

SMALL IS BEAUTIFUL: MOTIVATIONAL ALLOCATION IN THE NON-PROFIT SECTOR

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Abstract

We build an occupational-choice general-equilibrium model with for-profit firms, non-profit organizations, and endogenous private warm-glow donations. Lack of monitoring on the use of funds implies that an increase of funds of the non-profit sector (because of a higher income in the for-profit sector, a stronger preference for giving, or an inflow of foreign aid) worsens the motivational composition and performance of the non-profit sector. We also analyze the conditions under which donors (through linking donations to the motivational composition of the non-profit sector), non-profits themselves (through peer monitoring), or the government (using a tax-financed public funding of non-profits) can eliminate the low-effectiveness equilibrium. We present supporting case-study evidence from developing-country NGO sector and humanitarian emergencies. (JEL: L31, D64, J24, D5)

1. Introduction

One major recent global economic phenomenon has been the rising importance of non-profit and non-governmental organizations as providers of public goods (Brainard and Chollet, 2008). The massive increase in the number of international NGOs, from less than 5,000 in mid-1970s to more than 28,000 in 2013, attests to this (Union of International Associations, 2014; Werker and Ahmed, 2008). In developing countries, NGOs play a key role in the provision of public health and education services. They have also become fundamental actors in the empowerment of socially disadvantaged

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groups, such as women and ethnic/religious minorities (Brinkerhoff et al., 2007). In addition, NGOs contribute actively to monitoring adherence by multinational firms to environmental and labor standards (Yaziji and Doh, 2009).

The expansion of non-profit organizations as economic actors has not been restricted to the developing world. In the OECD countries they also play a major role as public good providers, especially in sectors such as health services, arts, education, and poverty relief (Bilodeau and Steinberg, 2006). Quite remarkably, non-profits represent a sizeable sector in terms of OECD countries' employment share: on average, 7.5% of their economically active population is employed in the non-profit sector. For some countries (Belgium, Netherlands, Canada, U.K., and Ireland) this share exceeds 10% (Salamon, 2010).

One distinctive feature concerning the provision of public goods by NGOs is their financing structure. Although a part of these organizations' operational costs is covered by government grants and by users fees, voluntary private donations also account for a major share of their budgets. Bilodeau and Steinberg (2006) report that for the 32 countries for which comparable data is available, on average, over 30% of non-profits' financing comes from voluntary private giving. Moreover, over 75% of this amount consists of small donations. Given the public-good nature of the services typically provided by non-profits, this fact is particularly intriguing, since small donors could hardly expect their contributions to entail any meaningful effect on total public good provision.

A simple explanation of this phenomenon is that private contributions to non-profits are partially motivated by *impure* altruism. Indeed, research in public and experimental economics has recurrently shown that rationalizing empirical regularities about altruism requires the explicit acknowledgment of private psychological benefits accruing to the donor from the act of giving.¹ This is the so-called "warm-glow" motivation, first modelled by Andreoni (1989).

Impure altruism by donors means, in turn, that the link between the motivation to give to non-profit organizations and the ultimate provision of public-goods by them may be very weak.² In addition, the very nature of the goods and services provided by non-profit organizations renders impossible to write contracts that condition their financing on their output, further weakening the link between donations and public-good provision.³ These two features, combined with the fact that individuals' intrinsic

1. See, e.g. Andreoni and Miller (2002), Ribar and Wilhelm (2002), Korenok et al. (2013), and Tonin and Vlassopoulos (2010).

2. In this paper, we mostly focus on the joy-of-giving (or *warm-glow*) motive for giving. However, an additional reason why people might be willing to donate is *social-signalling*, as modelled by Benabou and Tirole (2006). Social-signalling would complement and reinforce the joy-of-giving motive that we focus on in our model. One other reason that would also reinforce the act of giving, without any link to pure altruism, is tax incentives to giving.

3. See Chapter 12 of Hansmann (1996) and Bilodeau and Slivinski (1996) for detailed discussions on the issue of incomplete contracts in non-profit organizations.

motivation is private information, turn the non-profit sector particularly vulnerable to the misallocation of funds.

In a context where the scope for funds diversion is quite extreme, the size and the structure of financing of the non-profit sector may become major factors determining who enters this sector. This will in turn affect the level of intrinsic motivation of its managers, and consequently, the performance of the non-profit sector. Analyzing this key issue requires a general-equilibrium framework. When the non-profit sector is of non-negligible size, policies that influence the behavior of non-profit managers will impact the returns in both the non-profit and for-profit sectors. In such a setting, a partial-equilibrium model will miss out important sources of market interactions and may, therefore, lead to misguided policy recommendations (for instance, concerning the desirability of more extensive state financing to non-profits or channeling foreign aid via NGOs).

This paper proposes a tractable occupational-choice general-equilibrium model with for-profit firms, non-profit organizations and endogenous private donations. The model rests on five key assumptions. First, private donors give to non-profits because of warm-glow motives (i.e., with a weak link to the expected public-good output generated with their own donations). Second, individuals self-select either into the for-profit or non-profit sectors, whose returns are endogenous to the model, both because of aggregate occupational choices and endogenous donations. Third, there are decreasing returns at the level of single non-profit organizations (because intrinsic motivation is an essential input in limited supply compared to cash money, and that mission deepening for non-profits involves increasingly difficult tasks to accomplish). Fourth, monitoring the behavior and knowing the intrinsic motivation of the non-profit managers is inherently difficult. Fifth (also resulting from the non-measurability of non-profits' output), private donations are shared among the existing non-profits firms in a manner that is not strictly related to their performance.

The main mechanism in our model relies on the notion that motivational self-selection into the non-profit sectors may be altered by the level of donations received by non-profit firms. Imperfect monitoring of managers in the non-profit sector, together with warm-glow motives by private donors, implies that the scope for misallocation of funds in this sector expands when private giving rises. Therefore, in a context of asymmetric information, warm-glow altruism and self-selection interact in non-monotonic ways, possibly leading to equilibrium with severe misallocation of funds. Our model generates several important results concerning motivational allocation.

First, selfish motives can crowd out altruistic motivation from the non-profit sector. When this occurs, the non-profit sector ends up being managed by selfish agents who exploit the lack of monitoring to divert funds for project dimensions that are misaligned with the interests of the beneficiaries. Moreover, since the scope for misallocation of funds rises with the level of donations received by each non-profit firm, this problem is exacerbated in richer economies and in economies where private donors give more generously. Our model features thus a case where "small is beautiful": motivational allocation in the non-profit sector tends to be better when the overall financing of each non-profit remains small.

Second, foreign aid intermediation through the non-profit sector in a developing country may entail perverse effects: it may cause the economy to switch from an equilibrium with a good allocation to one with a bad allocation of pro-social motivation. One further implication of this result is that total output of the non-profit can become non-monotonic in the amount of foreign aid. At low levels of foreign aid, a small increase in aid leads to higher total NGO output, as the motivational composition of the non-profit sector is unaltered. However, a large injection of foreign aid may lead to a motivational re-composition of the non-profit sector, attracting self-interested agents into it, and thereby leading to a decline in total non-profit output. Such non-monotonic relation, in turn, can help explaining the micro-macro paradox observed by empirical studies of aid effectiveness (i.e., the absence of a positive effect of aid on output at the aggregate level, combined with numerous positive findings at the micro level).

