in terms of their outside option value (i.e., $\phi_i \subset \mathbb{R}_{++}$), as long as the specific values of $\phi_i \subset \mathbb{R}_{++}$ and $v_i \in \{v_A, v_B\}$ are drawn independently and from identical probability distributions. 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. In any case, assuming that social entrepreneurs find out the specific value of their monitoring cost $v_i \in \{v_A, v_B\}$ only after setting up their non-profit is akin to assuming that social entrepreneurs discover the intricacies of managing their projects (and in particular the human resource management challenges) only once their non-profits are operational.

4.1 Equilibrium with Uninformed Donors

From (7) and (8), it follows that in a regime with uninformed donors the payoff obtained by social entrepreneur $i \in \mathcal{N}$ with $v_i \in \{v_A, v_B\}$ will be

$$V_i^* = \begin{cases} \dfrac{\Delta}{2\sqrt{v_i}N} & \text{if} \quad v_i > \dfrac{\Delta}{2N}, \\ \left(\dfrac{\Delta}{N} - v_i\right)^{\frac{1}{2}} & \text{if} \quad v_i \leq \dfrac{\Delta}{2N}. \end{cases} \tag{13}$$

Using (13) while bearing in mind (12), we obtain the following result:

Proposition 1 *Suppose Assumption 2 holds true. Let N^* denote the value of N that satisfies condition (12). Then,*

$$N^* = \frac{k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}}{10k}\Delta, \tag{14}$$

where notice that $\partial N^*/\partial k < 0$ for all $k > 1$. The equilibrium levels of monitoring effort by the non-profit managers with costs $v_i = v_A$ and $v_i = v_B$ are given, respectively, by:

$$\varepsilon_A^* = \frac{5}{\left[k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}\right]} < 1 \tag{15}$$

$$\varepsilon_B^* = 1 \tag{16}$$

Proposition 1 describes how the number of potential social entrepreneurs deciding to set up a non-profit firm varies with k. Intuitively, a higher value of the monitoring cost for the social entrepreneurs drawing $v_i = v_A$ lowers the overall expected return of setting up a non-profit, hence reducing entry into the non-profit market. Proposition 1 also shows that, for all $k > 1$, 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 at the maximum level (i.e., $\varepsilon_B^* = 1$). Consequently, the regime with uniformed donors will always exhibit a positive level of funds diversion in equilibrium, which will takes place in those non-profits facing the higher level of marginal cost of monitoring.

4.2 Equilibrium with Informed Donors

As Lemma 1 shows, whenever N is greater than $2\Delta/k$, some social entrepreneurs deciding to found a non-profit end up exerting zero monitoring effort in equilibrium. In that case, some of the N non-profits remain *inactive* ex-post.

Proposition 2 *Suppose Assumption 3 holds true. 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 entrans who remain active after learning their monitoring cost parameter $v_i \in \{v_A, v_B\}$. Then,*

1. *When $k > 5$, 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 given by:*

$$\widehat{n} = \frac{\widehat{N}}{2} = \frac{\Delta}{5}. \tag{17}$$

2. *When $k \leq 5$, 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:*

$$\widehat{n} = \widehat{N} = \frac{16}{(k-5)^2 + 16k}\Delta. \tag{18}$$

Proposition 2 shows that the number of active non-profits $\widehat{n}$ is weakly decreasing in k (and strictly decreasing in k for $k \leq 5$). The relationship between $\widehat{n}$ and k is qualitatively analogous to that displayed in (14) in Proposition 1. Yet, despite their similarities, there is an important difference between the results in Proposition 1 and Proposition 2. In a regime with uninformed donors *all* potential social entrepreneurs who choose to enter the non-profit market will (ex-post) remain active, and they will all receive a positive share of the total pool of donations. This is no longer the case under full transparency: when $k > 5$, only those who enter the non-profit market and receive a draw $v_i = v_B$ will end up (actively) running a non-profit and receiving positive donations in equilibrium.

