When warm glow burns: Motivational (mis)allocation in the non-profit sector*

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Abstract

We build a simple occupational-choice model of the non-profit sector and private warm-glow donations. Lack of monitoring on the use of funds in the non-profit sectors implies that factors that increase funds of the non-profit sector (higher income in the for-profit sector, stronger preference for giving, or inflows of foreign aid) worsen the motivational composition and performance of the non-profit sector. If motivated donors give more than unmotivated ones, there exist two stable (motivational) equilibria. Linking donations to the motivational composition of the non-profit sector or tax-financed public funding of non-profits can eliminate the bad equilibrium.

Keywords: non-profit organizations, charitable giving, altruism, occupational choice.

JEL codes: L31, D64, J24, D5.

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1 Introduction

Public goods are often provided outside the public sector. A large fraction of typical public and quasi-public goods are provided and produced privately, in particular by non-profit organizations. For instance, 67% and 42% of the inpatient hospitals in the United States and Germany, respectively, are non-profits. 100% of orchestra and opera theaters in the United Kingdom and Japan are non-profit organizations (Bilodeau and Steinberg 2006). The role of the non-profit sector was particularly large back in history, when the taxing capacity of the state was relatively weak, and most of public-good needs were taken care of by non-profits, often of religious orientation. The role of non-profits in national economies remains important also nowadays: in the OECD countries, on average, 7.5 per cent of economically active population is employed in the non-profit sector, and for some countries (Belgium, Netherlands, Canada, U.K., Ireland) this share exceeds 10 per cent (Salamon 2010).

While a part of the financing of non-profits comes from the government via grants, and another part from fees, a large share of the non-profits' budgets is financed through voluntary private donations. Bilodeau and Steinberg (2006: 1285) report that, on average, for the 32 countries for which comparable data on non-profits is available, over 30% of financing comes from private giving, and more that three-quarters of this consists of small donations. Given the public-good nature of the services typically provided by non-profits, this suggests that contributions to non-profits are motivated by some form of altruism on behalf of donors.

Recent lines of research in public, experimental, and behavioral economics have shown that explaining empirical facts about giving requires the acknowledgment of private psychological benefits that a donor perceives from the act of giving. This is the so-called "warm-glow" motivation, first modelled by Andreoni (1989). For example, using a six-year panel of donations and government funding from the United States to 125 international relief and development organizations, Ribar and Wilhelm (2002) find that only the warm-glow motive is consistent with the observed absence of the crowding out of private donations to non-profits.[1] In laboratory experiments, Andreoni and Miller (2002) find that giving re-

[1] In a recent paper, using an instrumental-variable approach, Andreoni and Payne (2011) document substantial crowding out of private giving to charities by government grants (about 75 per cent). Virtually all of the crowding out is caused by non-profits strategically reducing fundraising (rather than donors

sponds to price and income variation in the way that is more consistent with the warm-glow motive than with pure altruism. Similarly, by varying initial endowments within a dictator-game setting, Korenok et al. (2013) find that giving patterns by dictators in 66 per cent of the cases is consistent with warm-glow motive, while only in 16 per cent of cases it is consistent with pure altruism. Finally, in a field experiment where student workers exerted real effort on a data entry task, Tonin and Vlassopoulos (2010) find that in an environment that elicits warm glow altruism (in addition to purely selfish behavior), workers increase effort due to warm glow altruism, and that additionally eliciting pure altruism has no further effect on effort.

Put together, these analyses indicate that in the vast majority of settings, donors' essential motivation for contributing to non-profit organizations is non-instrumental. In other words, donors' motivation mainly comes from the joy of giving.[2]

Donors do not directly provide public goods through their gifts, but donate them to organizations that use these gifts (combined with other inputs) to produce those goods. Importantly, the very nature of the goods and services that these organizations provide implies that it is basically impossible to write contracts that condition payment or future donations on the output produced by these entities (see Hansmann 1996, Chapter 12, and Bilodeau and Slivinski 2006a, Section 4.1., for a detailed discussion). Moreover, the production process in non-profits is typically difficult to monitor from the outside. As much as there is an informational asymmetry about the altruistic motivation of donors, there is also asymmetry of information concerning the motivation of individuals that found and operate non-profit organizations. This creates scope for diversion of the part of the revenues that the organization collects for private benefit of the founder/worker.

Evidence of opportunistic behavior in the non-profit sector abounds. One typical way through which the society tries to limit the scope of such diversion is the well-known non-distribution constraint, which means that legally the organization cannot distribute profits but must reinvest them towards the organization's mission (Hansmann 1996: 229-230). However, this policy clearly reduces the incentives to cut costs. Moreover, given

strategically reducing giving).

[2]In this paper, we mostly focus of the *joy-of-giving* (or *warm-glow*) motive for giving. However, an additional reason why people might be willing to give or donate to others is *social-signalling*, as modelled by Benabou and Tirole (2006). Social-signalling would simply complement and reinforce the joy-of-giving motive we focus on in our model.

the difficulty to control how these costs are calculated, it often spurs in-kind diversion. For instance, Smillie (1995: 151-153) describes how some development-oriented non-profits have used inflated and hidden overheads to engage in the in-kind diversion of funds. Frumkin and Keating (2001) analyze empirically the non-profit executive pay patterns and conclude that "while non-profits may not be breaching the letter of the law, some organizations appear to challenging its spirit: CEO compensation is significantly higher in organizations where free cash flows is present, as measured by commercial revenues, liquid assets and investment portfolios". Malani and Choi (2005) exploit the executive compensation data from 2700 nursing homes in the U.S. and find that the data support the hypothesis that non-profit managers behave as if they cared about profits as much as their counterparts in for-profit firms. Fisman and Hubbard (2005) find, also using the U.S. data, that non-profits in the U.S. states with relatively weak oversight have managerial compensation that is more highly correlated with donation flows and allocate a smaller percentage of donations to the endowment for future expenditures relative to organizations in strong oversight states. Overall, these pieces of evidence suggests that the monitoring of the behavior of non-profit managers is very limited, and has to rely primarily on the intrinsic motivation (self-regulation) of the managers.

One implication of the above considerations is that financing of the non-profit sector influences the composition of the sector, in terms of intrinsic motivation of its managers. In fact, there is some anecdotal evidence from the development non-profit sector in the South (i.e. local NGOs) that generous financing by foreign aid and a massive new emphasis on decentralized development has lead to some perverse effects, by triggering opportunistic behavior and elite capture in these local NGO projects (see, e.g., Platteau and Gaspart 2003).

Economists have analyzed separately the issues of donor motivation, the problem of non-contractability and poor monitoring in the non-profit sector, and the optimal financing of non-profit organizations. Yet, we are still missing a model that ties all these key elements together within a tractable general equilibrium framework. The general-equilibrium analysis of this problem is essential: the relative size of the non-profit sector is sufficiently big that a policy change that affects the behavior of non-profit managers and the entry/exit into the sector will turn out to affect the relative returns in the non-profit and for-profit sectors. Taking them as given might then lead to wrong policy conclusions (for instance, concerning the desirability of more extensive state financing or foreign aid to non-profits).

This paper proposes a tractable general equilibrium occupational-choice model of the non-profit sector and private donations. The model relies on three key assumptions. First, donors give to non-profits essentially because of the warm-glow or social signalling motives, i.e. with a weak link to the expected output generated by the particular donation. Second, monitoring the behavior and knowing the true motivation of the non-profit managers is intrinsically difficult. Third, also resulting from the non-measurability of output of non-profits, donations given to the non-profit sector are shared among the existing non-profits in a manner not strictly related to their productivity.

The model aims to address the following set of questions. What is the equilibrium composition of the non-profit and for-profit sectors, in terms of the intrinsic motivation of agents located in the two sectors? What are their relative equilibrium sizes? What are the implications of the external financing of the non-profit sector? What policies can improve the motivational composition of the non-profit sector? Are results similar if donations respond positively to a better perceived motivational composition of the non-profit sector?

The main mechanism driving our model is individuals' choice between working in the for-profit sector (and, eventually, giving donations) or entering the non-profit sector, on the basis of the individuals' motivation and the expected relative returns in the two sectors. When switching from one sector to the other (e.g. from the for-profit to the non-profit sector), the individual does not internalize the effects that her action imposes on the relative returns of other individuals (by affecting, on the one hand, the total donations pool, and on the other hand, the number of non-profits).

This mechanism generates the following four main results. First, crowding out of motivation: the non-profit sector ends up being sometimes polluted by (intrinsically) unmotivated agents, and the extent of this problem is exacerbated in richer economies or economies where donors give more generously.

Second, foreign aid intermediation through the non-profit/NGO sector may entail perverse effects: the economy may switch from a good to a bad allocation of motivation. One implication is that total output of the non-profit sector is a non-monotonic function of the amount of foreign aid. In particular, there may be an inverted U-shaped relation: at low levels of aid, a small increase in aid increases total non-profit output, as the motivated managers can do more with more funds, but as soon as the motivational composition of the sector starts to change (because of the crowding out), total non-profit output declines. This can explain the micro-macro paradox observed by empirical studies of aid effectiveness (i.e.

the absence of empirical positive effect of aid on output at the aggregate level, combined with numerous positive findings at the micro level).

Third, if motivated donors give more than unmotivated ones, there exist multiple equilibria. For intermediate ranges of productivity in for-profit sector, the model sustains two equilibria (with high and low average motivation in the non-profit sector). Which equilibrium arises depends on how agents' expectations about the relative size of the two sectors coordinate.

Fourth, imposing a policy that increases the cost of founding a non-profit (e.g. increasing the cost of licensing) can improve the motivational composition of the non-profit sector and eliminate the low-motivation equilibrium, when two stable equilibria co-exist. This implies that forcing agents to "burn money" before starting a non-profit might be a good idea to deter the motivational pollution of the non-profit sector by rent-seekers.

1.1 Related literature

Besides the aforementioned papers by Andreoni (1989) and Benabou and Tirole (2006), our paper relates to several other key papers that study pro-social motivation and non-profit organizations (Lakdawalla and Philipson 1998; Glaeser and Shleifer 2001; François 2003, 2007; Besley and Ghatak 2005; Aldashev and Verdier 2010). We contribute to this line of research by endogenizing the occupational choice decision of individuals and exploring the general-equilibrium implications of the financing of the non-profit sector.

The second related strand of literature is the occupational choice models applied to the selection into the public sector and politics (Caselli and Morelli 2004; Macchiavello 2008; Delfgaauw and Dur 2010; Jaimovich and Rud 2012; Bond and Glode 2012). We extend this line of research by analyzing how the selection mechanisms highlighted in these papers apply to the non-profit/NGO sector.

Finally, there is a small but growing theoretical literature that looks at the effects of the modes and quantity of foreign aid financing on the effectiveness of aid (see the survey by Bourguignon and Platteau 2013a). An early paper by Svensson (2000) underlines one channel of how short-term increases in aid flows can trigger rent-seeking "wars" among competing elites in a developing country. A recent paper by Bourguignon and Platteau (2013b) concentrates on moral hazard issues - in particular, that of domestic monitoring on how aid is used - related to the increasing amounts of foreign aid. Here, instead, we discuss a separate novel channel: that of motivational adverse selection into the sector that intermediates foreign aid.

2 Basic model

Consider an economy populated by a continuum of individuals with unit mass. There exist two occupational choices available to each agent: she may become either a *private* entrepreneur in the for-profit sector or a *social* entrepreneur by founding a firm in the non-profit sector. Henceforth, we will refer to the two types of firms as private and non-profit firms. For simplicity, we assume that each entrepreneur founds and manages only one firm. Let N denote the total mass of non-profit managers.

All agents are identically skilled. However, they differ in their level of pro-social motivation, denoted with m_i. There exist two levels of m_i, which we refer to henceforth as *types*: m_H ("motivated") and m_L ("unmotivated"), where $m_H > m_L$. The type m_i is private information. For simplicity, we will focus only on the extreme case in which $m_H = 1$ and $m_L = 0$. In addition, we assume the population is equally split between m_H- and m_L-types.

2.1 For-profit sector

Each private entrepreneur produces an identical amount of output. There are decreasing returns in the private sector, thus while the aggregate output is increasing in the mass of private entrepreneurs, $1-N$, the output produced by each private entrepreneur is decreasing in $1-N$. More precisely, we assume that each private entrepreneur produces

$$y = \frac{A}{(1-N)^{1-\alpha}}, \quad \text{where } 0 < \alpha < 1 \text{ and } A > 0, \tag{1}$$

thus, the aggregate output is $Y = A(1-N)^{\alpha}$. This assumption of decreasing average output can be justified if, for instance, each firm is built around some marketable product idea, and the most productive ideas are discovered first; so as the number of private firms increases, each additional firm is built around an ever less productive idea.