Third, we analyze a number of mechanisms that might prevent the emergence of the low-effectiveness equilibrium. From the donors' side, if warm-glow motivation responds positively to the expected productivity of the non-profit sector, the pure low-effectiveness equilibrium disappears. However, our model shows that, even in this case, when the amount of donations is sufficiently large, selfish agents still end up constituting an important share of the pool of non-profit managers, thus hurting the aggregate provision of public goods. On the non-profits' side, peer monitoring mechanisms can lead to multiple equilibria. In one equilibrium, the non-profit sector is managed by motivated agents and the quality of peer monitoring is high. In the second equilibrium, the sector is instead managed by selfish individuals and no peer monitoring takes place. The reason for the multiplicity of equilibria is that the quality of monitoring is itself endogenous to the occupational choice of agents, and it improves with the average level of motivation in the non-profit sector. Finally, we show that a properly designed public financing policy of the non-profit sector may improve the motivational composition of the non-profit sector.

Besides the aforementioned papers by Andreoni (1989) and Benabou and Tirole (2006), our paper relates to several other key papers that study theoretically the implications of pro-social motivation for non-profit organizations: Glaeser and Shleifer (2001), François (2003, 2007), Besley and Ghatak (2005), Lakdawalla and Philipson (2006), and Aldashev and Verdier (2010).⁴ We contribute to this line of research by endogenizing the returns of the different occupational choices available to individuals, and by exploring the general equilibrium implications of the level of financing of the non-profit sector.

The second related strand of literature is the one focusing on the self-selection of individuals into the public sector and politics: e.g., Caselli and Morelli (2004),

4. On the empirical side, Gregg et al. (2011) find that individuals in the non-profit sector in the U.K. are significantly more likely to do unpaid overtime work as compared to their counterparts in the for-profit sector. Moreover, this differential willingness remain even when the former individuals move into the for-profit sector, strongly supporting theories based on self-selection (rather than sector-specific incentive structure).

Macchiavello (2008), Delfgaauw and Dur (2010), Bond and Glode (2014), Jaimovich and Rud (2014). The insights from the theoretical research in this area, that mostly exploits occupational-choice models, have been confirmed by recent empirical studies. For instance, Georgellis et al. (2011) find, using the U.K. data, that individuals are attracted to the public sector by the intrinsic rather than the extrinsic incentives, and that (in the higher education and health sectors) higher extrinsic rewards reduce the propensity of intrinsically-motivated agents to enter into the public sector. We extend this line of ongoing research by (i) analyzing how the selection mechanisms apply to the non-profit/NGO sector within a context of endogenous voluntary donations, and (ii) studying the effectiveness of three mechanisms that potentially can improve the motivational selection into the non-profit sector.

Finally, there is growing literature that studies the effectiveness of different modes and levels of foreign aid (see the survey by Bourguignon and Platteau, 2015). Among these studies, Svensson (2000) underlines how short-term increases in aid flows may trigger rent-seeking wars among competing elites. Another interesting contribution is Bourguignon and Platteau (2013), which concentrates on moral hazard problems (in particular, it studies the effect of domestic monitoring on the ultimate use of aid flows). Our model studies a separate and novel channel: that of motivational adverse selection into the sector that intermediates foreign aid flows between outside donors and beneficiaries.

The rest of the paper is organized as follows. Section 2 builds our baseline model of occupational choice in the for-profit and non-profit sectors; it also analyzes the effects of foreign aid and public financing on the motivational allocation in the non-profit sector. Section 3 analyzes the functioning of three different oversight mechanisms: conditional warm-glow of donors, peer monitoring institutions by non-profits, and tax-financed government grants to non-profits. Section 4 discusses the main premises and modelling choices, as well as the generalizability of our results. Section 5 presents case-study evidence for the mechanisms of the model. Section 6 explores several avenues for future work, and concludes. The Appendix contains two extensions of the basic model, as well as some of the proofs of propositions.

2. Basic Model

Consider an economy populated by a continuum of agents with unit mass. There exist two occupational choices: an agent may become either a *private* entrepreneur in the for-profit sector or a *social* entrepreneur by founding a firm in the non-profit sector. Let's denote the choice of agent i with $o_i \in \text{private}, \text{social}$. We refer to the two types of firms as private and non-profit firms, respectively. Let N denote the total mass of non-profit entrepreneurs; thus, $1 - N$ is the mass of private entrepreneurs.

All agents are identically skilled. They differ, however, in their level of pro-social motivation, m_i , which indicates to which extent an individual is genuinely motivated to help others (the beneficiaries of her projects). There exist two levels of m_i , which we refer to henceforth as *types*: m_H (motivated) and m_L (selfish) types, where $m_H = 1$

and $m_L = 0$. A selfish type can also set up projects whose declared aim is helping the beneficiaries, but where she cares only about the aspects of these projects that increase her own well-being (ego, perks, etc.). The type m_i is private information. In what follows, we assume that the population is equally split between m_H - and m_L -types.

The utility function of an agent has the following form:

$$W_i = \mathbb{I}(o_i) \left[w_i^{1-m_i} g_i^{m_i} \frac{1}{m_i^{m_i} (1-m_i)^{1-m_i}} \right] + (1 - \mathbb{I}(o_i)) \left[c^{1-\delta} d^\delta \frac{1}{\delta (1-\delta)^{1-\delta}} \right], \quad (1)$$

where $\mathbb{I}(o_i)$ is the indicator function taking value 1 if $o_i = \textit{social}$. w_i and c denote her consumption in the non-profit and private sectors, respectively, whereas g_i and d stand for her warm-glow pro-social contribution in the non-profit and private sectors. Finally, $\delta \in \{0, 1\}$ is a parameter measuring the relative importance of giving as compared to private consumption. The details of this structure are explained below.

2.1. For-Profit Sector

We assume that 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

$$y = \frac{A}{(1-N)^{1-\alpha}}, \quad \text{where } 0 < \alpha < 1 \text{ and } A > 0. \quad (2)$$

Aggregate output is thus given by $Y = A(1-N)^\alpha$.⁵

Private-sector entrepreneurs derive utility from their own consumption (c). In addition, they also enjoy warm-glow utility from donating to the non-profit sector (d). The utility W_i of a entrepreneur in the private sector then reduces to:⁶

$$W_i = V_P(c, d) = c^{1-\delta} d^\delta \frac{1}{\delta (1-\delta)^{1-\delta}}, \quad \text{where } 0 < \delta < 1. \quad (3)$$

5. Our assumption of decreasing marginal returns with respect to the *aggregate* mass of private entrepreneurs reflects the fact that, at a given point in time, there is a fixed factor in the economy (which we do not explicitly model) that enters the production of goods in the private sector.

6. In principle, it may seem more reasonable to assume that agents who exhibit a higher degree of pro-social motivation should also be more prone to donating for social causes, and therefore display a larger value of δ in (3). We stick to the simplest possible formulation in this basic model, to introduce in the stark way the idea that donations are endogenous, by shutting down additional effects. In the Appendix B, 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 $0 < \delta_H \leq 1$. This introduces the additional complexity of making donations dependent on the degree of motivational heterogeneity in the for-profit sector, giving rise to the possibility of multiple equilibria.