Proposition 2 illustrates againt 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 tends to depress monitoring effort by non-profits that find it harder to rein in the diversion of funds. Notice that the value of k governs the degree of heterogeneity in costs to curb rent-seeking across non-profits. 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.

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 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.

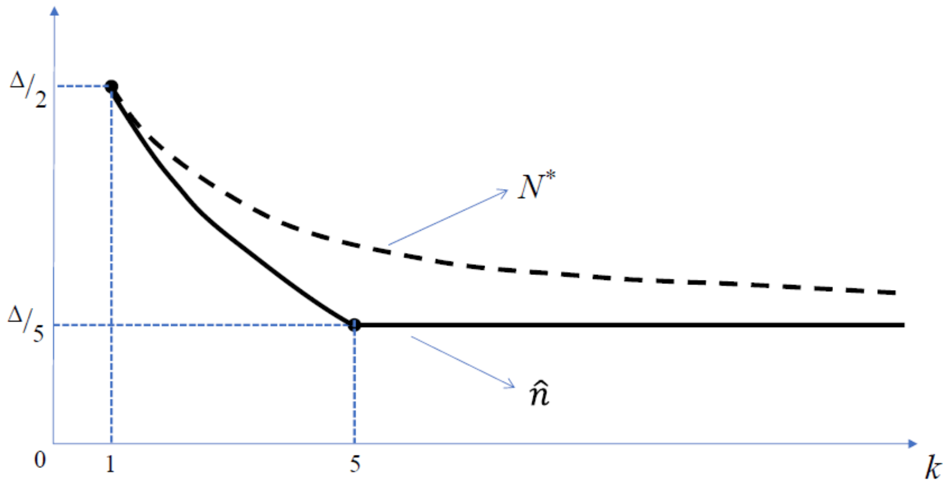
Proposition 3 *The number of active non-profits is always smaller under full transparency than in the regime with uninformed donors; that is,* $\widehat{n} < N^*$.

The result in Proposition 3 is 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 the regimes with informed and uninformed donors.

What are the reasons underlying $\widehat{n} < N^*$? For values of $k > 5$, 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. The main reason for $\widehat{n} < N^*$ is substantially different 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.

Another interesting feature of Figure 2 is the fact that the difference between N^* and $\widehat{n}$ is non-monotonic in k. In particular, we can observe that: *i)* $N^* - \widehat{n} \to 0$ as k approaches 1, *ii)* $N^* - \widehat{n}$ increases with k when $k \in (1, 5)$, *iii)* $N^* - \widehat{n}$ decreases with k when $k > 5$, converging asymptotically to zero as k grows to infinity. Intuitively, as k rises within the interval $k \in (1, 5)$, the rat race distortion mentioned above becomes more severe to those

Figure 2. Model with N non-profits: equilibrium number of active non-profits, as a function of asymmetry in monitoring costs



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 $(\widehat{n})$. Contrarily, in the regime with uninformed donors, a higher k will always hurt the payoff of social entrepreneurs with $v_i = k$, as those agents 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

The result in Proposition 3 gives us no information about the levels of *aggregate* non-profit output in each regime. We now show that the value of k is also crucial for determining which of the two regimes yields greater aggregate output. In addition, we show that the output gap between the 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,*

1. *$V^{UN} > V^{IN}$ for all $k \in (1, 5)$. Furthermore, $\partial(V^{UN} - V^{IN})/\partial k > 0$ for all $k \in (1, 5)$, while $\lim_{k \to 1} \left(V^{UN} - V^{IN}\right) = 0$.*