Private-sector entrepreneurs derive utility from their consumption of the private good (c). They also enjoy warm-glow utility from giving to the non-profit sector (d). In particular, we assume all entrepreneurs have the same Cobb-Douglas type utility function:[3]

$$V_P(c,d) = c^{1-\delta} d^{\delta} \frac{1}{\delta (1-\delta)^{1-\delta}}, \quad \text{where } 0 < \delta < 1. \tag{2}$$

Private-sector entrepreneurs maximize (2) subject to (1). The solution of the maximization problem yields $c^* = (1-\delta)\, y$ and $d^* = \delta y$, which in turn implies that at the optimum they obtain an indirect utility

$$V_P^* = y. \tag{3}$$

From the optimization problem of private-sector entrepreneurs, it follows that the total amount of entrepreneurial donations to the non-profit sector is

$$D = \delta (1-N)^{\alpha} A. \tag{4}$$

Obviously, this total amount of donations increases with the productivity of the private sector (A), the number of private firms ($1-N$), the parameter determining the marginal utility of warm-glow giving (δ), and decreases with the speed of fall of average output as the number of private firms grows (α).

2.2 Non-profit sector

The non-profit sector is composed by a continuum of non-profit firms with total mass N. Each non-profit firm is run by a social entrepreneur. We think of each single non-profit firm as a mission-oriented organization (as, for instance, in the seminal paper by Besley and Ghatak, 2005) with a narrow mission targeting one particular social problem (e.g., child malnutrition, air pollution, fighting malaria, saving whales, etc.).

Each non-profit manager i collects an amount of donations σ_i from the aggregate pool of donations D. Part of the collected donations σ_i is used to pay the wage of the non-profit manager w_i, while the rest (the *undistributed donations*) is used as input for the production of the service towards the organization's mission. We measure the effectiveness (output) of each specific non-profit firm by g_i, which is a function of the undistributed donations ($\sigma_i - w_i$). We assume that the output generated by each specific non-profit firm exhibits decreasing returns (in funds invested into the project of the non-profit), namely:

$$g_i = (\sigma_i - w_i)^{\gamma}, \quad \text{where } 0 < \gamma < 1. \tag{5}$$

[3] In Section 3.1 we relax the assumption that warm-glow donations by private entrepreneurs are independent of their level of pro-social motivation by letting δ be type-specific (δ_i), with $\delta_L = 0$ and $0 < \delta_H \leq 1$.

A non-profit manager derives utility from her own consumption (which equals her wage) and from her contribution to the solution of the social problem targeted by her organization's mission (this contribution is equal to g_i). The weight placed on each of two components of utility is given by the non-profit manager's level of pro-social motivation m_i. More precisely, we assume that the utility function of a non-profit manager with motivation m_i is:

$$U_i(w_i, g_i) = w_i^{1-m_i} g_i^{m_i} \frac{1}{m_i^{m_i}(1-m_i)^{1-m_i}}, \quad \text{where } m_i \in \{m_H, m_L\}. \tag{6}$$

In line with the evidence discussed above, we assume that the non-profit sector suffers from poor monitoring by donors. For simplicity, we take the extreme assumption that non-profit managers enjoy full discretion in setting their own wage (subject to the feasibility constraint $w_i \leq \sigma_i$). In addition, we assume that the pool of total donations D is equally shared by all non-profit firms.[4] Then, donations collected by each non-profit firm are

$$\sigma_i = \frac{D}{N} = \frac{\delta A (1-N)^{\alpha}}{N}.$$

Notice that σ_i decreases in N, through two distinct channels: firstly, because total donations D decrease when the mass of private entrepreneurs $(1-N)$ is smaller; secondly, because a rise in the mass of non-profit firms N means that a given total pool of donations D is split among a larger mass of non-profit firms.

Given that $m_H = 1$, motivated non-profit managers place all the weight in their utility function on g, and set accordingly $w_H^* = 0$. As a result, choosing to become a non-profit manager gives to a *motivated* agent the indirect utility equal to

$$U_H^* = \left(\frac{D}{N}\right)^{\gamma} = \left[\delta A \frac{(1-N)^{\alpha}}{N}\right]^{\gamma}. \tag{7}$$

Analogously, given that $m_L = 0$, unmotivated non-profit managers disregard contributing to their organizations' mission, and convert all the donations to their wages, $w_L^* = \sigma_i$. This implies that choosing to become a non-profit manager gives to an *unmotivated* agent the level of utility

$$U_L^* = \frac{D}{N} = \delta A \frac{(1-N)^{\alpha}}{N}. \tag{8}$$

We can now state the following

[4] Later, we relax this equal-sharing assumption by explicitly modelling fundraising effort by non-profit managers.

Lemma 1 *Let $\widehat{N}$ denote the level of N at which $D(\widehat{N}) = \widehat{N}$. Then,*

$$U_H^* \gtreqless U_L^* \text{ if and only if } N \lesseqgtr \widehat{N};$$

where: (i) $\delta A/(1+\delta A) < \widehat{N} < 1$, (ii) $\widehat{N}$ is strictly increasing in A and δ and strictly decreasing in α, (iii) $\lim_{A\to\infty} \widehat{N} = 1$, (iv) $\lim_{\alpha\to 0} \widehat{N} = \delta A$ and $\lim_{\alpha\to 1} \widehat{N} = \delta A/(1+\delta A)$.

Proof. $U_H^* \gtreqless U_L^*$ iff $N \lesseqgtr \widehat{N}$ follows immediately from the expressions in (7) and (8). The rest of the results follow from noting that $\delta A(1-\widehat{N})^\alpha/\widehat{N} = 1$, and differentiating this expression. ■

Lemma 1 is a single-crossing result useful for our further analysis. It states that a motivated individual obtains higher utility from becoming a non-profit manager, as compared to a unmotivated individual making the same choice, only when donations per non-profit are small enough, i.e. $D/N < 1$. Both U_H^* and U_L^* are strictly increasing in donations per non-profit, D/N. However, when level of donations received by each non-profit rises above the threshold level (here, it is 1), U_L^* dominates U_H^*. The reason for this result essentially rests on the concavity of g_i in (5), combined with the altruism displayed by motivated non-profit managers in (6). These two features translate into a payoff function of motivated non-profit managers, U_H^*, that is concave in D/N. On the contrary, unmotivated non-profit managers exhibit a payoff function, U_L^*, which is linear in D/N. This is because these agents only care about their private consumption, and hence they exploit the lack of monitoring in the NGO sector in order to always set $w_i = D/N$.[5]

2.3 Equilibrium occupational choice

Let N_H and N_L denote henceforth the mass of non-profit managers of m_H- and m_L-type, respectively (the total mass of non-profit managers is then $N = N_H + N_L$). In equilibrium, the following two conditions must be simultaneously satisfied:

[5] The result in Lemma 1 does not crucially depend on the extreme assumption that $m_H = 1$, and easily extends to any situation in which $0 = m_L < m_H = m \leq 1$. In that case, the m_H-type sets $w_i^* = \sigma_i (1-m)/(1-m+\gamma m)$, which in turn implies that at the optimum

$$U_m^* = \frac{\gamma^{\gamma m}}{m^{m(1-\gamma)}(1-m+\gamma m)^{1-m(1-\gamma)}}\left(\frac{D}{N}\right)^{1-m(1-\gamma)} = \Upsilon(m,\gamma)\left(\frac{D}{N}\right)^{1-m(1-\gamma)}.$$

Therefore, noting that, for any vector $(m,\gamma) \in (0,1] \times (0,1)$, the function $\Upsilon(m,\gamma)$ satisfies $1 \leq \Upsilon(\cdot) \leq 2$, it follows that whenever $D/N \gtreqless [\Upsilon(\cdot)]^{1/m(1-\gamma)}$, then $U_L^* \gtreqless U_m^*$.

i. Given the values of N_H and N_L, each individual chooses the occupation that yields the higher level of utility, with some agents possibly indifferent between the two occupations.

ii. The allocation (N_H, N_L) must be feasible. Namely, $(N_H, N_L) \in \left[0, \frac{1}{2}\right] \times \left[0, \frac{1}{2}\right]$.

In this basic model, for a given parametric configuration, the equilibrium occupational choice is unique (with the exception of the knife-edge case described in the footnote below). However, the type of agents (in terms of their pro-social motivation) who self-select into the non-profit sector depends on the specific parametric configuration of the model. In what follows, we describe the main features of the two broad kinds of equilibria that may take place: an equilibrium where $0 = N_H < N_L = N$ (referred to as 'dishonest equilibrium'), and an equilibrium where $0 = N_L < N_H = N$ (which we dub as 'honest equilibrium').[6]

Dishonest equilibrium

An equilibrium in which the non-profit sector is populated exclusively by unmotivated individuals arises when all motivated individuals prefer to found private firms, whereas all unmotivated ones (weakly) prefer to be social entrepreneurs:

$$U_H^*(N) < V_P^*(N) \leq U_L^*(N),$$

where $V_P^*(N)$ is given by (3), $U_H^*(N)$ by (7), $U_L^*(N)$ by (8), and $N = N_L \leq 1/2$.

Lemma 1 implies that for $U_H^*(N) < U_L^*(N)$ to hold, the non-profit sector should be sufficiently small (so that per-non-profit donations are sufficiently high), i.e. $N < \widehat{N}$. In addition, the condition $V_P^*(N) \leq U_L^*(N)$ boils down to:

$$N \leq N_0 \equiv \frac{\delta}{1+\delta}. \tag{9}$$

From (9) we may observe that $N_0 < 1/2$. As a result, in a 'dishonest equilibrium' it must necessarily be the case that $N = N_L = N_0$, so that the unmotivated agents turn out to be

[6] The above-mentioned two cases exclude the set of parametric configurations for which $\widehat{N} = N_0$, where N_0 is defined below in (9). When $\widehat{N} = N_0$, *all* individuals in the economy will be indifferent in equilibrium across the two available occupations. Moreover, because of that, there is actually equilibrium multiplicity, and the set equilibria is given by $\left\{ N_H^* + N_L^* = N_0, | \, 0 \leq N_H^* \leq \frac{1}{2}, 0 \leq N_L^* \leq \frac{1}{2} \right\}$. Hereafter, for the sake of brevity, we skip this knife-edge case.

indifferent between the for-profit and non-profit sectors. Indifference by m_L-types leads a mass $1/2 - N_0$ of them to become private entrepreneurs, allowing thus "markets" to clear. Notice, finally, that $U_H^*(N_0) < V_P^*(N_0)$ needs to be satisfied, hence the crucial parametric condition leading to a 'dishonest equilibrium' boils down to $N_0 < \widehat{N}$.

Honest equilibrium

This type of equilibrium takes place when all unmotivated individuals prefer to found private firms, whereas all motivated ones (weakly) prefer to be social entrepreneurs: $U_L^*(N) < V_P^*(N) \leq U_H^*(N)$,where $N = N_H \leq 1/2$. Lemma 1 states that for $U_H^*(N) > U_L^*(N)$ to hold, the non-profit sector should be sufficiently large in size: $N > \widehat{N}$. The condition $U_L^*(N) < V_P^*(N)$ requires that $N > N_0$ (this is because the unmotivated agents prefer to quit the non-profit sector where the seek rents only when the size of that sector is large enough, so that the rents per agent are too low). Unlike in the previous case, in the 'honest equilibrium' one can not rule out the possibility of full sectorial specialization of the two motivational types of agents (i.e., in principle, an 'honest equilibrium' may well feature $N_L = 0$ and $N_H = 1/2$).

For future reference, we denote with N_1 the value of N that makes m_H-types indifferent between occupations. From (1) and (7) we observe that:

$$\frac{(1 - N_1)^{\frac{1-\alpha(1-\gamma)}{\gamma}}}{N_1} \equiv \frac{A^{\frac{1-\gamma}{\gamma}}}{\delta}. \tag{10}$$

Equilibrium characterization

The following proposition characterizes the different kinds of equilibria that may arise, given the specific parametric configuration of the model.