Private-sector entrepreneurs maximize (3) subject to (2). This yields $c^* = (1 - \delta)y$ and $d^* = \delta y$, which in turn implies that, at the optimum, their indirect utility function is equal to the income they generate as private entrepreneurs:

$$V_P^* = y. \quad (4)$$

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

$$D = \delta (1 - N)^\alpha A, \quad (5)$$

which increases with the productivity of the private sector (A), the number of private firms ($1 - N$), and the propensity to donate out of income (δ).

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 in Besley and Ghatak (2005), with a narrow mission targeting one particular social problem (e.g., child malnutrition, air pollution, fighting malaria, etc.).

Each non-profit manager i collects an amount of donations i from the aggregate pool of donations D . The collected donations i can be allocated into two distinct dimensions of the project. One dimension, which absorbs a level of expenses equal to w_i , does not serve the ultimate needs of the beneficiaries, but might increase the well-being of the non-profit manager. Such self-serving dimensions may include his wages, in-kind perks such as a car with a driver, but can also be his pet projects or actions that might increase his ego utility. The second dimension uses the undistributed donations $i - w_i$ as an input for the production of the service towards the organization's mission and increases the well-being of beneficiaries. We measure the effectiveness/output of each specific non-profit firm by g_i , which is a function of the undistributed donations ($i - w_i$). We assume that the output generated by each specific non-profit firm exhibits decreasing returns with respect to the funds invested into the project, namely:

$$g_i = (i - w_i)^\gamma, \quad \text{where } 0 < \gamma < 1. \quad (6)$$

An important feature of this specification is the fact that the curvature of the non-profit sector technology is larger than that of the for-profit sector. As we will see, this assumption underlies the single-crossing result (Lemma 1), which, in turn, allows a simple characterization of the different types of equilibria that may arise. As we argue more precisely in our discussion Section 4, this assumption seems reasonable in the context of the functioning of the non-profit sector.

A non-profit manager derives utility from the two dimensions noted above. 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 . The utility W_i of a non-profit manager

with motivation m_i reduces to:

$$W_i = U_i(w_i, g_i) = w_i^{1-m_i} g_i^{m_i} \frac{1}{m_i^{m_i} (1-m_i)^{1-m_i}}, \text{ where } m_i \in \{m_H, m_L\}. \quad (7)$$

We assume that the monitoring by donors of the non-profit sector is weak, and donors cannot control how non-profit managers split the donations between the two dimensions. For simplicity, we take the extreme assumption that non-profit managers enjoy full discretion in deciding this allocation (subject to the feasibility constraint $w_i \leq i$). In addition, we assume that the pool of total donations D is equally shared by all non-profit firms.⁷ Therefore, donations collected by each non-profit firm are given by:

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

Notice that i is decreasing in N through two distinct channels. Firstly, because the level of aggregate donations D shrinks when the mass of private entrepreneurs $(1-N)$ gets smaller. Secondly, because a rise in the mass of non-profit firms N means that a given total pool of donations D must be 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 the dimension that helps the beneficiaries 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

$$U_H^* = \left(\frac{D}{N}\right)^\gamma = \left[\delta A \frac{(1-N)^\alpha}{N}\right]^\gamma. \quad (8)$$

Analogously, given that $m_L = 0$, selfish non-profit managers disregard contributing to their organizations' mission, and allocate all the donations to the self-serving (unproductive) dimension, $w_L^* = i$. This implies that choosing to become a non-profit manager gives to a *selfish* agent the level of utility

$$U_L^* = \frac{D}{N} = \delta A \frac{(1-N)^\alpha}{N}. \quad (9)$$

We can now state the following single-crossing result:

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

$$U_H^* \geq U_L^* \text{ if and only if } N \geq \hat{N};$$

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

7. Appendix A presents a model that relaxes the equal-sharing assumption by endogenizing fundraising effort.

Lemma 1 states that a motivated individual obtains higher utility from becoming a non-profit manager, as compared to a selfish 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 the level of donations received by each non-profit rises above a certain threshold (which here is equal to 1), U_L^* surpasses U_H^* . The reason for this result essentially rests on the concavity of g_i in (6), combined with the altruism displayed by motivated non-profit managers in (7). These two features translate into a payoff function of motivated non-profit managers, U_H^* , that is concave in D/N . Conversely, selfish non-profit managers exhibit a payoff function, U_L^* , which is linear in D/N . This is because these agents only care about their perks or pet projects, and hence they exploit the lack of monitoring in the NGO sector in order to always set $w_i = D/N$.

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:

1. 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 occupations.
2. The allocation (N_H, N_L) must be feasible: $(N_H, N_L) \in [0, 1/2] \times [0, 1/2]$.

In this basic specification of the model, for a given parametric configuration, the equilibrium occupational choice will always be unique (except for one knife-edge case described in the next footnote). Nevertheless, the type of agents (in terms of their pro-social motivation) who self-select into the non-profit sector will depend 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 $0 = N_H < N_L = N$ (which we refer to as low-effectiveness or L-equilibrium), and an equilibrium where $0 = N_L < N_H = N$ (which we dub as high-effectiveness of H-equilibrium).⁸

L-equilibrium. In a ‘low-effectiveness equilibrium’ the non-profit sector is populated exclusively by selfish individuals, and arises when payoffs are such that: $U_H^*(N) < V_P^*(N) \leq U_L^*(N)$, where $V_P^*(N)$ is given by (4), $U_H^*(N)$ by (8), $U_L^*(N)$ by (9), and $N = N_L \leq 1/2$.

8. These two cases exclude the set of parametric configurations for which $\hat{N} = N_0$, where N_0 is defined below in (10). When $\hat{N} = N_0$, all individuals in the economy will be indifferent in equilibrium across the two occupations. Moreover, because of that, there is actually equilibrium multiplicity, and the set equilibria is given by $\{N_H^* + N_L^* = N_0, | 0 \leq N_H^* \leq 1/2, 0 \leq N_L^* \leq 1/2\}$. Hereafter, for the sake of brevity, we skip this knife-edge case.

Lemma 1 implies that for $U_H^*(N) < U_L^*(N)$ to hold, the number of non-profit firms should be sufficiently small (i.e., $N < \hat{N}$), so that the donations received by each non-profit firm turn out to be sufficiently large. In addition, the condition $V_P^*(N) \leq U_L^*(N)$ leads to:

$$N \leq N_0 \equiv \frac{\delta}{1 + \delta}. \quad (10)$$

From (10) we may observe that $N_0 < 1/2$. As a result, in a low-effectiveness equilibrium it must necessarily be the case that $N = N_L = N_0$, so that the selfish agents turn out to be 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 an L-equilibrium boils down to $N_0 < \hat{N}$.