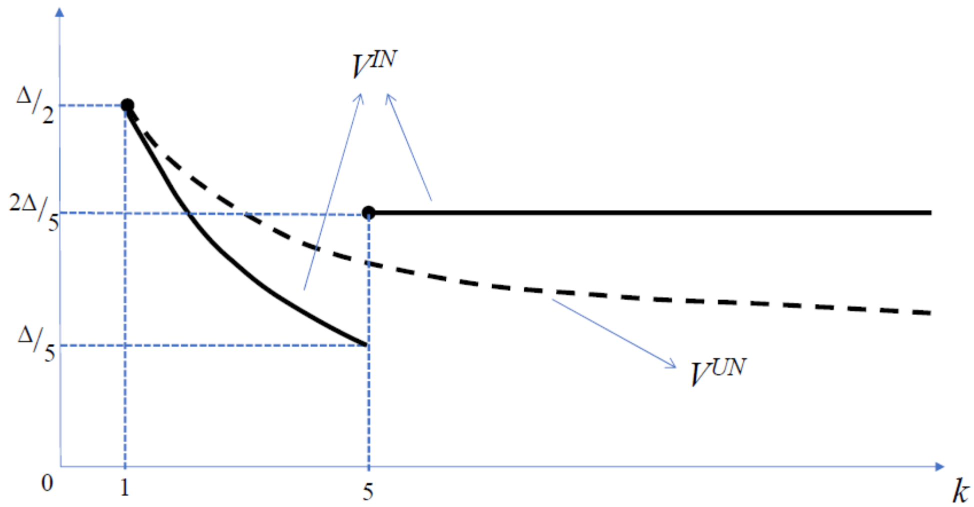
2. *$V^{IN} > V^{UN}$ for all $k \geq 5$. Furthermore, $\partial(V^{IN} - V^{UN})/\partial k > 0$ for all $k \geq 5$.*

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 between the rat-race distortion in monitoring spending induced by full transparency, and the fact that informed donors tend to channel their donations to cleaner non-profits. It turns out that this trade-off behaves non-monotonically with respect to k.

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 exert sufficient monitoring effort to keep funds diversion at relatively low levels, even when donors remain uninformed about the level of diversion. This in turn means that aggregate spending on monitoring in the regime with informed donors is unnecessarily high, as a result of the rat race mentioned above. The severity of the rat race distortion becomes worse when k is greater, which is why the gap between V^{UN} and V^{IN} grows with k while $k \in (1, 5)$. 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 keeps rising above five.

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 (i.e., when k is around 5) 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.

Figure 3. Model with N non-profits: aggregate non-profit output, as a function of asymmetry in monitoring costs



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 sources of uncertainty are revealed to the donor (i.e., before the taste shocks $\{\sigma_{j,i}\}_{i=1,..,N}$ are drawn for donor j). This is analogous to computing the aggregate expected utility of the unit continuum of donors. Hence, the welfare 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 on 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.[13]

Consider first the regime with informed donors. In equilibrium, social entrepreneurs

[13] Our model has implicitly imposed a given degree of differentiation of donors' tastes. This could be relaxed by generalising (4) to the case where $f(\sigma) = \exp(-\sigma^{-\theta})\sigma_{j,i}^{-(1+\theta)}$. A larger value of θ in the Fréchet distribution will be associated with a less dispersed distribution of tastes shocks. Naturally, weaker "love of variety" by donors will make it more likely that they prefer the regime with full transparency.

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:

$$\mathrm{E}_{IN}(U_j) = \int_0^\infty \sigma_{j,IN}^{\max}\, \widetilde{f}\left(\sigma_{j,IN}^{\max}\right)\, d\sigma_{j,IN}^{\max},$$
$$\text{where: } \sigma_{j,IN}^{\max} \equiv \max\{\sigma_{j,1}, \sigma_{j,2}, .., .\sigma_{j,\widehat{n}}\} \quad \text{and} \quad \widetilde{f}\left(\sigma_{j,IN}^{\max}\right) = \widehat{n}\frac{\exp(-\widehat{n}\sigma_{j,IN}^{\max})}{(\sigma_{j,IN}^{\max})^2}. \tag{19}$$

In (19) $\widetilde{f}(\sigma_{j,IN}^{\max})$ is the probability density function of the extreme value $\sigma_{j,IN}^{\max}$, and its particular shape follows from the Fréchet distribution (4). Intuitively, in a regime with informed donors, all *active* non-profits (which amount to the number $\widehat{n}$) will set in equilibrium $\varepsilon^* = 1$. As a result, a generic donor j will always choose to give his unit donation to the non-profit carrying the highest taste shock, denoted by $\sigma_{j,IN}^{\max}$. Notice also that donors know that no rent-seeking will ever take place in equilibrium in this regime, hence their expected utility in (19) attaches no discount on the donation.[14]