Proposition 1 *Whenever $A(1+\delta)^{1-\alpha} \neq 1$, the equilibrium occupational allocation (N_H^*, N_L^*) is unique. The type of agents who manage the non-profit sector is determined solely by whether $A(1+\delta)^{1-\alpha}$ is strictly larger or smaller than one:*

i. If $A(1+\delta)^{1-\alpha} > 1$, in equilibrium there is a mass $N^* = N_L^* = N_0$ of non-profit firms, all managed by m_L-types. The mass of private entrepreneurs equals $1 - N_0$; a mass $\frac{1}{2}$ of them are motivated, the remaining $\frac{1}{2} - N_0$ are unmotivated.

ii. If $A(1+\delta)^{1-\alpha} < 1$, in equilibrium there is a mass $N^* = N_H^* = \min\left\{N_1, \frac{1}{2}\right\}$ of non-profit firms, all managed by m_H-types. Moreover, if $N_H^* = N_1$ (respectively, $N_H^* = \frac{1}{2}$), the mass of private entrepreneurs equals $1 - N_1$ (respectively, $\frac{1}{2}$). When $N_H^* = N_1$, the mass of private entrepreneurs consists of a mass $\frac{1}{2}$ of unmotivated individual and a mass $\frac{1}{2} - N_1$ of motivated ones. Instead, when $N_H^* = \frac{1}{2}$, all private entrepreneurs are unmotivated.

Proof. *See Appendix A.* ■

Proposition 1 characterizes the three main types of equilibria that may be arise in the model, depending on the specific parametric configurations. These three cases are depicted in Figure 1.

An interesting implication stemming from Proposition 1 is that more productive economies (i.e., economies with a relatively large A) tend to exhibit a 'dishonest equilibrium'. This is because higher productivity entails higher profits to private entrepreneurs. As a result, a larger amount of donations to any non-profit firm (σ_i) is needed, in equilibrium, to compensate for the higher opportunity cost of managing a non-profit firm (i.e. of *not* becoming a private entrepreneur). Thus, as the productivity of the economy grows, some non-profit managers quit the non-profit sector to found private firms, and this increases the per-non-profit donation for the remaining non-profits (through the two channels indicated above, i.e. more donors and fewer non-profits). However, as σ_i increases, the non-profit sector becomes relatively more attractive to m_L-types than to m_H-types. This is because the unmotivated individuals only care about the level σ_i, while the motivated care about the productivity of undistributed donations (which, by assumption (5), display decreasing marginal productivity). And thus, an economy that starts off with a relatively low productivity and the non-profit sector managed by motivated agents, beyond a certain threshold of productivity starts to exhibit the non-profit sector population only by unmotivated agents (note that beyond the threshold, all the motivated agents quit the non-profit sector and get replaced - though, at a lower rate - by unmotivated entrants).

A similar intuition applies to the effect of a higher warm-glow utility from giving: a greater δ (for instance, driven by a stronger social norm of giving or a stronger prestige associated with observable giving by private-sector managers) yields larger amount of total donations, D, for a given mass of non-profits N, making the non-profit sector relatively more attractive to unmotivated agents than to motivated ones. This leads to a reshuffling of the motivational composition of the non-profit sector, similar to the one described just above).

In terms of policy repercussions, the results obtained above imply that the value-added of better accountability for the performance of the non-profit sector increases with aggregate generosity in the economy. In other words, donations and accountability are complementary inputs in the aggregate production function of the non-profit sector. More generous donations - either because of higher aggregate income or larger warm-glow willingness-to-give - correspond to an increase of only one input into this aggregate production function. We argue that this increase without an accompanying increase in the other input (stricter accountability) is deleterious for the functioning of the non-profit sector (aggregate isoquants might not be well-behaved).

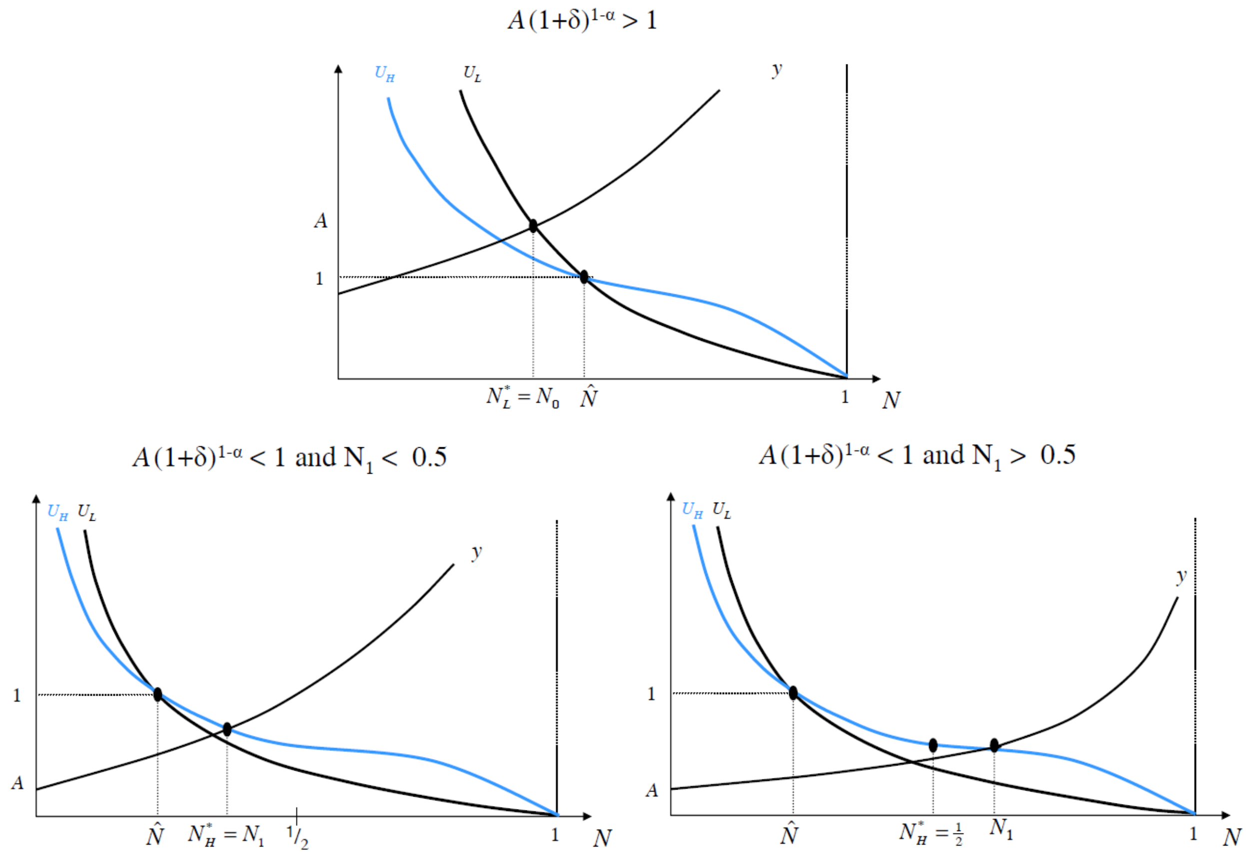


Figure 1: Equilibrium characterization

2.4 Effect of foreign aid on the equilibrium allocation

So far, in our model all donations were generated (endogenously) within the economy. However, foreign aid and donations are a crucial source of revenue for non-profits and non-governmental organizations (NGOs) in many developing countries, and an ever larger share of foreign aid is channeled through the NGOs. For instance, data from the United States shows that over 40 per cent of U.S. overseas development funds flows through NGOs (Barro and McCleary 2006). International aid agencies as well have been increasingly preferring NGOs to public-sector channels: e.g., whereas between 1973 and 1988, a tiny 6 per cent of World Bank projects went through NGOs, already in 1994 this share exceeded 50 per cent (Hudock 1999). As Kanbur (2006) argues, the rise of NGOs during the 1980s was one of the key changes in the functioning of the foreign aid sector.

What is the effect of increasing foreign aid on the motivational composition and performance of the non-profit sector? In this subsection, we try to answer this question, by modifying the model allowing an injection of amount $\Delta > 0$ of foreign aid (outside donations).

Foreign aid represents an *exogenous* increase in the total amount of donations available to the national non-profit sector. Donations collected by a non-profit firm now become:

$$\frac{D}{N} = \frac{\delta A \left(1 - N\right)^{\alpha} + \Delta}{N}. \tag{11}$$

As done above in Lemma 1, we first pin down the threshold $\widehat{N}$ such that, for all $N > \widehat{N}$ the utility obtained by unmotivated non-profit managers dominates that obtained by motivated non-profit managers.

Lemma 2 *(i) Whenever* $0 \leq \Delta \leq 1$*, there exists a threshold* $\widehat{N} \leq 1$ *such that* $U_H^*(N) \gtreqless U_L^*(N)$ *iff* $N \gtreqless \widehat{N}$*; the threshold* $\widehat{N}$ *is strictly increasing in* Δ*, and* $\lim_{\Delta \to 1} \widehat{N} = 1$*. (ii) Whenever* $\Delta > 1$*,* $U_H^*(N) < U_L^*(N)$ *for all* $0 < N \leq 1$*.*

Proof. The first part follows from noting that $\widehat{N}$ must solve the following equality: $\Delta = \widehat{N} - \delta A(1 - \widehat{N})^{\alpha} \equiv \Phi(\widehat{N})$, where $\Phi'(\widehat{N}) > 0$, hence $\partial \widehat{N}/\partial \Delta > 0$. Also, given that $\Phi'(\widehat{N}) > 0$ and $\Phi(1) = 1$, it follows that, for any $0 \leq \Delta \leq 1$, the solution of $\Phi(\widehat{N}) = \Delta$ must necessarily satisfy $\widehat{N} \leq 1$. The second part follows directly from observing that when $\Delta > 1$, the right-hand side of (11) is strictly greater than unity for all $0 < N \leq 1$. ■

The first result in Lemma 2 essentially says that the set of values of N for which the inequality $U_H^*(N) < U_L^*(N)$ holds –which is given by the interval $(0, \widehat{N})$– expands as the amount of foreign aid Δ increases. The second result states that when foreign aid is sufficiently large, the dominance relation $U_H^*(N) < U_L^*(N)$ becomes valid for any feasible value of N.

The injection of foreign aid thus enlarges the set of parameters under which the economy features an equilibrium with unmotivated non-profit managers ("dishonest equilibrium"). The proposition below characterizes formally this perverse effect of foreign aid. For brevity, we restrict the analysis only to the more interesting case, in which $A(1+\delta)^{1-\alpha} < 1$.

It is useful to denote with $\underline{N}$ the level of N for which $y(N)$ in (1) equals one; that is,

$$\underline{N} \equiv 1 - A^{\frac{1}{1-\alpha}}. \tag{12}$$

In addition, in order to disregard situations in which $\underline{N} \geq 0$ fails to exist, we henceforth set the following upper-bound on A:

Assumption 1 $A \leq 1$.

Note that if $A > 1$, then the condition $A(1+\delta)^{1-\alpha} < 1$ for an 'honest equilibrium' in Proposition 1 could never hold, and - as an artefact - the model would always deliver a 'dishonest equilibrium'.[7]

Proposition 2 *Let $A(1+\delta)^{1-\alpha} < 1$ so that when $\Delta = 0$ the economy features an 'honest equilibrium'. Let also $\Delta_0 \equiv 1 - A^{\frac{1}{1-\alpha}}(1+\delta)$, and note $\widehat{N} = \underline{N}$ when $\Delta = \Delta_0$.*

i. If $2^{1-\alpha}A > 1$, there exist two thresholds, $\Delta_A > \Delta_0 > 0$, such that:

- *(a) Whenever $0 \leq \Delta < \Delta_0$, the mass of non-profit firms is given by the strictly increasing function $\mathcal{N}_H(\Delta) : [0, \Delta_0) \to [N_1, \underline{N})$. At the equilibrium, all non-profit firms are managed by m_H-types; i.e. $N_H^* = \mathcal{N}_H(\Delta)$ and $N_L^* = 0$.*
- *(b) Whenever $\Delta_0 < \Delta \leq \Delta_A$, the mass of non-profit firms is given by the weakly increasing function $\mathcal{N}_L(\Delta) : (\Delta_0, \Delta_A] \to \left(\underline{N}, \frac{1}{2}\right]$. At the equilibrium, all non-profit firms are managed by m_L-types; i.e. $N_L^* = \mathcal{N}_L(\Delta)$ and $N_H^* = 0$.*

[7] Another way to avoid the problem of obtaining a 'dishonest equilibrium' by construction is to assume that the production function of private entrepreneurs is given by $y(N)$, with $y'(N) > 0$, $y''(N) < 0$, $y(1) = \infty$ and $y(0) = 0$. Notice that all these properties are satisfied by (1), except for $y(0) = 0$, which in (1) is actually $y(0) = A$. Intuitively, what is needed to give room for an 'honest equilibrium' is that $y(N) \leq 1$ for some $N \geq 0$. Assumption 1 ensures this is always the case.