H-equilibrium. This type of equilibrium takes place when all selfish individuals prefer to found private firms, whereas all motivated ones prefer (weakly) 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 have a sufficiently large number of non-profit firms: $N > \hat{N}$. The condition $U_L^*(N) < V_P^*(N)$ requires that $N > N_0$. Unlike the previous case, in the high-effectiveness equilibrium one cannot rule out the possibility of full sectorial specialization of the two motivational types of agents (i.e., in principle, an H-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 (2) and (8) we can observe that N_1 is implicitly defined by:

$$\frac{(1 - N_1)^{\frac{1-\alpha(1-\gamma)}{\gamma}}}{N_1} \equiv \frac{A^{\frac{1-\gamma}{\gamma}}}{\delta}. \quad (11)$$

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 is unique. When $A(1 + \delta)^{1-\alpha} > 1$ the economy is in an L-equilibrium, whereas when $A(1 + \delta)^{1-\alpha} < 1$ the economy is in an H-equilibrium. More formally:*

1. *Low-Effectiveness Equilibrium:* 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 is equal to $1 - N_0$; among these a mass $1/2$ are m_H -types and a mass $1/2 - N_0$ are m_L -types.
2. *High-Effectiveness Equilibrium:* if $A(1 + \delta)^{1-\alpha} < 1$, in equilibrium, there is a mass $N^* = N_H^* = \min\{N_1, 1/2\}$ of non-profit firms all managed by m_H -types. The mass of private entrepreneurs is equal to $\max\{1 - N_1, 1/2\}$; among these a mass $1/2$ are m_L -types and a mass $\max\{0, 1/2 - N_1\}$ are m_H -types.

Proposition 1 characterizes the main types of equilibria that may arise in the model. These cases are depicted in Figure 1(a)–(c) (panels A, B, and C). This figure portrays the indirect utilities of motivated and selfish agents in the non-profit sector (U_H and U_L , respectively) and that of individuals in the private sector (y), all of them as functions of the size of the non-profit sector, N .

An implication of Proposition 1 is that more productive economies (i.e., those with a relatively large A) tend to exhibit a low-effectiveness equilibrium. This result rests on the fact that a larger A entails greater profits to private entrepreneurs. Hence, in equilibrium, a larger amount of donations to any non-profit firm (σ_i) are needed in order to compensate for the higher opportunity cost of managing a non-profit firm (i.e., the fact of *not* becoming a private entrepreneur). In turn, when σ_i is larger, the scope for rent-seeking in the non-profit sector is greater, which attracts more intensely selfish agents than motivated ones. A similar intuition applies to the effect of a higher warm-glow utility from giving; that is, a greater δ . This yields a larger amount of total donations, D , for a given mass of non-profits N , making the non-profit sector relatively more attractive to selfish agents than to motivated ones.⁹

2.4. Effect of Foreign Aid on the Equilibrium Allocation

So far, all donations in our model were generated (endogenously) within the economy. However, in the context of developing economies, foreign aid represents also a major source of revenue for non-profits organizations. In fact, an ever growing share of foreign aid is being channeled via NGOs. For instance, McCleary and Barro (2008) show that over 40% of U.S. overseas development funds flows through NGOs. International aid agencies have been increasingly choosing NGOs over public-sector channels as well: e.g., whereas between 1973 and 1988, only 6% of World Bank projects went through NGOs, by 1994 this share exceeded 50% (Hudock, 1999).¹⁰

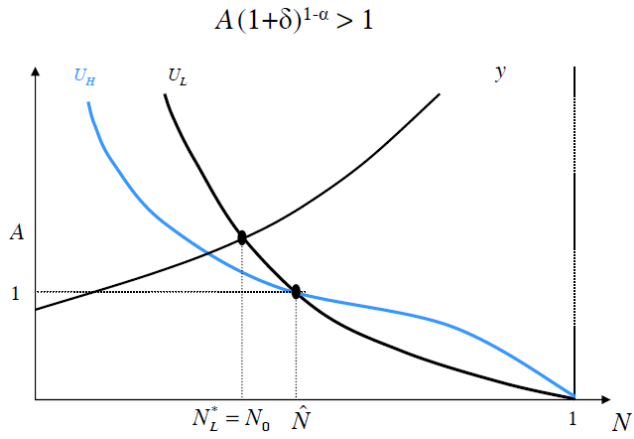
What would be the effect of a rise in foreign aid on the motivational composition and performance of the non-profit sector of the recipient economy? In this subsection, we analyze this question by slightly modifying the above model to allow for an injection $\Delta > 0$ of foreign aid into the economy.

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:

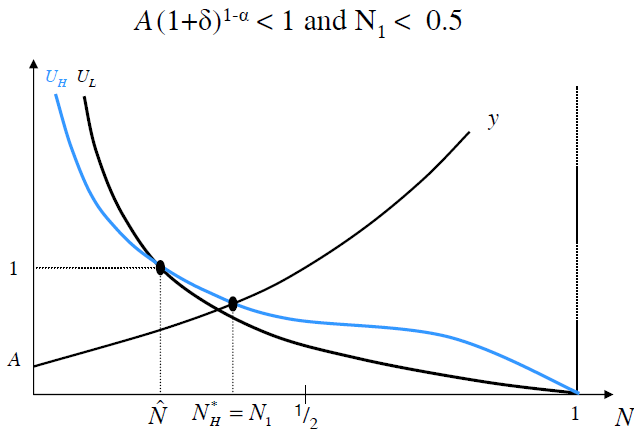
$$\frac{D}{N} = \frac{\delta A (1 - N)^\alpha + \Delta}{N}. \quad (12)$$

9. It is important to mention that these results entail that, as the scale of the donations market increases, it may then become socially desirable to invest in certain types of changes in the organization of the NGO sector that help mitigating rent-seeking behaviors, such as better accounting and monitoring mechanism, tougher certification schemes, etc.

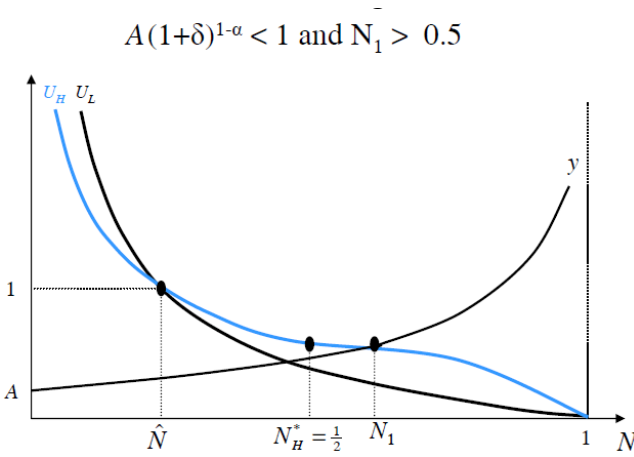
10. Kanbur (2006) argues that the rise of NGOs during the 1980s was one of the key changes in the functioning of the foreign aid sector.



(a) Low-effectiveness equilibrium.



(b) High-effectiveness equilibrium with incomplete sorting.



(c) High-effectiveness equilibrium with full sorting.

FIGURE 1

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 selfish 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 $U_H^*(N) \geq U_L^*(N)$ iff $N \geq \widehat{N}$; the threshold \widehat{N} is strictly increasing in Δ , and $\lim_{\Delta \rightarrow 1} \widehat{N} = 1$. (ii) Whenever $\Delta > 1$, $U_H^*(N) < U_L^*(N)$ 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, $U_H^*(N) < U_L^*(N)$ 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 selfish non-profit managers ('L-equilibrium'). The proposition below formalizes this perverse effect of foreign aid. For brevity, we restrict the analysis only to the more interesting case, in which $A(1 + \delta)^{1-\alpha} < 1$.