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:

$$\mathrm{E}_{UN}(U_j) = \int_0^\infty \left(\tfrac{1}{2}\,\varepsilon_A^*\,\sigma_{j,UN}^{\max} + \tfrac{1}{2}\varepsilon_B^*\,\sigma_{j,UN}^{\max}\right)\, \widetilde{f}\left(\sigma_{j,UN}^{\max}\right)\, d\sigma_{j,UN}^{\max},$$
$$\text{where: } \sigma_{j,UN}^{\max} \equiv \max\{\sigma_{j,1}, \sigma_{j,2}, .., .\sigma_{j,N^*}\} \quad \text{and} \quad \widetilde{f}\left(\sigma_{j,UN}^{\max}\right) = N^*\frac{\exp(N^*\sigma_{j,UN}^{\max})}{(\sigma_{j,UN}^{\max})^2}. \tag{20}$$

In the case of (20), $\widetilde{f}\left(\sigma_{j,UN}^{\max}\right)$ is the probability density function of the extreme value $\sigma_{j,UN}^{\max}$. In addition, ε_A^* is given by (15), while $\varepsilon_B^* = 1$. 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 2 *The expected utility of a donor j in the two regimes compares as*

$$\mathrm{E}_{IN}(U_j) \gtreqless \mathrm{E}_{UN}(U_j) \quad \Leftrightarrow \quad \frac{\widehat{n}}{N^*} \gtreqless \frac{1+\varepsilon_A^*}{2}, \tag{21}$$

[14] That is, donor j knows that, in equilibrium, he will always end up giving to a firm for which $\tau_{j,i} = t_i = 0$.

where $\widehat{n}$ is given by (17) when $k \geq 5$ and by (18) when $k < 5$, N^* is given by (14), and ε_A^* is given by (15).

Condition (21) pins down precisely 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 (21) to the value of the marginal cost of monitoring in the less efficient non-profits (k).

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

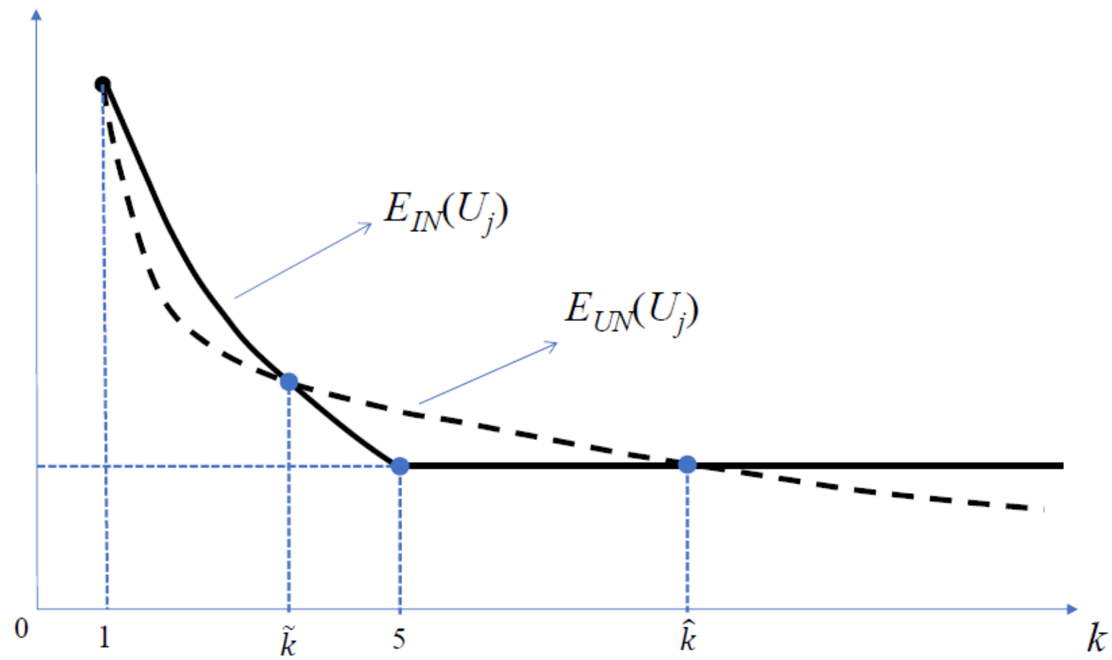
1. *A generic donor j behind the veil of ignorance prefers a regime with full transparency to a regime with uninformed donors for all $k \in (1, \widetilde{k})$, and for all $k > \widehat{k}$.*