(c) *Whenever* $\Delta > \Delta_A$*, the mass of non-profit firms is given by the strictly increasing function* $\mathcal{N}_{LH}(\Delta) : (\Delta_A, \infty) \to \left(\frac{1}{2}, 1\right)$*. At the equilibrium,* $N_L^* = \frac{1}{2}$ *and* $N_H^* = \mathcal{N}_{LH}(\Delta) - \frac{1}{2}$.

ii. *If* $2^{1-\alpha}A < 1$*, there are two thresholds,* $\Delta_0 > \Delta_B > 0$*, such that:*

(a) *Whenever* $0 \leq \Delta \leq \Delta_B$*, the mass of non-profit firms is given by the non-decreasing function* $\mathfrak{N}_H(\Delta) : [0, \Delta_B] \to \left[\min\{N_1, \frac{1}{2}\}, \frac{1}{2}\right]$*. At the equilibrium, all non-profit firms are managed by* m_H*-types; i.e.*$N_H^* = \mathfrak{N}_H(\Delta)$ *and* $N_L^* = 0$.

(b) *Whenever* $\Delta_B < \Delta < \Delta_0$*, the mass of non-profit firms is given by the strictly increasing function* $\mathfrak{N}_{HL}(\Delta) : (\Delta_B, \Delta_0) \to \left(\frac{1}{2}, \underline{N}\right)$*. At the equilibrium,* $N_H^* = \frac{1}{2}$ *and* $N_L^* = \mathfrak{N}_{HL}(\Delta) - \frac{1}{2}$.

(c) *Whenever* $\Delta > \Delta_0$*, the mass of non-profit firms is given by the strictly increasing function* $\mathfrak{N}_{LH}(\Delta) : (\Delta_0, \infty) \to (\underline{N}, 1)$*. At the equilibrium,* $N_L^* = \frac{1}{2}$ *and* $N_H^* = \mathfrak{N}_{LH}(\Delta) - \frac{1}{2}$.

Proof. *See Appendix A.* ■

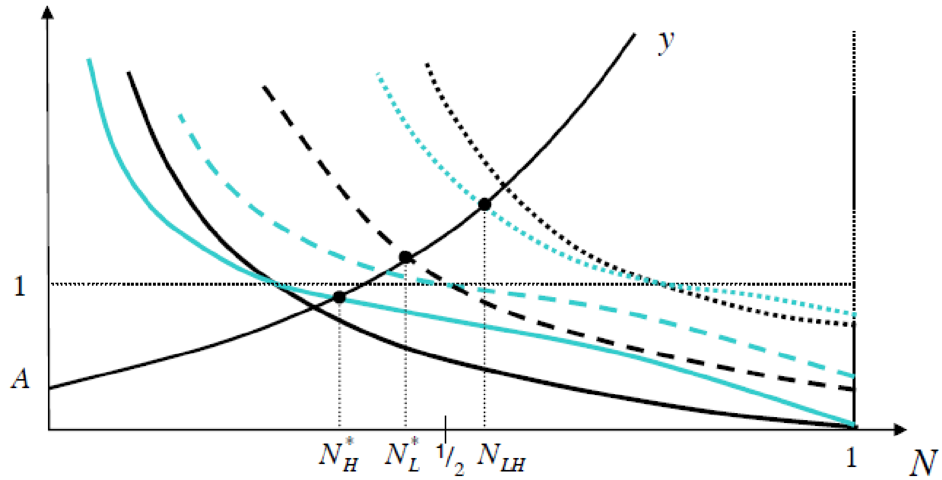
Proposition 2 describes the effects of increasing the amount of foreign aid Δ on the equilibrium allocation of an economy which, in the absence of any foreign donations, would display an 'honest equilibrium'. The most interesting results arise when $A(1+\delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$. In this case, when foreign aid is not too large ($0 \leq \Delta < \Delta_0$), the non-profit sector continues to be managed only by motivated agents. However, when the level of donations surpasses the threshold Δ_0, unmotivated agents start being attracted into the non-profit sector due to the greater scope for rent extraction. Interestingly, for any $\Delta_0 < \Delta \leq \Delta_A$, the economy experiences a complete reversal in the equilibrium occupational choice: all m_H-types choose the private entrepreneurial sector, while the non-profit sector becomes entirely managed by m_L-types. Finally, when $\Delta > \Delta_A$, foreign aid becomes so large that the non-profit sector starts attracting back some of the m_H-types in order to equalize the returns of motivated agents in the for-profit and non-profit sectors. Notice, however, that when $\Delta > \Delta_A$ the mass of non-profits run by unmotivated agents is still larger than the mass of non-profits managed by m_H-types.

Figure 2 depicts the above-mentioned results when $A(1+\delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$. The solid lines represent $U_H^*(N)$ and $U_L^*(N)$ when $\Delta = 0$, the dashed lines shows non-profit managers' payoffs when $\Delta_0 < \Delta \leq \Delta_A$, and the dotted lines plots those payoffs when $\Delta > \Delta_A$.

An interesting corollary that stems from Proposition 2 refers to the total output of the non-profit sector, G, at different values of Δ. In particular, bearing in mind that *only* motivated non-profit managers use donations to produce the mission-oriented output g_i, when $A(1+\delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$, we obtain that

$$G(\Delta) = \begin{cases} \mathcal{N}_H(\Delta)\left[\dfrac{\delta A(1-\mathcal{N}_H(\Delta))^{\alpha}+\Delta}{\mathcal{N}_H(\Delta)}\right]^{\gamma} & \text{if } 0 \leq \Delta < \Delta_0, \\ 0 & \text{if } \Delta_0 < \Delta \leq \Delta_A, \\ \left(\mathcal{N}_{LH}(\Delta)-\frac{1}{2}\right)\left[\dfrac{\delta A(1-\mathcal{N}_{LH}(\Delta))^{\alpha}+\Delta}{\mathcal{N}_{LH}(\Delta)}\right]^{\gamma} & \text{if } \Delta > \Delta_A. \end{cases} \tag{13}$$

The expressions in (13) show that $G(\Delta)$ is *non-monotonic* in Δ. In particular, non-profit output grows initially with the amount of foreign aid, until reaching $\lim_{\Delta\to\Delta_0} G(\Delta) = \underline{N}$; this is the enhancing effect of foreign donations when the non-profits are managed by motivated managers. However, when $\Delta_0 < \Delta \leq \Delta_A$, the motivation in the non-profit sector gets completely "polluted" by the presence of unmotivated managers, and $G(\Delta)$ falls discontinuously to zero. Finally, when foreign donations rise beyond Δ_A, non-profit output starts to grow again (starting from a level equal to zero), as some of the donations will end up in the hands of m_H-types.



Similar results are obtained when $2^{1-\alpha}A < 1$. In this case,

$$G(\Delta) = \begin{cases} \mathfrak{N}_H(\Delta)\left[\dfrac{\delta A\left(1-\mathfrak{N}_H(\Delta)\right)^{\alpha}+\Delta}{\mathfrak{N}_H(\Delta)}\right]^{\gamma} & \text{if } 0 \leq \Delta \leq \Delta_B, \\ \dfrac{1}{2}\left[\dfrac{\delta A\left(1-\mathfrak{N}_{HL}(\Delta)\right)^{\alpha}+\Delta}{\mathfrak{N}_{HL}(\Delta)}\right] & \text{if } \Delta_B < \Delta < \Delta_0, \\ \left(\mathfrak{N}_{LH}(\Delta)-\frac{1}{2}\right)\left[\dfrac{\delta A\left(1-\mathfrak{N}_{LH}(\Delta)\right)^{\alpha}+\Delta}{\mathfrak{N}_{LH}(\Delta)}\right]^{\gamma} & \text{if } \Delta > \Delta_0. \end{cases} \tag{14}$$

According to (14), $G(\Delta)$ increases monotonically with Δ for all $\Delta < \Delta_0$, reaching $\lim_{\Delta\to\Delta_0} G(\Delta) = \frac{1}{2}$. However, as soon as Δ rises above Δ_0, aggregate non-profit output falls discretely to $\underline{N} - \frac{1}{2}$. Thereafter, for all $\Delta > \Delta_0$, $G(\Delta)$ grows again monotonically with Δ, starting from $G(\Delta) = \underline{N} - \frac{1}{2}$.

This analysis confirms some of the concerns raised by critiques of foreign aid, by pointing out at one precise mechanism through which the negative effect of aid operates: the encouragement of unmotivated agents replace motivated ones in the NGO sector. For instance, Dambisa Moyo writes in her book entitled *Dead Aid* (Moyo 2009):

> "Donors, development agencies and policymakers have, by and large, chosen to ignore the blatant alarm signals, and have continued to pursue the aid-based model even when it had become apparent that aid, under whatever guise, is not working... Foreign aid does not strengthen social capital - it weakens it. By [...] encouraging rent-seeking behavior, siphoning off scarce talent from the employment pool [...] aid guarantees that in most aid-dependent regimes social capital remains weak and the countries themselves poor" (pp. 27, 59)

Note that our mechanism is distinct from the arguments raised concerning the perverse effects of foreign aid on the functioning of the public sector (higher corruption, break-up of accountability mechanisms of elected officials, triggering ethnic-based rent-seeking). We show that even when foreign aid is channeled through the NGO sector, perverse effects might arise, because more massive aid inflows lead to the worsening of motivational composition of the NGO sector.

Our analysis also helps to shed light on the so-called micro-macro paradox in empirical foreign aid literature. This paradox refers to the fact that at the microeconomic level, there are numerous studies that find the positive effect of foreign-aid financed projects on some measures of welfare of beneficiaries; however, at the aggregate level, most studies fail to find a significant positive effect of foreign aid on the beneficiary country's well-being. We explain this paradox as follows. When aid inflows are small, or when you hold the motivational composition of the NGO sector constant, the general-equilibrium effect described in our model is negligible and, thus, empirically one finds a positive effect of aid projects. However, when aid inflows are sufficiently large (e.g. when the well-functioning micro-level projects are scaled up), the general-equilibrium effect kicks in and the motivational adverse selection effect neutralizes the positive effect found at the micro level.

2.5 Endogenous fundraising effort

In the basic model, we have assumed that total donations are divided mechanically between all non-profit firms. It is well known, however, that non-profits compete for donations and engage actively in fundraising. For instance, in his analysis of the humanitarian relief NGOs, De Waal (1997) describes the so-called Gresham's Law of the NGO sector:

> "[An organization that is] most determined to get the highest media profile obtains the most funds ... In doing so it prioritizes the requirements of fundraising: it follows the TV cameras, ... engages in picturesque and emotive programmes (food and medicine, best of all for children), it abandons scruples about when to go in and when to leave, and it forsakes cooperation with its peers for advertising its brand name." (PAGE #)

Similarly, in his poignant account of the development aid industry, Hancock (1989) describes the example of World Vision (a large U.S.-based NGO), aggressively competing for donors in the Australian market with local religious organizations:

> "On 21 December 1984, unable to resist the allure of Ethiopian famine pictures, World Vision ran an Australia-wide Christmas Special television show calling on the public in that country to give it funds. In so doing it broke an explicit understanding with the Australian Council of Churches that it would not run such television spectaculars in competition with the ACC's traditional Christmas Bowl appeal. Such ruthless treatment of 'rivals' pays, however: the American charity is, today, the largest voluntary agency in Australia." (PAGE #)

In this sub-section, we relax the restrictive assumption of fixed division of donations by incorporating the endogenous fundraising choice by non-profits. In terms of the private sector, we keep the same structure described in Section 2.1. The main difference is that now non-profit managers can influence the share of funds that they obtain from the pool of total donations by exerting fundraising effort. More precisely, we assume that each non-profit manager i is endowed with one unit of time which she may split between fundraising and working towards the mission of her non-profit organization (project implementation). Fundraising effort allows the non-profit manager to attract a larger share of donations (from the pool of aggregate donations) to her own non-profit, while implementation effort is required in order to make those donations effective in addressing the non-profit's mission. We denote henceforth by $e_i \geq 0$ the effort exerted in fundraising and by $\varsigma_i \geq 0$ the implementation effort. The time constraint implies that $e_i + \varsigma_i \in [0, 1]$.