For future reference, it proves useful to denote by \underline{N} the level of N for which $y(N)$ in (2) equals one; that is,

$$\underline{N} \equiv 1 - A^{1-\alpha}. \quad (13)$$

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 'H-equilibrium' in Proposition 1 could never hold, and the model would always deliver – by construction – an 'L-equilibrium'.¹¹

PROPOSITION 2. Consider an economy where $2^{-(1-\alpha)} < A < (1 + \delta)^{-(1-\alpha)}$. In these cases, the fraction of motivated non-profit managers will depend non-monotonically on the level of foreign aid. More precisely, by defining $\Delta_0 \equiv 1 - A^{1/1-\alpha}(1 + \delta)$, where notice that $\Delta_0 > 0$, then:

1. When $0 \leq \Delta < \Delta_0$, all non-profit firms are managed by m_H -types.
2. There exists a finite threshold $\Delta_A > \Delta_0$ such that, when $\Delta_0 < \Delta \leq \Delta_A$, all non-profit firms are managed by m_L -types.
3. When $\Delta > \Delta_A$, non-profit firms are managed by a mix of types, with m_L -type majority. In particular, there is a mass $N_L^* = 1/2$ of selfish non-profit managers

11. Another way to avoid this problem would be 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 $y(0) = 0$. Note that all these properties are satisfied by (2), except for $y(0) = 0$. Intuitively, what is needed to give room for an 'H-equilibrium' is that $y(N) \leq 1$ for some $N \geq 0$. Assumption 1 ensures this is always the case.

and a mass $0 < N_H^* < 1/2$ of motivated managers, where N_H^* is strictly increasing in Δ .

Proposition 2 describes the effects of changes in the amount of foreign aid Δ on the equilibrium allocation of an economy which, in the absence of any foreign donations, would display a high-effectiveness equilibrium. The proposition focuses on the case where $A(1 + \delta)^{1-\alpha} < 1$, but $2^{1-\alpha}A > 1$, which illustrates the non-monotonic effect of foreign aid on motivational composition in the non-profit sector in the cleanest possible way. However, in the Appendix C we show that analogous results also arise for the case when $2^{1-\alpha}A < 1$ (see Proposition 2(bis) therein)¹².

According to Proposition 2, when foreign aid is not too large ($\Delta < \Delta_0$), the non-profit sector remains managed by motivated agents. However, when the level of donations surpasses the threshold Δ_0 , selfish 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 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 selfish agents is still larger than the mass of non-profits managed by m_H -types.

Figure 2 depicts the above-mentioned results. 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 $\Delta > \Delta_A$. A gradual injection of foreign aid from $\Delta = 0$ to $\Delta = \Delta_0$ initially has no effect on the motivational composition of the non-profit sector. Beyond the amount of aid $\Delta = \Delta_0$ the motivational composition of the non-profit sector is completely reversed. Further increases in foreign aid have no effect on the non-profit sector's output, up to the point $\Delta = \Delta_A$. There, all the unmotivated agents have moved into the non-profit sector and thus its size equals $1/2$. From then on, further injections of aid (beyond Δ_A) start to attract back some motivated agents into the non-profit sector, and the motivational composition of the sector therefore improves.

A key corollary that stems from Proposition 2 refers to the total output of the non-profit sector, G , at different values of Δ . Bearing in mind that *only* motivated non-profit managers devote the donations collected to the dimension that produces the mission-oriented output g_i (and, thus, contributes to the well-being of beneficiaries), an implication of Proposition 2 is that $G(\Delta)$ is *non-monotonic* in Δ . In particular, non-profit output grows initially with the amount of foreign aid, up to the level when

12. The only major qualitative difference is that when $2^{1-\alpha}A < 1$ the 'L-equilibrium' where all non-profit firms are managed by m_L -types will no longer arise. Instead, when $2^{1-\alpha}A < 1$, while the economy still exhibits an 'H-equilibrium' for levels of Δ that are sufficiently low, beyond a certain threshold of Δ the economy switches directly to a mixed-type equilibrium. In that respect, the fraction of motivated non-profit managers will still depend non-monotonically on the level of foreign aid when $2^{1-\alpha}A < 1$.

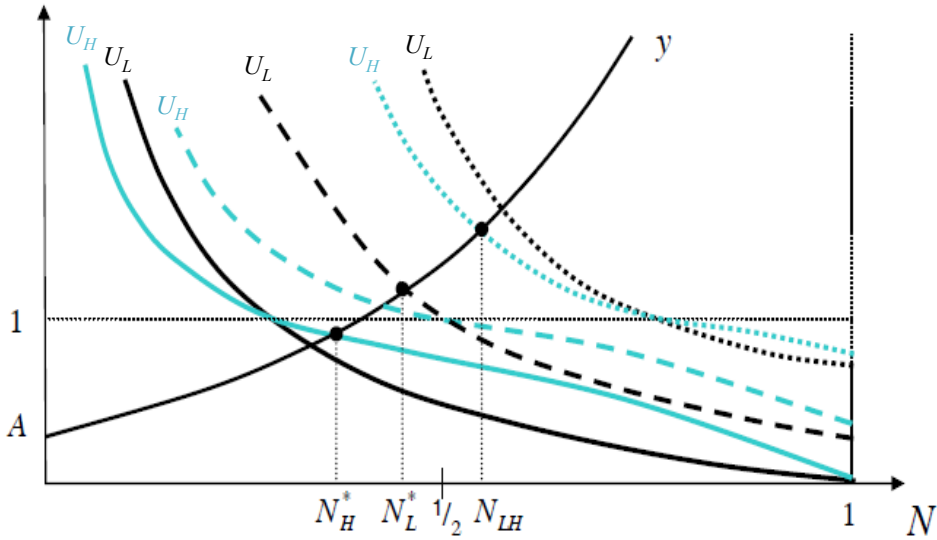


FIGURE 2. Effect of foreign aid injection.

$\Delta = \Delta_0$ when it reaches $G(\Delta_0) = \underline{N}$, which is the enhancing effect of foreign donations when the non-profits are managed by motivated managers. However, for $\Delta_0 < \Delta \leq \Delta_A$, the motivation in the non-profit sector gets completely "polluted" by the presence of selfish managers, and $G(\Delta)$ drops suddenly to zero. Finally, when foreign donations rise beyond Δ_A , non-profit output begins to grow again (starting off from $G = 0$), as some of the donations will end up in the hands of m_H -types. This non-monotonicity of the total output of the non-profit sector is depicted by Figure 3.

Note that our mechanism is quite different from the several arguments previously raised concerning the perverse effects of foreign aid on the functioning of the public sector.¹³ In fact, our model shows that even when foreign aid is channeled through the NGO sector (hence, by-passing the public bureaucracy) perverse effects might still arise, since massive aid inflows may end up worsening the motivational composition of the NGO sector in the recipient country.

Our results may also help shedding light on the so-called micro-macro paradox found in the empirical foreign aid literature; e.g., Mosley (1986). On the one hand, at the microeconomic level, there are numerous studies that find the positive effect of foreign-aid financed projects on measures of welfare of beneficiaries. On the other hand, at the aggregate level most studies actually fail to find a significant positive effect. Our model rationalizes this paradox as follows: when aid inflows are small (or, alternatively, when you hold the motivational composition of the NGO sector constant)

13. For example, Svensson (2000) suggests that foreign aid channelled through the public sector may lead to higher bureaucratic corruption, break-up of accountability mechanisms of elected officials, and the ignition of ethnic-based rent-seeking behavior.