2. *A generic donor j behind the veil of ignorance prefers a regime with uninformed donors to a regime with full transparency for all $k \in (\widetilde{k}, \widehat{k})$.*

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

Proposition 5 and Figure 4 show that, if donors could choose (behind the veil of ignorance) between the two regimes, they would prefer to remain uninformed for values of $k \in (\widetilde{k}, \widehat{k})$. The intuition for this result is clear if one recalls Figure 2. The gap between N^* and $\widehat{n}$ (the loss of non-profit variety in the full-transparency regime) is widest for levels of k around 5. As k approaches 1, the gap between $\widehat{n}$ and N^* narrows, and this happens at a faster speed than the shrinking of the ratio $(1+\varepsilon_A^*)/2$ with a declining k. In other words, 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 (under uninformed-donors regime as compared to the full-transparency regime). At $k = \widetilde{k}$, these two effects cancel each other, and for k below $\widetilde{k}$, the welfare loss from less non-profit variety is smaller than the welfare gain from the more intense monitoring by active non-profits. On the other hand, for values of $k > \widehat{k}$, the equilibrium level of monitoring effort ε_A^* is too low in order to compensate for the larger variety of non-profits that donors can choose from in a regime with uninformed donors.

Figure 4. Model with N non-profits: donors' welfare as a function of asymmetry in monitoring costs



The result in Proposition 5 crucially rests on a general equilibrium consideration. A generic donor j may prefer a regime where donors remain uninformed about the level of diversion *not* because he appreciates ignorance *per se*. Indeed, should a donor be offered the option to observe or not the level of funds diversion, any rational donor would always choose complete observability if facing this choice *individually* (i.e., while all other donors remained uninformed about funds diversion). However, the regime with full transparency does not offer this option individually, but does it to all the donors at the same time. In such a situation, a generic donor j may turn out to be better off in a context in which *no one* can observe the level of 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.

6 Conclusion

We have analyzed the implications of transparency/"value-for-money" policies in the non-profit sector, and how the moral hazard problem inside non-profit organizations interacts with the competitive structure of the sector. Our main result is that more transparency on the use of funds has an ambiguous effect on the total public good provision and the welfare of donors. This occurs because of the two opposed forces. On the one hand, more transparency encourages a non-profit manager to devote more resources to monitoring and curbing rent-seeking inside her organization. On the other hand, more transparency encourages managers of *some* non-profits (those with higher cost of monitoring) to reduce the internal resources devoted to preventing rent-seeking. From the donors' perspective, there are also two corresponding opposed effects: transparency is desirable because of the reduction in diversion for the non-profits active in the market, but it also backfires because of a lower diversity of non-profits, hence reducing the set of charitable causes among which a donor can choose.

Our analysis fits into the broad debate about the new architecture of foreign aid that features more reliance on NGOs, community-driven development, and impact philanthropy (see, for instance, Smillie, 1995, Platteau and Gaspart, 2003; Easterly, 2008; Mansuri and Rao, 2012). Our main policy implication of is that in the contexts where the strategic-interaction effect is important, it leads to the under-provision of public goods in dimensions where monitoring is relatively more costly. This is crucial, for example, when development 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). In such settings, our analysis suggests that the transparency initiatives should be paired with increased public funding earmarked for NGOs engaged in projects with more costly monitoring, so as to avoid the loss of project diversity that more intense competition might trigger.