As before, the non-profit manager collects an amount of donations σ_i from the aggregate pool of donations D. One part of σ_i is used to pay the wage of non-profit manager w_i, while $\sigma_i - w_i$ is used as input for the non-profit's production. In this section, we assume that the output of a non-profit firm is given by:

$$g_i = 2(\sigma_i - w_i)\varsigma_i.$$

In other words, undistributed donations $(\sigma_i - w_i)$ and implementation effort (ς_i) are complements in the production function of the non-profit.

We assume that *aggregate* fundraising effort does not alter the *total* pool of donations channeled to the non-profit sector, D. However, the fundraising effort exerted by each specific non-profit manager does affect how a given D is divided among the mass of non-profit firms, N. In other words, we model fundraising as a *zero-sum game* over the division of a given D. Formally, we assume that

$$\sigma_i = \frac{D}{N} \times \frac{e_i}{\overline{e}} = \frac{\delta A (1-N)^{\alpha}}{N} \times \frac{e_i}{\overline{e}}, \tag{15}$$

where $\overline{e}$ denotes the *average* fundraising effort in the non-profit sector as a whole.

Again, non-profit managers derive utility from their own consumption and from their contribution towards their mission, with weights on each of two sources of utility determined by the agent's level of pro-social motivation, m_i. In addition, we assume the *total* effort exerted by non-profit managers entails a level of disutility which depends on the agent's intrinsic pro-social motivation:

$$U_i(w_i, g_i) = \frac{w_i^{1-m_i} g_i^{m_i}}{m_i^{m_i}(1-m_i)^{1-m_i}} - (1-m_i)(e_i + \varsigma_i), \quad \text{where } m_i \in \{m_H, m_L\}.$$

Since $m_H = 1$, in the optimum, motivated non-profit managers will always set $w_H^* = 0$ and $e_H^* + \varsigma_H^* = 1$. The exact values of e_H^* and ς_H^* are determined by the following optimization problem

$$e_H^* \equiv \underset{e_i \in [0,1]}{\arg\max} : g_i = 2\frac{D}{N}\frac{e_i}{\overline{e}}(1-e_i),$$

with $\varsigma_H^* = 1 - e_H^*$. The above problem yields,

$$e_H^* = \varsigma_H^* = \frac{1}{2}, \tag{16}$$

which in turn implies that an m_H-type non-profit manager obtains a level of utility given by

$$U_H^* = \frac{1}{2\overline{e}}\frac{D}{N} = \frac{1}{2\overline{e}}\frac{\delta A (1-N)^{\alpha}}{N}. \tag{17}$$

With regards to unmotivated non-profit managers, again, they will always set $w_L^* = \sigma_i$. In addition, since unmotivated agents care only about their private consumption and ς_i is only instrumental in producing non-profit output, in the optimum, they will always set $\varsigma_i^* = 0$. As a consequence, the level of e_L^* will be determined by the solution of the following maximization problem

$$e_L^* \equiv \underset{e_i \in [0,1]}{\arg\max} : w_i = \frac{D}{N}\frac{e_i}{\overline{e}} - e_i,$$

which, trivially, yields

$$e_L^* = \begin{cases} 0, & \text{if } \overline{e}^{-1} D/N < 1, \\ 1, & \text{if } \overline{e}^{-1} D/N \geq 1. \end{cases} \tag{18}$$

As a result, the utility that an *unmotivated* agent obtains from becoming a non-profit manager is

$$U_L^* = \max\left\{\frac{D}{N}\frac{1}{\overline{e}} - 1, 0\right\}. \tag{19}$$

Honest equilibrium

In an honest equilibrium all non-profit managers are of m_H-type and set $e_H^* = 0.5$. Denoting by N_H^* the equilibrium mass of non-profit managers in an honest equilibrium, this implies that they will end up raising

$$\sigma_H^* = \frac{\delta A \left(1 - N_H^*\right)^\alpha}{N_H^*}. \tag{20}$$

Recalling (3), (17) and (19), we can observe that an honest equilibrium exists if and only if $\sigma_H^* \leq 1$ when motivated agents are indifferent between the non-profit and the for-profit sectors. Hence, an honest equilibrium exists if and only if

$$\frac{\delta A \left(1 - N_H^*\right)^\alpha}{N_H^*} \leq 1,$$

where N_H^* solves $U_H^*(N = N_H^*, \overline{e} = 0.5) = V_P^*(N = N_H^*)$. Proposition 3, presented below, shows that the necessary and sufficient parametric condition for an honest equilibrium to exist is that $A \leq 1/\left(1+\delta\right)^{1-\alpha}$, and that this equilibrium is unique.

Dishonest equilibrium

In a dishonest equilibrium all non-profit managers are of m_L-type and set $e_L^* = 1$. Denoting now by N_L^* the equilibrium mass of non-profit managers in a dishonest equilibrium, this implies that they will end up raising

$$\sigma_L^* = \frac{\delta A \left(1 - N_L^*\right)^\alpha}{N_L^*}. \tag{21}$$

Using again (3) (17) and (19), it follows that a dishonest equilibrium exists if and only if $\sigma_L^* > 2$ when unmotivated agents are indifferent between sectors. Therefore, a dishonest equilibrium exists if and only if

$$\frac{\delta A \left(1 - N_L^*\right)^\alpha}{N_L^*} \geq 2,$$

where N_L^* solves $U_L^*(N = N_L^*, \overline{e} = 1) = V_P^*(N = N_L^*)$. Proposition 3 shows that the necessary and sufficient parametric condition for the existence of a dishonest equilibrium is $A \geq \left[2/\left(2+\delta\right)\right]^{1-\alpha}$, and that this equilibrium is unique.

Mixed-type equilibrium

In a mixed-type equilibrium all agents are indifferent across occupations and the non-profit sector is managed by a mix of m_H and m_L types. That is, a mixed-type equilibrium is characterized by $U_H^*(N^*) = U_L^*(N^*) = V_P^*(N^*)$, where $N^* = N_L^* + N_H^*$ and $0 < N_L^*, N_H^* \leq 1/2$. Equality among (17) and (19) requires that average fundraising effort satisfies $\overline{e}_{mixed} = 0.5 \times (D/N)$, which in turn means that $U_H^*(N^*) = U_L^*(N^*) = 1$. The returns in the private sector must then also be equal to one, which, using (3), implies that in mixed-type equilibrium the total mass of non-profits must be equal to $N^* = 1 - A^{\frac{1}{1-\alpha}}$. In addition, since $e_H^* = 0$ while $e_L^* = 1$, then the fact that $\overline{e}_{mixed} = 0.5 \times (D/N)$ together with $N^* = 1 - A^{\frac{1}{1-\alpha}}$ pin down the exact values of N_L^* and N_H^*, so as to ensure indifference across the two occupations by all agents. Proposition 3 shows that the necessary and sufficient parametric condition for the existence of a mixed-type equilibrium is $1/(1+\delta)^{1-\alpha} < A < [2/(2+\delta)]^{1-\alpha}$, and that this equilibrium is unique.

Equilibrium characterization with fundraising effort

The following proposition characterizes the type of equilibrium that arises, given the specific parametric configuration of the model.

Proposition 3 *The type of equilibrium allocation that arises is always unique and depends of the specific parametric configuration of the model:*

i. If $A \leq 1/(1+\delta)^{1-\alpha}$, the economy exhibits an 'honest equilibrium' with $N^* = N_H^* = \delta/(1+\delta)$. All non-profit managers exert the same level of fundraising and project implementation effort: $e_H^* = \varsigma_H^* = 0.5$.

ii. If $A \geq [2/(2+\delta)]^{1-\alpha}$, the economy exhibits a 'dishonest equilibrium' with $N^* = N_L^*$, where $\delta/(2+\delta) < N_L^* < \delta/(1+\delta)$. All non-profit managers exert the same level of fundraising and project implementation effort: $e_L^* = 1$ and $\varsigma_L^* = 0$.

iii. If $1/(1+\delta)^{1-\alpha} < A < [2/(2+\delta)]^{1-\alpha}$, the economy exhibits a mixed-type equilibrium with a mass of non-profit firms equal to $N_{mixed}^* = 1 - A^{\frac{1}{1-\alpha}}$, where

$$N_H^* = 2\left[1 - A^{\frac{1}{1-\alpha}}(1+\delta/2)\right], \quad \text{and} \quad N_L^* = A^{\frac{1}{1-\alpha}}(1+\delta) - 1. \tag{22}$$

Motivated non-profit managers set $e_H^* = \varsigma_H^* = 0.5$*, while unmotivated agents set* $e_L^* = 1$ *and* $\varsigma_L^* = 0$*. The average level of fundraising effort is then:*

$$\overline{e}_{mixed} = \frac{1}{2}\frac{\delta A^{\frac{1}{1-\alpha}}}{1 - A^{\frac{1}{1-\alpha}}}. \tag{23}$$

Proof. *See Appendix A.* ■

The existence of the "honest" equilibrium when $A \leq 1/(1+\delta)^{1-\alpha}$ is the same as in the basic model. The novelty under this alternative setup is that the set of parameters under which the pure "dishonest" equilibrium obtains is smaller than in the basic model, and that in the intermediate range of aggregate productivity (or of generosity of donors), there exists a "mixed" equilibrium, i.e. the one under which the non-profit sector is populated by both types of agents. The existence of competition for donations reduces the utility of all the agents, but it seems to harm more the unmotivated agents, and thus creates parameter configurations under which in the absence of competition the non-profit sector would be populated only by unmotivated agents, whereas in the presence of competition a fraction of them move to the private sector (and are replaced by motivated ones).

It is interesting to compare the findings of this model to those of Aldashev and Verdier (2010). In that model, more intense competition for funds leads to higher diversion of donations by non-profit managers. This occurs because as agents have to spend more time raising funds, less time is left to be devoted to working towards the non-profit mission, and thus the opportunity cost of diverting money for private consumption decreases. In that model, all agents are identical, and thus the problem of more intense competition lies in aggravating moral hazard. Here, instead, the existence of motivationally different types of agents implies that the problem is that of adverse selection, and - interestingly - tougher competition for funds turns out to reduce the extent of this problem.

3 Extensions

The basic model of the previous section made two strong assumptions. The first - a behavioral one - is that donations by private entrepreneurs were unrelated to their degree of altruism. The second, - an institutional one - that donors were completely unaware of the motivational problems in the non-profit sector and enjoyed giving independently of who is managing the non-profit sector. In this section, we present two extensions of the model that relax both of these assumptions.

3.1 Extension 1: Pure and impure altruism

The model presented in Section 2 assumes that all private entrepreneurs (*regardless* of their pro-social motivation) donate an identical fraction of their income to the non-profit sector. However, if warm glow giving is actually the result of some sort of altruistic behavior, it seems more reasonable to expect the propensity to donate out of income to be increasing in the degree of pro-social motivation. Here, we modify the utility function in (2) by letting the propensity to donate be individual specific (δ_i) and increasing in m_i. In particular, we now assume that $\delta_i = \delta_H \in (0, 1]$ when $m_i = m_H$, whereas $\delta_i = \delta_L = 0$ when $m_i = m_L$.[8]

The key difference that arises when δ_i is an increasing function of m_i is that, for a given value of $1 - N$, the total level of donations will depend positively on the ratio $(1 - N_H)/(1 - N)$. Intuitively, the fraction of entrepreneurial income donated to the non-profit sector will rise with the (average) level of warm-glow motivation displayed by the pool of private entrepreneurs.

To keep the analysis simple, we abstract from fundraising effort, and assume again that the mass of total donations are equally split by the mass of non-profits. In addition, we let the payoff functions by motivated and unmotivated non-profit entrepreneurs be given again by (7) and (8), respectively. Donations collected by a non-profit is given by:

$$\frac{D}{N} = \frac{\delta_H \, A \left(\frac{1}{2} - N_H\right)}{\left(1 - N_H - N_L\right)^{1-\alpha} \left(N_H + N_L\right)}. \tag{24}$$

When the total amount of donations to the non-profit sector depends positively on the fraction of pro-socially motivated private entrepreneurs, the model exhibits multiple equilibria. The main reason for equilibrium multiplicity is that, when δ_i is increasing in m_i, the ratio between U_H^* and U_L^* does not depend *only* on the level of N –as it was the case with (7) and (8) in Section 2– but, looking at (24), it follows that it *also* depends on how N breaks down between N_H and N_L. Such dependence on the ratio N_H/N_L generates

[8] Notice that, in the specific case in which $\delta_H = 1$, the utility functions in the private sector and the non-profit sector would display the same structure for both m_H- and m_L-types: for the former, all the utility weight is being placed on pro-social actions (either warm-glow giving or producing g_i); for the latter, all the utility weight is being placed on private consumption.

a positive interaction between the incentives by m_L-types to self-select into the non-profit sector and the self-selection of m_H-types into the private sector. The next proposition deals with this issue in further detail.