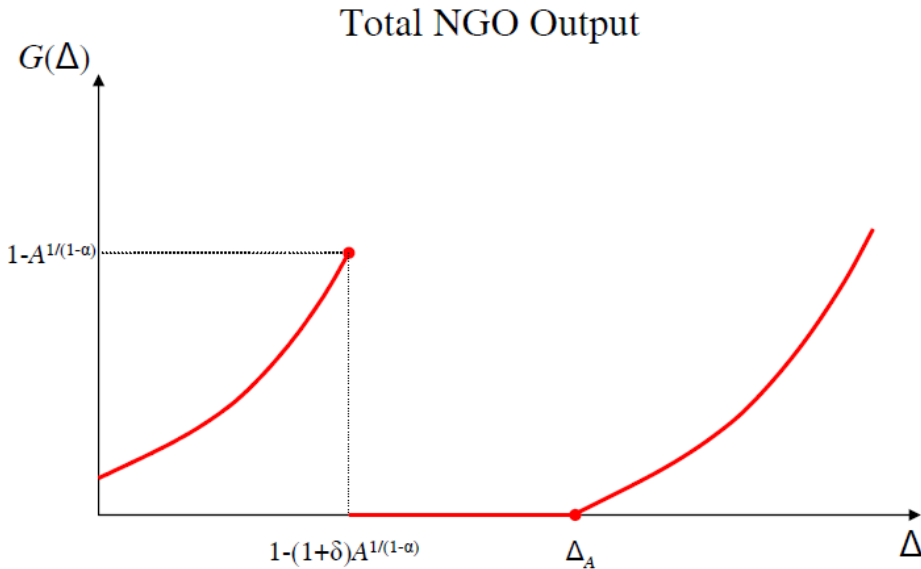


FIGURE 3. Foreign aid and non-profit sector output.

the general equilibrium effect becomes negligible, and one may well find 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 effects kick in, and the motivational adverse selection effect may neutralize the positive effect found at the micro level.

3. Eliminating Low-effectiveness Equilibrium

The analysis of the previous section raises a natural question: Can the low-effectiveness equilibrium be avoided? If so, through which channels? In this section, we explore three possible safeguard mechanisms that might prevent this equilibrium from emerging. The first focuses on the donors' behavior and relaxes the assumption of donors being completely unaware of the motivational problems in the non-profit sector. The second exploits the idea that managers in the non-profit sector might have an informational advantage about the quality of the sector's output and thus there may be scope for creating non-profit watchdog organizations. Finally, the third focuses on government policies, in particular on taxes and public financing of the non-profit sector.

3.1. Donors' Preferences: Conditional Warm Glow

So far, we have assumed that entrepreneurs donate a fraction of their income simply because they enjoy the act of giving. Such disconnection between donations and their

use may sound a bit too extreme. One may expect that motivated entrepreneurs will be unwilling to donate money when the non-profit sector is entirely run by selfish types.¹⁴

In this subsection, we relax the assumption of fully naive warm-glow giving by motivated entrepreneurs. In particular, we modify the basic model presented in Section 2 in two ways. First, we let the propensity to donate be type-specific (δ_i) and increasing in m_i . More precisely, assume that $\delta_i = \delta_H \in (0, 1]$ when $m_i = m_H$, whereas $\delta_i = \delta_L = 0$ when $m_i = m_L$. Second, we let warm-glow weight rise with the fraction of motivated non-profit managers, by postulating that m_H -type private entrepreneurs have the following utility function:

$$V_H(c, d) = \left[\tilde{\delta}_H^{\tilde{\delta}_H} (1 - \tilde{\delta}_H)^{1 - \tilde{\delta}_H} \right]^{-1} c^{1 - \tilde{\delta}_H} d^{\tilde{\delta}_H},$$

where $\tilde{\delta}_H = f \delta_H$ and $f \equiv \frac{N_H}{N_H + N_L}$. (14)

The utility function (14) displays *conditional* warm glow altruism, in the sense that the intensity of the warm-glow weight ($\tilde{\delta}_H$) 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 (14), the level of donations obtained by a non-profit firm will be given by:

$$\frac{D}{N} = \frac{\delta_H A \left(\frac{1}{2} - N_H\right) N_H}{(1 - N_H - N_L)^{1 - \alpha} (N_H + N_L)^2}. \quad (15)$$

PROPOSITION 3. *Let the warm-glow weight be given by $\tilde{\delta}_i = f \delta_i$, where $\delta_H \in (0, 1]$, $\delta_L = 0$ and $f \equiv N_H / (N_H + N_L)$. Then, defining $\Lambda \equiv [(2 + \delta_H) / (2 + 2\delta_H)]^{1 - \alpha}$:*

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

$$n_H(A) = \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{[1 - A^{1/(1-\alpha)}]^2}{\delta_H}},$$

$$n_L(A) = [1 - A^{1/(1-\alpha)}] - n_H.$$

Moreover, the fraction of motivated non-profit managers decreases with A , $\partial f / \partial A < 0$.

14. In a recent study, Metzger and Günther (2015) test, in a laboratory experiment, whether private donors seek information, before giving, about the impact of their donations to international NGOs. Interestingly, they find that only a small fraction of donors makes a well-informed donation decision and that demand for information mostly concerns the recipient type (and not the impact of donation). They also find that the information about the impact of donations does not change average donation size.

Proposition 3 states that when warm glow weights depend on the fraction of motivated agents within the pool of non-profit managers, the purely low-effectiveness equilibrium ceases to exist. The responsiveness of δ_H to f in (14) counterbalances the effect that a larger mass of m_H -type entrepreneurs has on total donations, and thus neutralizes the source of interaction that leads to the rise of L-equilibrium. In other words, conditional warm glow altruism removes the possibility that the non-profit sector is managed fully by selfish agents, since in those cases motivated private entrepreneurs would refrain from donating any of their income. Nevertheless, 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 3 shows that the fraction of selfish non-profit managers is monotonically increasing in A .

3.2. Non-profits: Peer Monitoring by Watchdog Organizations

Our benchmark model assumed that non-profit managers are able to divert any amount of funds they receive away from the dimension that actually helps the ultimate beneficiaries. This crude assumption intends to reflect the idea that monitoring the behavior of non-profit managers (or knowing their intrinsic motivation) is an inherently difficult task for donors. In real life, cognizant of such pitfalls (and to ensure the credibility of the sector as a whole), non-profits that care about the collective reputation of the sector often try to create peer-monitoring institutions, so as to discourage misbehavior within the sector. This is especially the case in developed economies, and examples of such institutions are the CFB quality label in the Netherlands and the Fundraising Standards Board in Britain; see Similon (2015) for a detailed description).¹⁵ In this section, we explore the consequences of peer-monitoring in the non-profit sector on the equilibrium occupational choices of motivated and selfish agents.

To incorporate peer-monitoring, we now assume that, after the decision by each non-profit manager of how to split donations between the two dimensions (i.e. pro-beneficiary and perks), each non-profit gets randomly matched together with another non-profit. During this matching process, they may get to know each other's accounts. In particular, with probability $0 < \rho < 1$, a non-profit observes the budget structure of its matching partner. We assume that only the motivated non-profit managers care about the governance structure of their sector. Thus, if they realize that their matching partner has been diverting funds for perks or allocating the funds to projects useless for beneficiaries, they will make this information public. Publicizing this information leads to a penalty $\chi > 0$ for the selfish agent (χ can reflect a reputation cost, disutility

15. In some sense, the model developed in Section 2 could then be thought as more appropriate for underdeveloped and middle-income economies, where watchdog organizations are less present.

related to public shaming, or the cost of legal punishment meted out to the selfish non-profit manager).