A natural avenue for future research is to test empirically the mechanisms proposed in our model. This would required first of all identifying a clear date of introduction of a policy requiring more transparency, at an aggregate (e.g. national) level. Secondly, data (proxies) on non-profit behavior in terms of monitoring and project choice (before and after the policy) would need to be collected. Although this might seem challenging, the proxies developed in recent empirical work on transparency (e.g. Dang and Owens, 2020) seem promising. Given the potential policy importance, we hope that our study encourages further empirical and theoretical investigation on the strategic behavior of non-profits in response to changes in information-related policy initiatives.

Appendix A: Proofs

Proof of Lemma 1. 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 (11), there can be four different equilibrium classes, which are those laid out in Lemma 1. From this, we can observe the results in cases 1 and 3 follow straightforwardly from (9) and (11), 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 $\Delta/N = \frac{1}{2}$. ■

Proof of Proposition 1. Suppose that the equilibrium with uniformed donors satisfies $1 \leq \Delta/2N^* < k$. In that case, in equilibrium, we will have that $\varepsilon_A^* < \varepsilon_B^* = 1$. From this, using (12) and (13), it follows that N^* will stem from the following condition:

$$\frac{1}{2}\left[\left(\frac{\Delta}{N} - 1\right)^{\frac{1}{2}} + \frac{\Delta}{2\sqrt{k}N}\right] = 1. \tag{22}$$

Solving (22), the result in (14) obtains. Next, note that $\Delta/2N^* < k$ holds true for any $k > 1$ when N^* is given by (14). In addition, since N^* is strictly decreasing in k, it follows that the condition $\Delta/2N^* \leq 1$ will also always hold true for any $k > 1$. As a result, for any $k > 1$, the equilibrium must always necessarily verify $\varepsilon_A^* < \varepsilon_B^* = 1$ as initially stated. ■

Proof of Proposition 2. Firstly, recall from Lemma 1, it follows that there cannot be an equilibrium where $\widehat{\varepsilon}_A = 1$ and $\widehat{\varepsilon}_B = 0$. Secondly, notice that the equilibrium entry condition

(12) 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 $\widehat{\varepsilon}_B = 0$ 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 (17) 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 (17). Replacing (17) 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, notice that when the Nash equilibrium entails $\widehat{\varepsilon}_i = 1$ for all $i \in \mathcal{N}$, 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 (12). This leads to

$$\left(\frac{\Delta}{\widehat{n}} - 1\right)^{\frac{1}{2}} + \left(\frac{\Delta}{\widehat{n}} - k\right)^{\frac{1}{2}} = 2, \tag{23}$$

from where (18) 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 (18) 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 (22), 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 (14) 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 (14) and (18), we have that:

$$\frac{N^*}{\widehat{n}} = \Psi(k) \equiv \frac{\left[k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}\right] \left[(k-5)^2 + 16k\right]}{160k}, \tag{24}$$

where from (24) 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 (12) 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 (14) and (18).

To prove the second part of the proposition, note from (14) 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 2. 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 (17) and (18), N^* by (14), ε_A^* by (15), and $\varepsilon_B^* = 1$, from where (21) obtains. ■

Proof of Proposition 5.

Let first $k > 5$. Plugging (14), (15), and (17), into (21), it follows that $E_{IN}(U_j) > E_{UN}(U_j)$ if and only if the following condition holds:

$$\Upsilon(k) \equiv \frac{5}{4k^{\frac{1}{2}}} + \frac{k + 2k^{\frac{1}{2}} + \left(k^2 + 4k^{\frac{3}{2}} - k\right)^{\frac{1}{2}}}{4k} < 1. \tag{25}$$

Notice now from $\Upsilon(k)$ in (25) 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 (14), (15), and (18), into (21), it follows that $E_{IN}(U_j) > E_{UN}(U_j)$ if and only if the following condition holds true:

$$\widetilde{\Upsilon}(k) \equiv \frac{\Upsilon(k)}{5}\left[\left(\frac{k-5}{4}\right)^2 + k\right] < 1, \tag{26}$$

where $\Upsilon(k)$ is defined in (25). Note now that $\widetilde{\Upsilon}(k)$ as defined in (26) satisfies the following conditions: *i)* $\widetilde{\Upsilon}(5) > 1$; *ii)* $\widetilde{\Upsilon}(1) = 1$; *iii)* there exists a value $k_{\min} \in (1, 5)$ 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 $1 < k < \widetilde{k}$. ■