Proposition 4 *Let $\delta_i = \delta_H \in (0,1]$ for $m_i = m_H$ and $\delta_i = \delta_L = 0$ for $m_i = m_L$. Then,*

i. Unique 'honest equilibrium': If $A < (1 - \delta_H/2)^{1-\alpha}$, the equilibrium in the economy is unique, and characterized by $\delta_H/(2 + 2\delta_H) < N_H^* < \frac{1}{2}$ and $N_L^* = 0$.

ii. Unique 'dishonest equilibrium': If $A > [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$, the equilibrium in the economy is unique, and characterized by $N_L^* = \delta_H/2$ and $N_H^* = 0$.

iii. Multiple equilibria: If $(1 - \delta_H/2)^{1-\alpha} < A < [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$, there exist three equilibria in the economy,[9]

a) an 'honest equilibrium' where $\delta_H/(2 + 2\delta_H) < N_H^* < \frac{1}{2}$ and $N_L^* = 0$;

b) a 'dishonest equilibrium' where $N_L^* = \delta_H/2$ and $N_H^* = 0$;

c) a 'mixed-type equilibrium' where $N_H^* = \frac{1}{2} - \frac{1 - A^{1/(1-\alpha)}}{\delta_H}$ and $N_L^* = \frac{\left[1 - A^{1/(1-\alpha)}\right](1+\delta_H)}{\delta_H} - \frac{1}{2}$.

Proof. *See Appendix A.* ■

Proposition 4 shows that for A sufficiently small the economy will exhibit an 'honest equilibrium', whereas when A is sufficiently large the economy will fall in a 'dishonest equilibrium'. These two results are in line with those previously presented in Proposition 1. However, Proposition 4 also shows that there exists an intermediate range, $(1 - \delta_H/2)^{1-\alpha} < A < [1 - \delta_H/(2 + 2\delta_H)]^{1-\alpha}$, in which the economy displays multiple equilibria. For those intermediate values of A, the exact type of equilibrium that takes place will depend on how agents' expectations coordinate. If agents expect that large mass of m_H-types choose the non-profit sector (case a above), then the total mass of private donations (for a given N) will be relatively small, stifling the incentives of m_L-types to become non-profit managers. However, if individuals expect a large mass of m_H-types to become private entrepreneurs (case b above), the value of D (for a given N) will turn out to be large, which will enhance the incentives of m_L-types to enter into the non-profit sector more than it does so for m_H-types. Finally, there is also the possibility of intermediate consistent expectations (case c

[9] In the specific cases where $A = (1 - \delta_H/2)^{1-\alpha}$ or $A = [1 - \delta_H/(2 + 2\delta_H)]^{1-\alpha}$, the 'mixed-type equilibrium' described below disappears, while the other two equilibria remain.

above), in which both motivated and unmotivated agents are indifferent across occupations, and a mix of m_L- and m_H-types share the non-profit sector.

3.2 Extension 2: Conditional Warm Glow Giving

So far, we have assumed that m_H-type private entrepreneurs donate a fraction δ_H of their income simply because they enjoy the *act* of giving. This is the essence of warm glow giving and *impure* altruism. But, if these agents were actually motivated by *pure* altruism, then motivated entrepreneurs would not be willing to donate money to non-profits managed by m_L types, and a 'dishonest equilibrium' could never arise in our model.

In this subsection, we relax the assumption of impure altruism to some degree, although we do not go all the way to assuming pure altruism by private entrepreneurs with rational expectations.[10] More precisely, we extend our model in Section 3.1 to allow δ_H to rise with the fraction of motivated non-profit managers, by postulating that m_H-type private entrepreneurs have the following utility function:

$$V_H(c,d) = \left[\widetilde{\delta}_H^{\widetilde{\delta}_H} (1-\widetilde{\delta}_H)^{1-\widetilde{\delta}_H}\right]^{-1} c^{1-\widetilde{\delta}_H} d^{\widetilde{\delta}_H}, \quad \text{where } \widetilde{\delta}_H = f\,\delta_H \text{ and } f \equiv \frac{N_H}{N_H+N_L}. \tag{25}$$

The utility function (25) displays *conditional* warm glow altruism, in the sense that the *intensity* of the warm glow giving parameter ($\widetilde{\delta}_H$) is linked to the likelihood that the donation ends up in the hands of a motivated non-profit manager.

When pro-socially motivated private entrepreneurs are characterized by (25), the level of donations obtained by a non-profit firm will be given by:

$$\frac{D}{N} = \frac{\delta_H\, A \left(\frac{1}{2} - N_H\right) N_H}{(1-N_H-N_L)^{1-\alpha}\,(N_H+N_L)^2}. \tag{26}$$

Proposition 5 *Let the propensity to donate be given by $\widetilde{\delta}_i = f\,\delta_i$, where $\delta_i = \delta_H \in (0,1]$ for $m_i = m_H$, $\delta_i = \delta_L = 0$ for $m_i = m_L$, and $f \equiv N_H/(N_H+N_L)$. Then, defining $\Lambda \equiv [(2+\delta_H)/(2+2\delta_H)]^{1-\alpha}$:*

i. If $A \leq \Lambda$, in equilibrium, $N_H^* = \eta_H(A)$ and $N_L^* = 0$, where: $\partial\eta_H/\partial A < 0$, and $\lim_{A\to\Lambda}\eta_H(A) = \delta_H/(2+2\delta_H)$.

[10] Our desire to maintain impure altruism at least in part is not just for modelling convenience. Andreoni (1988) shows that under pure altruism, voluntary contributions to public good provision vanish when the number of donors is sufficiently large.

ii. If $\Lambda < A \leq 1$*, in equilibrium,* $0 < N_H^* < \frac{1}{2}$ *and* $0 < N_L^* < \frac{1}{2}$*, with* $N_H^* + N_L^* = \left[1 - A^{1/(1-\alpha)}\right]$*. In particular,* $N_H^* = n_H(A)$ *and* $N_L^* = n_L(A)$*, where:*

$$\begin{aligned} n_H(A) &= \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{\left[1 - A^{1/(1-\alpha)}\right]^2}{\delta_H}}, \\ n_L(A) &= \left[1 - A^{1/(1-\alpha)}\right] - n_H. \end{aligned}$$

Moreover, when $\Lambda < A \leq 1$*, the fraction of pro-socially motivated non-profit managers is strictly decreasing in* A*; that is,* $\partial f / \partial A < 0$*.*

Proof. See Appendix A. ■

Proposition 5 states that when warm glow weights depend on the fraction of motivated agents within the pool of non-profit managers, the possibility of multiplicity of equilibria disappear. The responsiveness of $\widetilde{\delta}_H$ to f in (25) counterbalances the effect that a larger mass of m_H-type entrepreneurs has on total donations in (24), and thus neutralizes the source of interaction that leads to multiple equilibria in Proposition 4. In addition, conditional warm glow altruism removes the possibility that the non-profit sector is managed fully by unmotivated agents, since in those cases motivated private entrepreneurs would refrain from donating any of their income. However, conditional warm glow altruism does not preclude the fact that the non-profit sector may end up being *partly* managed by m_L-types. This occurs when A is sufficiently large, which is in line again with the results of the baseline model in Proposition 1. Furthermore, Proposition 5 shows that the fraction of dishonest non-profit managers monotonically increases with A within the range $\Lambda < A \leq 1$.

4 Discussion

In this paper, we have built a pure theory of private provision of public goods via voluntary contributions to organizations in the non-profit sector, in a general-equilibrium occupational-choice setting. The main applications of this theory, in our opinion, lie in two domains.

The first is foreign aid intermediation by NGOs. Aid is being increasingly channelled via NGOs, essentially driven by increasing emphasis of project ownership, decentralization, and participatory development. This emphasis is mostly driven by the disillusionment in government-to-government project aid, which is often considered to be politicized and/or easily corruptible (see, for instance, empirical evidence by Alesina and Dollar 2000 and Kuziemko and Werker 2006). However, little analysis so far has been made concerning the implication of massive channelling of aid via NGOs (with an exception of the papers mentioned in the introduction). The application of our theory to foreign aid allows to understand these implications, in particular, the two effects of aid inflows on the functioning of the NGO sector: dilution (increase in N) and selection (unmotivated agents' entry into the NGO sector). The key implication of our results is that investment into better accountability in the NGO sector (e.g. restrictions on diversion of funds for private perks) needed to prevent the appearance of the dishonest equilibrium is positively related to the amount of foreign aid. In other words, optimal aid delivery through NGOs requires harder controls accompanying the scaling-up of aid efforts.

The second application, instead, pertains to the recent debates on the accountability, value-for-money, and performance-based pay in the non-profit sector in developed countries. It is well known that firms in the non-profit sector, because of the inherent difficulty of measuring performance and the disconnection between beneficiaries and financiers of the services provided by these firms, is prone to asymmetric information and agency problems. Understanding the conditions under which these problems are most salient is an open issue in public economics literature. Our analysis contributes to this debate by indicating that the role of (endogenously determined) relative outside options of unmotivated and motivated individuals inside the non-profit sector is crucial. In particular, what is crucial is the type of individuals (i.e. motivated or unmotivated ones) that exit more intensively the non-profit sector, when incomes in the private sector (and thus donations to the non-profit sector) decrease. If, as in our model, the exit is more intensive by unmotivated agents, the recession can have a cleansing effect, in terms of motivational composition of the non-profit sector. This is, in our view, an interesting hypothesis that can be tested empirically in future work.

Appendix A. Proofs

Proof of Proposition 1. **Part (*i*).** First of all, notice that by replacing $N = N_0$ into (8), it follows that $A(1+\delta)^{1-\alpha} > 1$ implies $U_L^*(N_0) > 1$. Hence, since $U_L^*(\widehat{N}) = 1$, it must necessarily be the case that $N_0 < \widehat{N}$. Because of Lemma 1, this also means that $U_L^*(N_0) > U_H^*(N_0)$. Now, since $U_L^*(N_0) = y(N_0)$, then $y(N) < U_L^*(N_0)$ for any $N < N_0$, meaning that whenever $N < N_0$ the mass of non-profit managers must *at least* be equal to 0.5 (the total mass of m_L-types). But this contradicts the fact that $N_0 < 0.5$; hence an equilibrium with $N < N_0$ cannot exist. Moreover, an equilibrium with $N > N_0$ cannot exist either, because whenever $N > N_0$ holds, $y(N) > U_H^*(N)$ and $y(N) > U_L^*(N)$, contradicting the fact that there is a mass of individuals equal to $N > 0$ choosing to become non-profit managers. As a result, when $A(1+\delta)^{1-\alpha} > 1$, an allocation with $N^* = N_L^* = N_0$ represents the unique equilibrium. Since $U_H^*(N_0) < U_L^*(N_0) = y(N_0)$, in the equilibrium, all m_H-type become private entrepreneurs, and a mass $0.5 - N_0$ of m_L-type agents (who are indifferent between the two occupations) also become private entrepreneurs.