With these assumptions, the expected utility of a *selfish* non-profit manager becomes

$$U_L^*(N, N_H) = \frac{D}{N} - \frac{N_H}{N} \rho \chi = \delta A \frac{(1-N)^\alpha}{N} - \frac{N_H}{N} \rho \chi. \quad (16)$$

The second term in (16) reflects the fact that, when a selfish non-profit manager is matched with a motivated one (which occurs with probability N_H/N), he suffers a loss equal to χ with probability ρ . Regarding motivated non-profit managers, given that the matching process does not affect them, their indirect utility in the non-profit sector remains as described by equation (8).¹⁶

This formulation intends to capture a number of relevant features of the monitoring aspect of the development non-profit sector. First, on the motivational side, motivated agents clearly have an intrinsic motivation to also care about the public-good nature of having a well-functioning non-profit sector. Relatedly, they may as well feel concerned about the general reputation of the sector.¹⁷ Second, in terms of information acquisition, because of contacts and information-sharing between different NGOs on the terrain and operations (Meyer 1997), insiders are more likely to have access to information about the behavior of other members of the non-for-profit sector.

The fact that the expected utility of selfish non-profit managers in (16) is decreasing in the share of motivated managers opens up the possibility of multiple equilibria. Intuitively, a non-profit sector that is mainly run by intrinsically motivated agents enjoys also high levels of monitoring and sanctioning of misbehavior in the sector. This, in turn, discourages selfish agents from entering the non-profit sector as they expect a low probability of success in their intended diversion of funds. Conversely, when the non-profit sector is relatively poor in terms of motivation, selfish agents feel more attracted to it given the larger scope for successful rent extraction that poor monitoring allows. The next proposition fully characterizes the possible motivational equilibrium allocations in the non-profit sector under the possibility of peer monitoring.

PROPOSITION 4. *The equilibrium allocation of motivation in the non-profit sector with peer-monitoring non-profits depends on the parametric configuration in the following way:*

1. If $A(1+\delta)^{1-\alpha} > 1$, there exists a threshold value $\bar{\Phi} > 0$ of the expected cost of monitoring $\rho\chi$ such that:
 - (a) If $\rho\chi < \bar{\Phi}$, only the ‘L-equilibrium’ prevails (with $N^* = N_0 = N_L^* < 1/2$).
 - (b) If $\rho\chi > \bar{\Phi}$, the model exhibits multiple equilibria with three possible equilibrium outcomes: (i) an ‘L-equilibrium’ (with $N^* = N_0 = N_L^* < 1/2$), (ii)

16. Motivated agents do not report anything in these matches while selfish agents do not care about reporting. We disregard the unplausible case where selfish agents would make false reports concerning motivated agents, which seems rather far-fetched.

17. One could also rationalize these reputational concerns from a dynamic perspective as ensuring that the sector maintains its credibility vis-a-vis the donors.

- an ‘H-equilibrium’ (with $N^* = N_1 = N_H^* < 1/2$), (iii) a ‘mixed-type equilibrium’ (with $N^* = N_1 = N_H^* + N_L^* < 1/2$ and N_H^* and $N_L^* > 0$).
2. If $A(1 + \delta)^{1-\alpha} < 1$, only the ‘H-equilibrium’ prevails (with $N^* = N_H^* = \min\{N_1, 1/2\}$).

It is interesting to compare the above results to those in Proposition 1. When $\rho\chi > \bar{\Phi}$ (that is, when the expected punishment upon detection is high enough), peer monitoring by motivated agents in the non-profit sector allows the possibility of a high-effectiveness equilibrium when $A(1 + \delta)^{1-\alpha} > 1$. These are parameter configurations that led to an ‘L-equilibrium’ as a unique equilibrium in Proposition 1. However, peer monitoring by non-profit managers does not ensure that such improved motivational allocation will necessarily emerge when $A(1 + \delta)^{1-\alpha} > 1$. In fact, multiple equilibria are possible in that range. The reason for this is that the quality of monitoring is itself endogenous to the occupational choice of agents. This negative externality from motivated non-profit managers to selfish ones naturally creates a scope for expectation-driven multiple equilibria.¹⁸

3.3. Policies: Taxes and Public Financing of Non-profit Sector

In most economies, an important part of non-profits’ revenues comes from public grants financed by taxes. This raises two main questions. First, what is the effect of partial public financing on the motivational composition and size of the non-profit sector? Second, can public financing generate an improvement in the composition of the non-profit sector, as compared to the decentralized equilibrium? In this section, we address these questions by adding a set of public policy variables into our basic model.

We let the government impose a proportional tax on income in the for-profit sector and use its proceeds to distribute (unconditional) grants to non-profit firms. Thus, the payoffs of individuals in the private sector now becomes

$$V_P^* = (1 - t)y, \quad (17)$$

where y is still given by (2). The level of donations collected by each non-profit in this case are equal to

$$i = \frac{D}{N} = \frac{\overbrace{\delta(1-t)(1-N)y}^{\text{private donations}} + \overbrace{t(1-N)y}^{\text{public grant}}}{N}. \quad (18)$$

Public financing via such a tax/grant system alters occupational choices of individuals via two distinct channels. First, we can see in (17) that taxation lowers

18. Notice that the multiplicity of equilibria hinges crucially on the fact that selfish non-profit managers do not care about reporting of misbehavior by their peers. One solution to this problem could then be (monetarily) rewarding whistleblowing, so as to induce also selfish non-profit managers to report rent-seeking.

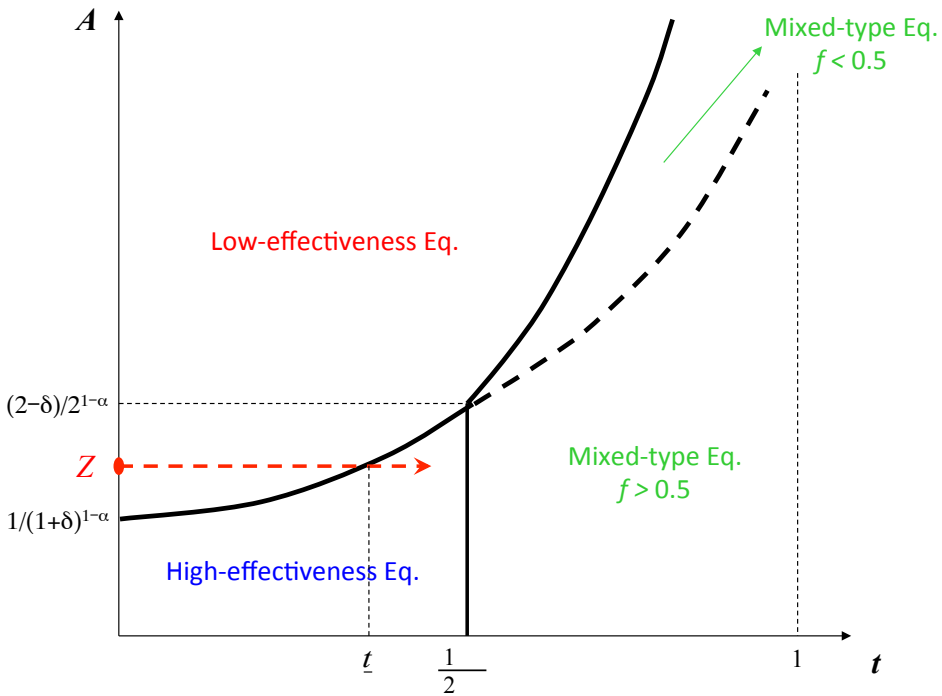


FIGURE 4. Public financing of non-profit sector.

returns in the private sector. Second, since the public sector distributes back all the taxes it collects while the private sector only gives a fraction δ of its net income, i in (18) increases with the tax rate t . Both channels, ceteris paribus, turn the non-profit sector more attractive to all individuals. However, within our general equilibrium framework, the key issue is whether public financing increases the attractiveness of the non-profit sector relatively more for motivated or for selfish individuals.