Appendix B: Extensions

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:

$$f(\sigma_{j,i}) = \exp(-\sigma_{j,i}^{-\theta})/\sigma_{j,i}^{1+\theta}, \quad \text{where } \theta \geq 1. \tag{27}$$

In the benchmark model, we have restricted the analysis to the case in which $\theta = 1$. The parameter θ in (27) mainly governs the variance of σ. Specifically, the larger θ, the smaller the dispersion of the random variable generated by (27). 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 (27).[15] As a consequence, we will focus only on the equilibrium results with fully informed donors. When using (27), the amount of donations received by non-profit i will be given by:

$$D_i = \frac{\varepsilon_i^\theta}{E}, \quad \text{where } E = \varepsilon_i^\theta + \sum\nolimits_{l \in \mathcal{N}, l \neq i} \varepsilon_l^\theta, \tag{28}$$

where notice that (28) boils down to (9) 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

$$\max_{\varepsilon_i \in [0,1]} : \left[\left(\varepsilon_i^{1+\theta} \cdot (\Delta/E) - v_i \varepsilon_i^2 \right) \right]^{\frac{1}{2}}. \tag{29}$$

Note now that in (29) the exponent $1 + \theta \geq 2$. As a consequence, its solution will be characterised by identical corner solutions for any $\theta \geq 1$. Specifically, (29) will yield as solution the exact same best-response functions as those previously obtained with $\theta = 1$ in

[15] 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 $f(\sigma)$.

(11).[16] This will, in turn, imply that all the equilibrium results obtained in Lemma 1 and Proposition 2 will all hold true exactly as stated in the benchmark model for any $\theta \geq 1$.

Donors' Welfare

The only main result of the model that will be subject to some changes when replacing (4) by its more general version (27) 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 (27) we can obtain a generalised expression for the statement in Lemma 2, which would now read as follows:

$$\mathrm{E}_{IN}(U_j) \gtreqless \mathrm{E}_{UN}(U_j) \quad \Leftrightarrow \quad \left(\frac{\widehat{n}}{N^*}\right)^{\frac{1}{\theta}} \gtreqless \frac{1+\varepsilon_A^*}{2}, \tag{30}$$

where, exactly as in (21), $\widehat{n}$ is given by (17) when $k \geq 5$ and by (18) when $k < 5$, N^* is given by (14), and ε_A^* is given by (15).

The difference between (21) and (30) 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 (30) 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 (27).

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 $\widetilde{k}(\theta) \in (1,5)$, 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 $k > \widehat{k}(\theta)$.*

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

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 $k > 1$.*

Proof. Notice first that Proposition 5 combined with (30) 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 $\mathrm{E}_{UN}(U_j) > \mathrm{E}_{IN}(U_j)$. 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 (30) 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 (27). 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. To scale donors' utility for different levels of θ, we let now ρ in (5) be equal to $\left(\Gamma(1-\theta^{-1})\right)^{-1}$, where $\Gamma(\cdot)$ denotes the gamma function.

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. 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 $\alpha \in (0, 1)$.[17] 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:

$$\Delta\left(E(U)\right) = \left(E(U)\right)^\alpha . \tag{31}$$

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

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

[17] 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.