Part (*ii*). Since $A(1+\delta)^{1-\alpha} < 1$ implies $U_L^*(N_0) < 1$, when the former inequality holds, $N_0 > \widehat{N}$. Moreover, notice that an equilibrium with $N \leq N_0$ cannot be exist, as it would contradict the fact that $N_0 < 0.5$. In turn, because the equilibrium must necessarily verify $N > N_0 > \widehat{N}$, only motivated agents will become non-profit managers, while all unmotivated agents will self-select into the for-profit sector. Now, by the definition of N_1 in (10), it follows that if $N_1 \leq 0.5$, then $N^* = N_H^* = N_1$ represents the unique equilibrium allocation. (Notice that $A(1+\delta)^{1-\alpha} < 1$ ensures $N_1 > N_0$.) In that situation, the m_H-types are indifferent across occupations (and there is a mass $0.5 - N_1$ of them in the private sector), while when $N < N_1$ all motivated agents wish to become non-profit managers contradicting $N < 0.5$, and when $N > N_1$ nobody would actually choose the non-profit sector contradicting $N > 0$. With a similar reasoning, it is straightforward to prove that when $N_1 > 0.5$, the unique equilibrium allocation is given by $N^* = N_H^* = 0.5$, as in that case the condition $U_L^*\left(\frac{1}{2}\right) < y\left(\frac{1}{2}\right) < U_H^*\left(\frac{1}{2}\right)$ holds, whereas for $N < 0.5$ all m_H-types intend to become non-profit managers, and when $N > 0.5$ there is either nobody or only a mass one-half of agents who wish to go the non-profit sector. ■

Proof of Proposition 2. **Part (*i*).** **(a)** First of all, recalling (12), notice $2^{1-\alpha}A > 1$ implies $\underline{N} < \frac{1}{2}$. Using the results in Proposition 1, it then follows that when $A(1+\delta)^{1-\alpha} <$

$1 < 2^{1-\alpha}A$ and $\Delta = 0$, in equilibrium, $N^* = N_H^* = N_1$, where recall that N_1 is implicitly defined by (10). Let now $\mathcal{N}_H$ be implicitly defined by the following condition:

$$\mathcal{N}_H^{-\gamma}\left[\delta A\left(1-\mathcal{N}_H\right)^{\alpha}+\Delta\right]^{\gamma}\left(1-\mathcal{N}_H\right)^{1-\alpha} \equiv A; \tag{27}$$

in raw words, $\mathcal{N}_H$ denotes the level of N that equalizes (1) and the utility obtained by a motivated non-profit manager when D/N is given by (11). From (27), it is easy to observe that when $\Delta = 0$, $\mathcal{N}_H = N_1$. In addition, differentiating (27) with respect to $\mathcal{N}_H$ and Δ, we obtain that $\partial\mathcal{N}_H/\partial\Delta > 0$. Let now

$$\Delta_0 \equiv 1 - A^{\frac{1}{1-\alpha}}(1+\delta), \tag{28}$$

and, using (12), notice that $\left[\delta A\left(1-\underline{N}\right)^{\alpha}+\Delta_0\right]/\underline{N} = 1$; hence $\mathcal{N}_H(\Delta_0) = \underline{N}$. As a consequence of all this, when $A\left(1+\delta\right)^{1-\alpha} < 1 < 2^{1-\alpha}A$, for all $0 \le \Delta < \Delta_0$, in equilibrium, $N^* = N_H^* = \mathcal{N}_H(\Delta)$, where $\partial\mathcal{N}_H/\partial\Delta > 0$, and $\mathcal{N}_H\left(\Delta\right) : [0, \Delta_0) \to [N_1, \underline{N})$.

(b) Using again the fact that $\left[\delta A\left(1-\underline{N}\right)^{\alpha}+\Delta_0\right]/\underline{N} = 1$, from (11) it follows that, for all $\Delta > \Delta_0$, the utility achieved as non-profit managers by m_L-types must be strictly larger than that obtained by m_H-types. Let now

$$\Delta_A \equiv 2^{-\alpha}A\left[\left(2^{1-\alpha}A\right)^{\frac{1-\gamma}{\gamma}} - \delta\right]. \tag{29}$$

Using (1) and (11), notice that when $N = \frac{1}{2}$ and $\Delta = \Delta_A$, the utility obtained by motivated non-profit managers is equal to $y\left(\frac{1}{2}\right)$. All this implies that, when $A\left(1+\delta\right)^{1-\alpha} < 1 < 2^{1-\alpha}A$, for all $\Delta_0 \le \Delta < \Delta_A$, in equilibrium, $N^* = N_L^* = \mathcal{N}_L(\Delta) \le \frac{1}{2}$, where $\mathcal{N}_L(\Delta)$ is non-decreasing in Δ. In particular, for all $\Delta_0 \le \Delta \le 2^{-\alpha}A\left(1-\delta\right)$ the function $\mathcal{N}_L(\Delta)$ is implicitly defined by

$$\left[\frac{\delta A\left(1-\mathcal{N}_L\right)^{\alpha}+\Delta}{\mathcal{N}_L}\right]\left(1-\mathcal{N}_L\right)^{1-\alpha} \equiv A, \tag{30}$$

while for all $2^{-\alpha}A\left(1-\delta\right) < \Delta < \Delta_A$, $\mathcal{N}_L(\Delta) = \frac{1}{2}$. Lastly, when $\Delta = 2^{-\alpha}A\left(1-\delta\right)$, the expression in (30) implies $\mathcal{N}_L = \frac{1}{2}$, proving that $\mathcal{N}_L(\Delta) : (\Delta_0, \Delta_A] \to \left(\underline{N}, \frac{1}{2}\right]$ is continuous and weakly increasing.

(c) First, note that when $\Delta > \Delta_A$, the expression in (27) delivers a value of $\mathcal{N}_H > \frac{1}{2}$. As a result, motivated agents must necessarily be indifferent in equilibrium between the two occupations, since some of them must choose to actually work as non-profit managers to allow $\mathcal{N}_H > \frac{1}{2}$. In addition, since by definition of Δ_A in (29), $\delta A\left[\left(1-N\right)^{\alpha}+\Delta_A\right]/N > y(N)$ when $N = \frac{1}{2}$, all unmotivated agents must be choosing the non-profit sector when $\Delta > \Delta_A$.

Let thus $\mathcal{N}_{LH}$ be implicitly defined by the following condition:

$$\mathcal{N}_{LH}^{-\gamma}\left[\delta A\left(1-\mathcal{N}_{LH}\right)^{\alpha}+\Delta\right]^{\gamma}\left(1-\mathcal{N}_{LH}\right)^{1-\alpha}\equiv A. \tag{31}$$

Differentiating (31) with respect to $\mathcal{N}_{LH}$ and Δ, we can observe that $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. From (31), we can also observe that $\lim_{\Delta\to\Delta_A}\mathcal{N}_{LH} = \frac{1}{2}$ and $\lim_{\Delta\to\infty}\mathcal{N}_{LH} = 1$. As a result, we may write $\mathcal{N}_{LH}(\Delta) : (\Delta_A,\infty) \to \left(\frac{1}{2},1\right)$, with $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. Moreover, since $N_L^* = \frac{1}{2}, \forall\, \Delta > \Delta_A$, it must be the case that in equilibrium $N_H^* = \mathcal{N}_{LH}(\Delta) - \frac{1}{2}$.

Part *(ii)*. **(a)** Because of Proposition 1, when $\Delta = 0$, in equilibrium, $N_H^* \leq \frac{1}{2}$ and $N_L^* = 0$. Next, let $\Delta_B \equiv 2^{-\alpha}A(1-\delta)$, and note that:

$$2\left[\delta A\left(\tfrac{1}{2}\right)^{\alpha}+\Delta_B\right] = 2^{1-\alpha}A, \tag{32}$$

and note that the right-hand side of (32) equals $y(\frac{1}{2})$, while its left-hand side equals D/N when $N = \frac{1}{2}$ and $\Delta = \Delta_B$. Furthermore, notice that $2[\delta A\left(\frac{1}{2}\right)^{\alpha} + \Delta]$ is strictly increasing in Δ. As a consequence, it follows that in equilibrium, $N_L^* = 0$ for any $0 \leq \Delta \leq \Delta_B$. In addition, denoting by $\mathfrak{N}_H(\Delta) = \min\{\frac{1}{2}, \chi\}$, where χ is the solution of $\left[\delta A\left(1-\chi\right)^{\alpha}+\Delta\right]/\chi = A/(1-\chi)^{1-\alpha}$, the result, $N_H^* = \mathfrak{N}_H(\Delta)$ for any $0 \leq \Delta \leq \Delta_B$ obtains.

(b) This part of the proof follows from the definition of Δ_0 in (28), together with the fact that $2[\delta A\left(\frac{1}{2}\right)^{\alpha} + \Delta] > 2^{1-\alpha}A$, for all $\Delta > \Delta_B$. As a result, we may implicitly define the function $\mathfrak{N}_{HL}(\Delta)$ by

$$\left[\frac{\delta A\left(1-\mathfrak{N}_{HL}\right)^{\alpha}+\Delta}{\mathfrak{N}_{HL}}\right]\left(1-\mathfrak{N}_{HL}\right)^{1-\alpha}\equiv A,$$

and observe that $\partial\mathfrak{N}_{HL}/\partial\Delta > 0$. Noting that, whenever $N = \mathfrak{N}_{HL}(\Delta)$, m_L-types are indifferent across occupations completes the proof of this part.

(c) This part of the proof follows again from the definition of Δ_0 in (28), which implies that for all $\Delta > \Delta_0$, the expression in (11) yields $D/N > 1$ when $N = \underline{N}$. For this reason, whenever $\Delta > \Delta_0$, the m_H-types must be indifferent across occupations in equilibrium, while all m_L-types will strictly prefer the non-profit sector. We can then implicitly define the function $\mathfrak{N}_{LH}(\Delta)$ by

$$\mathfrak{N}_{LH}^{-\gamma}\left[\delta A\left(1-\mathfrak{N}_{LH}\right)^{\alpha}+\Delta\right]^{-\gamma}\left(1-\mathfrak{N}_{LH}\right)^{1-\alpha}\equiv A,$$

and observe that $\partial\mathfrak{N}_{LH}/\partial\Delta > 0$ to complete the proof. ■

Proof of Proposition 3. **Part (*i*).** First, recall that in an honest equilibrium $\overline{e} = \frac{1}{2}$. Second, using (20) and (3) when $N = N_H^*$, we have that

$$\frac{\delta A \left(1 - N_H^*\right)^{\alpha}}{N_H^*} = \frac{A}{\left(1 - N_H^*\right)^{1-\alpha}} \quad \Leftrightarrow \quad N_H^* = \frac{\delta}{1+\delta} < \frac{1}{2}.$$

Therefore, an honest equilibrium must necessarily feature $N_H^* = \delta / \left(1 + \delta\right)$, with m_H types indifferent across the two occupations. In such an equilibrium, they obtain a level of utility equal to $A(1+\delta)^{1-\alpha}$. Third, from (18) it follows that this solution is a Nash equilibrium, as the best response by m_L-type non-profit managers would be $e_L = 0$ when $2A(1+\delta)^{1-\alpha} < 1$, while $e_L = 1$ otherwise. In both cases, $A(1+\delta)^{1-\alpha} \leq 1$ implies that unmotivated agents should prefer the private sector to the non-profit sector. Moreover, this must be the unique Nash equilibrium solution, since the incentives for an m_L-type agent to start a non-profit will decline with the average level of $\overline{e}$, which in equilibrium will never be below 0.5 as implied by (16).

Part (*ii*). Preliminarily, let first define $\widetilde{N} \equiv \delta/(2+\delta)$. Note then that, when $\overline{e} = 1$, the payoff functions (17) and (3) are equalized when $N = \widetilde{N}$; namely, $U_H^*(\widetilde{N}) = V^*(\widetilde{N})$. Next, notice that, for a given $\overline{e}$, both (17) and (19) are strictly decreasing in N, while they grow to infinity as N goes to zero. Hence, to prove that a dishonest equilibrium exists, it suffices to show that the condition $A \geq \left[2/\left(2+\delta\right)\right]^{1-\alpha}$ implies $U_H^*(\widetilde{N}) \leq U_L^*(\widetilde{N})$. To prove that the dishonest equilibrium is the unique equilibrium, notice first that an honest equilibrium is incompatible with $A \geq \left[2/\left(2+\delta\right)\right]^{1-\alpha}$. Therefore, the only other alternative would be a mixed-type equilibrium with all agents indifferent between the private and non-profit sector. Yet, for (17) and (19) to be equal, it must be that $D/N = 2\overline{e}$. This equality in turn implies that all activities must yield a payoff equal to 1, however, when $A \geq \left[2/\left(2+\delta\right)\right]^{1-\alpha}$, this would be inconsistent with $\overline{e} < 1$, therefore a mixed-type equilibrium cannot exist either.