Using the fact that in the uniformed 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 (31), we can obtain:

$$E^*_{UN}(U) = (\Omega(k))^{\frac{1}{\theta-\alpha}}\left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\theta}{\theta-\alpha}}. \tag{32}$$

Plugging (32) back in (31), yields level of donations that hold in the equilibrium with uniformed donors and endogenous donations:

$$\Delta^*_{UN} = (\Omega(k))^{\frac{\alpha}{\theta-\alpha}}\left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\alpha\theta}{\theta-\alpha}}. \tag{33}$$

Finally, plugging (33) back into $N^* = \Omega(k)\,\Delta^*$ yields the number of active nonprofits in an equilibrium with uninformed donors and endogenous donations:

$$N^* = (\Omega(k))^{\frac{\theta}{\theta-\alpha}}\left(\frac{1}{4k\Omega(k)} + \frac{1}{2}\right)^{\frac{\alpha\theta}{\theta-\alpha}}. \tag{34}$$

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 (17) and (18) for $\Delta = \Delta^*$, and letting $\Delta^* = (E^*_{IN}(U))^{\alpha}$, we can obtain:

$$E^*_{IN}(U) = \begin{cases} \left[\left((k-5)/4\right)^2 + k\right]^{-\frac{1}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{1}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{35}$$

Plugging (35) back in (31), yields:

$$\Delta^*_{IN} = \begin{cases} \left[\left((k-5)/4\right)^2 + k\right]^{-\frac{\alpha}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{\alpha}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{36}$$

Lastly, replacing (36) into the corresponding expressions in (17) and (18) yields the number of active nonprofits in an equilibrium with informed donors and endogenous donations:

$$\widehat{n} = \begin{cases} \left[\left((k-5)/4\right)^2 + k\right]^{-\frac{\theta}{\theta-\alpha}} & \text{if } k \in (1,5)\,, \\ 5^{-\frac{\theta}{\theta-\alpha}} & \text{if } k \geq 5. \end{cases} \tag{37}$$

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 (31).[18] 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 (31), 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 (34) and (37) 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 (31), and hence N^* is given (34) by and $\widehat{n}$ by (37). 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

[18] To see this formally, note that the model where Δ is determined by (31) 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 (32) and (32) that whenever the equality above holds true, we will also have $E^*_{UN}(U) = E^*_{IN}(U)$ for any $0 < \alpha < 1$.

hand, notice from (34) 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 $E^*_{UN}(U) = E^*_{IN}(U)$ 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 (37) 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 (34) and (37) 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 (31), within the context of the generalised Frechet distribution (27). 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 uniformed one. As a consequence, the pool of donors will also be larger in the informed regime than in the uniformed 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.

References

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

[2] 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.

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

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

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

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

[7] 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.

[8] Bilodeau, M. & Steinberg, R. (2006). "Donative non-profit organizations." Chapter 19 in S.-C. Kolm and J. Mercier Ythier (eds.), *Handbook of the Economics of Giving, Altruism, and Reciprocity*, Amsterdam: North-Holland, 2006.

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

[10] 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.

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

[12] 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.

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

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

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

[16] Exley, C. L. (2020). Using charity performance metrics as an excuse not to give. *Management Science*, 66(2), 553-563.

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

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

[19] Gregory, A. G. & Howard, D. (2009). The non-profit starvation cycle. Stanford Social Innovation Review, 7(4), 49-53.

[20] Grossman, S. J., & Hart, O. D. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, 94(4), 691-719.

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

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

[23] Iossa, E., & Saussier, S. (2018). Public-private partnerships in Europe for building and managing public infrastructures: An economic perspective. *Annals of Public and Cooperative Economics*, 89(1), 25-48.

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

[25] Lecy, J., & Searling, E. (2015). Anatomy of the nonprofit starvation cycle. *Nonprofit and Voluntary Sector Quarterly* 44(3): 539-563.

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

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

[28] Mansuri, G., & Rao, V. (2012). *Localizing development: Does participation work?* Washington, DC: The World Bank.

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

[30] 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.

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

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

[33] Salamon, L., and Newhouse, C. (2019). The 2019 Nonprofit Employment Report, *Nonprofit Economic Data Bulletin* no. 47. Baltimore: Johns Hopkins Center for Civil Society Studies. Available at ccss.jhu.edu.

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

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

[36] Schubert, P., & Boenigk, S. (2019). The nonprofit starvation cycle: Empirical evidence from a German context. *Nonprofit and Voluntary Sector Quarterly*, 48(3), 467-491.

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

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