Part (*iii*). First of all, following the argument in the proof of part (i) of the proposition, notice that an honest equilibrium cannot exist, since when $A(1+\delta)^{1-\alpha} > 1$ unmotivated agents would like to deviate to the non-profit sector and set $e_L = 1$. Secondly, notice that a necessary condition for a dishonest equilibrium to exist is that $U_H^* > 1$ when $N = \widetilde{N}$ and $\overline{e} = 1$, but replacing $N = \widetilde{N}$ and $\overline{e} = 1$ into (17) yields a value strictly smaller than 1 when $A < \left[2/\left(2+\delta\right)\right]^{1-\alpha}$. As a result, when $A(1+\delta)^{1-\alpha} < A < \left[2/\left(2+\delta\right)\right]^{1-\alpha}$ the equilibrium must necessarily be of mixed-type, with all agents indifferent across occupations. This requires that $U_H^*(N^*) = U_L^*(N^*) = V_P^*(N^*) = 1$. From (3) we obtain that $V_P^*(N^*) = 1$

implies $N^*_{mixed} = 1 - A^{\frac{1}{1-\alpha}}$. In addition, $U^*_H(N^*) = U^*_L(N^*)$ requires that $2\bar{e}_{mixed} = D/N$, which using $N^*_{mixed} = 1 - A^{\frac{1}{1-\alpha}}$ leads to (23). Therefore, using the facts that $e^*_H = 0.5$ and $e^*_L = 1$, the levels of N^*_H and N^*_L in (22) immediately obtain. Lastly, to prove that this equilibrium is unique, notice that e^*_{mixed} in (23) lies between 0.5 and 1, thus there must exist only one specific combination of N^*_H and N^*_L consistent with a mixed-type equilibrium. ■

Proof of Proposition 4. First of all, notice that $N_H = 0.5$ cannot hold in equilibrium, as (24) implies that in that case $D/N = 0$, an no agent would then choose the non-profit sector. We can then focus on three equilibrium cases: (i) $N^*_L = 0$ and $0 < N^*_H < 0.5$, with m_L-types strictly preferring the private sector (ii) $N^*_L \leq 0.5$ and $N^*_H = 0$, with m_H-types strictly preferring the private sector (iii) $0 \leq N^*_L \leq 0.5$ and $0 \leq N^*_H < 0.5$, will all types indifferent across occupations.

Case (i). For this case to hold in equilibrium, the following condition must be verified:

$$\underbrace{\frac{\delta_H A\left(\frac{1}{2} - N_H\right)}{(1 - N_H)^{1-\alpha} N_H}}_{U^*_L(N_H,0)} < \underbrace{\frac{A}{(1 - N_H)^{1-\alpha}}}_{y(N_H,0)} = \underbrace{\left[\frac{\delta_H A\left(\frac{1}{2} - N_H\right)}{(1 - N_H)^{1-\alpha} N_H}\right]^{\gamma}}_{U^*_H(N_H,0)}. \tag{33}$$

For $U^*_L(N_H, 0) < y(N_H, 0)$ in (33) to hold, $N_H > \delta_H/(2 + 2\delta_H)$ must be true. Next, since $U^*_L(N_H, 0) < U^*_H(N_H, 0) \Leftrightarrow U^*_L(N_H, 0) < 1$, and $y(N_H, 0)$ is strictly increasing in N_H while $U^*_H(N_H, 0)$ is strictly decreasing in it and $U^*_H(\frac{1}{2}, 0) = 0$, a sufficient condition for (33) to hold in equilibrium is that

$$\frac{\delta_H A\left(\frac{1}{2} - N_H\right)}{(1 - N_H)^{1-\alpha} N_H} < 1 \text{ when } N_H = \frac{\delta_H}{2 + 2\delta_H},$$

which in turn leads to the condition $A < [(2 + \delta_H) / (2 + 2\delta_H)]^{1-\alpha}$.

Case (ii). The case takes place when the following condition holds:

$$\underbrace{\left[\frac{\frac{1}{2}\delta_H A}{(1 - N_L)^{1-\alpha} N_L}\right]^{\gamma}}_{U^*_H(0,N_L)} < \underbrace{\frac{A}{(1 - N_L)^{1-\alpha}}}_{y(0,N_L)} \leq \underbrace{\frac{\frac{1}{2}\delta_H A}{(1 - N_L)^{1-\alpha} N_L}}_{U^*_L(0,N_L)}. \tag{34}$$

Using the expressions in (34), notice that for $U^*_L(0, N_L) > y(0, N_L)$ to hold, $N_L < \delta_H/2$. But, since $0 < \delta_H \leq 1$, $N_L < \delta_H/2$ and $U^*_L(0, N_L) > y(0, N_L)$ cannot possibly hold together. As a consequence, in equilibrium, $U^*_L(0, N_L) = y(0, N_L)$ must necessarily prevail, implying in turn that $N_L = \delta_H/2$. Next, since $U^*_L(N_H, 0) > U^*_H(N_H, 0) \Leftrightarrow U^*_L(N_H, 0) > 1$, a sufficient condition for (34) to hold in equilibrium is that

$$\frac{\frac{1}{2}\delta_H A}{(1 - N_L)^{1-\alpha} N_L} > 1 \text{ when } N_L = \frac{\delta_H}{2},$$

which in turn leads to the condition $A > (1-\delta_H/2)^{1-\alpha}$.

Case (iii). Keeping in mind that $U_L^*(N_H,0) = U_H^*(N_H,0) \Leftrightarrow U_L^*(N_H,0) = 1$, this case will arise when the following equalities hold:

$$\underbrace{\frac{A}{(1-N_H-N_L)^{1-\alpha}}}_{y(N_H,N_L)} = \underbrace{\frac{\delta_H A\left(\frac{1}{2}-N_H\right)}{(1-N_H-N_L)^{1-\alpha}(N_L+N_H)}}_{U_L^*(N_H,N_L)} = 1. \tag{35}$$

Recalling the definition of $\underline{N}$ in (12), $U_L^*(N_H,N_L) = 1$ leads to $[\delta_H(0.5-N_H)]/\left[1-A^{1/(1-\alpha)}\right] = 1$, from where we obtain:

$$N_H = \frac{1}{2} - \frac{1-A^{\frac{1}{1-\alpha}}}{\delta_H}. \tag{36}$$

Next, using again the definition of $\underline{N}$ in (12), we may obtain $N_L = \left[1-A^{1/(1-\alpha)}\right] - N_H$, which using (36) yields:

$$N_L = \left(1-A^{\frac{1}{1-\alpha}}\right)\frac{1+\delta_H}{\delta_H} - \frac{1}{2}. \tag{37}$$

Lastly, (36) implies that $N_H > 0 \Leftrightarrow A > (1-\delta_H/2)^{1-\alpha}$, while (37) means that $N_L > 0 \Leftrightarrow A < [(2+\delta_H)/(2+2\delta_H)]^{1-\alpha}$, completing the proof. ■

Proof of Proposition 5. First of all, from (26), it is straightforward to observe that neither $N_H = 0.5$, nor $0 = N_H < N_L$ can possibly hold in equilibrium, as both situations would imply $D/N = 0$, an no agent would thus choose the non-profit sector.

Second, set $N_L = 0$ into (26), and take the limit of the resulting expression as N_H approaches zero, to obtain

$$\lim_{N_H\to 0} \left.\frac{D}{N}\right|_{N_L=0} = \frac{\delta_H\, A}{2}\frac{N_H}{(N_H)^2} = \infty.$$

The above result in turn implies that $0 = N_H = N_L$ cannot hold in equilibrium either, as in that case the non-profit would become infinitely appealing to m_H-types.

Third, suppose $0 < N_H < N_L = \frac{1}{2}$. Using (1) and (26), for this to be an equilibrium, it must necessarily be the case that

$$\frac{\delta_H\, A\left(\frac{1}{2}-N_H\right)N_H}{\left(\frac{1}{2}-N_H\right)^{1-\alpha}\left(\frac{1}{2}+N_H\right)^2} \geq \frac{A}{\left(\frac{1}{2}-N_H\right)^{1-\alpha}}. \tag{38}$$

However, the condition (38) cannot possibly hold, since it would require $\delta_H\ (0.5-N_H)\,N_H \geq (0.5+N_H)^2$, which can never be true.

Because of the previous three results, the only possible equilibrium combinations are: (i) $N_L^* = 0$ and $0 < N_H^* < 0.5$, (ii) $0 \leq N_L^* \leq 0.5$ and $0 < N_H^* < 0.5$, will all types indifferent across occupations.

Case (i). For this case to hold in equilibrium, condition (33) must be verified, which following the same reasoning as before in the Proof of Proposition 4 leads to the condition $A < [(2+\delta_H)/(2+2\delta_H)]^{1-\alpha}$.

Case (ii). For this case to hold in equilibrium, the following equalities must all simultaneously hold:

$$\frac{D}{N} = \frac{\delta_H A \left(\frac{1}{2} - N_H\right) N_H}{(1 - N_H - N_L)^{1-\alpha} (N_H + N_L)^2} = y(N) = \frac{A}{(1 - N_H - N_L)^{1-\alpha}} = 1. \tag{39}$$

Taking into account the definition of $\underline{N}$ in (12), it follows that $y(N) = 1$ requires $N_H + N_L = 1 - A^{\frac{1}{1-\alpha}}$. As a result, (39) boils down to the following condition:

$$\delta_H \left(\tfrac{1}{2} - N_H\right) N_H - \left(1 - A^{\frac{1}{1-\alpha}}\right)^2 = 0 \tag{40}$$

The expression in (40) yields real-valued roots if and only if

$$A \geq \left(1 - \sqrt{\delta_H}/4\right)^{1-\alpha}. \tag{41}$$

When (41) is satisfied, the solution of (40) is given by:

$$N_H = \begin{cases} r_0 \equiv \dfrac{1}{4} - \sqrt{\dfrac{1}{16} - \dfrac{\left[1 - A^{1/(1-\alpha)}\right]^2}{\delta_H}}, \\ r_1 \equiv \dfrac{1}{4} + \sqrt{\dfrac{1}{16} - \dfrac{\left[1 - A^{1/(1-\alpha)}\right]^2}{\delta_H}}. \end{cases} \tag{42}$$

Note now that the roots r_0 and r_1 are not necessarily equilibrium solutions for N_H. More precisely, since $N_L = [1 - A^{\frac{1}{1-\alpha}}] - N_H$, then $N_L \geq 0 \Leftrightarrow N_H \leq [1 - A^{\frac{1}{1-\alpha}}]$. As a consequence, for $N_H = r_1$ in (42) to actually be an equilibrium solution, it must then be the case that $r_1 \leq 1 - A^{\frac{1}{1-\alpha}}$. But this inequality is true *only* in the specific case when $A = \left(1 - \sqrt{\delta_H}/4\right)^{1-\alpha}$ and $\sqrt{\delta_H} = 1$, which in turn also implies that $r_1 = r_0$ in (42). Without any loss of generality, we may thus fully disregard r_1, and check under which conditions $r_0 \leq 1 - A^{\frac{1}{1-\alpha}}$.

Using (42), and letting $x \equiv 1 - A^{\frac{1}{1-\alpha}}$, an equilibrium with $N_L \geq 0$ when $N_H = r_0$ requires the following condition to hold:

$$\Psi(x) \equiv \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{x^2}{\delta_H}} \leq x, \tag{43}$$

Now, notice $\Psi(x) = x$ when $A = \left[(2+\delta_H) \,/\, (2+2\delta_H)\right]^{1-\alpha}$. In addition, noting that $\Psi'(x) > 0$ and $\Psi''(x) > 0$, it then follows that: i) $\Psi(x) < x$, for all $A > \left[(2+\delta_H) \,/\, (2+2\delta_H)\right]^{1-\alpha}$; while $\Psi(x) > x$, for all $(1-\sqrt{\delta_H}/4)^{1-\alpha} < A < \left[(2+\delta_H) \,/\, (2+2\delta_H)\right]^{1-\alpha}$. Consequently, when $A \geq \left[(2+\delta_H) \,/\, (2+2\delta_H)\right]^{1-\alpha}$, there is an equilibrium with $N_H = r_0$ and $N_L = [1 - A^{\frac{1}{1-\alpha}}] - r_0$.

Lastly, to prove that $\partial f / \partial A < 0$, note that $f = \Psi(x)/x$, hence

$$\frac{\partial f}{\partial A} = \frac{1}{4x^2}\frac{\partial x}{\partial A} - \frac{1}{16x^3}\left(\frac{1}{16} - \frac{x^2}{\delta_H}\right)^{-\frac{1}{2}}\frac{\partial x}{\partial A},$$

from where $\partial f / \partial A < 0$ stems from noting that $\partial x / \partial A < 0$ and that

$$1 - \frac{1}{4x}\left(\frac{1}{16} - \frac{x^2}{\delta_H}\right)^{-\frac{1}{2}} > 0,$$

because of (42). ■

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