To study the more interesting case, let us focus on a setting where our basic economy (without public financing) would give rise to a low-effectiveness equilibrium: $A(1 + \delta)^{1-\alpha} > 1$.

Consider now an increase in taxes, with the transfer of all the proceeds to non-profits as grants. For such policy to induce a motivational improvement in the non-profit sector, it is crucial that, in the new equilibrium (after taxes), the selfish individuals who were initially managing the non-profit sector switch occupations and move to the private sector. This will occur only if the policy attracts enough motivated agents from the private sector into the non-profit sector, so that this entry sufficiently dilutes the amount of funds per non-profit organization, even after taking into account the larger total funding of the non-profit sector as a whole. The proposition below formally proves that such a tax/grant policy exists.

PROPOSITION 5. For $A(1 + \delta)^{1-\alpha} = 1 + \varepsilon$, where $0 < \varepsilon < \bar{\varepsilon}$, there exist a feasible range of tax rates $[\underline{t}, \bar{t}]$, where $\underline{t} > 0$ and $\bar{t} \equiv (1 - \delta)/(2 - \delta)$, such that when $t \in [\underline{t}, \bar{t}]$ an ‘H-equilibrium’ arises.

Figure 4 plots the equilibrium regions for different combinations of values of A and t (see Appendix C for the derivation of the equilibrium regions). There are four different regions. For combinations of relatively low values of A and t , the model features an ‘H-equilibrium’ where the non-profit sector is fully managed by motivated agents. On the other hand, given a certain level of t , for sufficiently high levels of A we have an ‘L-equilibrium’. Notice that when $t = 0$, the boundary between these two regions is given by $A = 1/(1 + \delta)^{1-\alpha}$, as previously stated in Proposition 1. In addition, with public financing, two new equilibrium regions arise: one with a mixed-type equilibrium with a fraction of motivated agents in the non-profit sector larger than one half ($f > 0.5$), and one with a mixed-type equilibrium with $f < 0.5$. These two types of equilibria occur when the tax rate is sufficiently large, while the former also requires that A is sufficiently small and the latter that A takes intermediate values.

A crucial feature of Figure 4 is that the threshold level of A splitting the high-effectiveness and low-effectiveness equilibrium regions is increasing in t (up to the point in which $t = \bar{t}$). As a consequence of this, there are situations in which introducing public funding of non-profits via (higher) taxes on private incomes can make the economy switch from an ‘L-equilibrium’ to an ‘H-equilibrium’. This is depicted in Figure 4 by the dashed line arrow.

This result rests on a subtle general equilibrium interaction. Consider an economy with no taxes that is on the low-effectiveness equilibrium region, located at point Z . At Z , all m_H -types prefer the private sector, while m_L -types are indifferent between both sectors.¹⁹ Since a higher tax rate makes the non-profit sector more attractive, by sufficiently raising t we can make m_H -types prefer non-profit sector as well. However, when all motivated agents switch to the non-profit sector, the value of N will rise and the returns in this sector will accordingly decrease. When t lies within the interval $[\underline{t}, \bar{t}]$, the new equilibrium allocation induced by the higher t leads to an increase in total funding of the non-profit sector, while simultaneously reducing the value of per-organization funding (i) enough so that only motivated agents are ultimately attracted to the non-profit sector.²⁰

In terms of actual implementation, our result implies that it may be advisable to give starting grants to new non-profits. For instance, consider the recent proposals to do “philanthropy through privatization” (Salamon, 2013), which consists in returning part of proceeds from the privatization of public sector assets to foundations and

19. Hence, at Z , one part of the m_L -types choose the private sector and the other part choose non-profit firms.

20. Notice that all this implies that, in the new equilibrium, the total mass of non-profit firms must necessarily be larger than in Z , since from (18) it follows that σ_i will grow with t for a given level of N . In other words, after t is raised to a level within $[\underline{t}, \bar{t}]$, a mass N_L^* of selfish non-profit managers will be replaced by a mass N_H^* of motivated non-profit managers, where $N_H^* > N_L^*$.

charities. Our analysis suggests that this policy would work correctly only if the way these proceeds are used is such that they are scattered through a multitude of small organizations, rather than concentrating them on a few large non-profits. In fact, while the latter risks worsening the motivational composition of the sector by attracting selfish agents, the former ensures that the returns in the non-profit sector remain low enough to attract only motivated managers.

4. Discussion

In this section, we proceed to discuss some of the key assumptions and modelling choices of our baseline framework. We also provide some discussion regarding the robustness of our results to relaxing these assumptions.

4.1. *Decreasing Returns in the Non-profit Sector*

One key assumption is the decreasing returns in the non-profit sector ($0 < \gamma < 1$).²¹ This assumption underlies the single-crossing result (Lemma 1), which is, in turn, crucial for characterizing the different types of equilibria that may arise (Proposition 1). The nature of the functioning of the non-profit sector makes this assumption seem appropriate in the context of our model. Two distinct reasons motivate our choice of decreasing returns at the level of single non-profit organizations: *i*) the fact that motivated agents may become a scarce input unable to grow at the same speed as donations ; *ii*) the fact that non-profits tend to face increasingly difficult tasks to accomplish as their effort within their mission boundaries deepens.

Non-profit organizations are entities crucially defined by their missions (that is, the specific social problems that these organizations aim to address). A fundamental scarce resource from the viewpoint of these organizations is then mission-oriented motivated labor, i.e. individuals who are aligned with the mission of a particular non-profit.²² The practitioners of the sector, in fact, underline that finding such people and expanding the staff of the organization is often extremely difficult, mainly because of the existing variety of missions and organizations.²³ In this respect, a fundamental operational difference between non-profit and for-profit firms is that, while (individually) the latter can easily purchase the required inputs in the market at the given market price, the former tends to face an often binding constraint on the amount of ‘mission-oriented motivation’ it can acquire. Thus, as funding expands, if the non-profit motivated

21. This assumption is dispensed, though, in the model presented in the Appendix A, where we use a linear production function for each single non-profit firm.

22. Although our model has treated pro-socially motivated agents as identical (hence, without displaying heterogeneity in their type of pro-social motivation), the idea that each NGO manager operates a different non-profit firm implicitly reflects the underlying notion that motivated agents also differ in the social mission they most strongly align with.

23. This has also been highlighted by the matching-to-mission model of Besley and Ghatak (2005).

labor cannot grow at the same pace, some form of diminishing returns of those funds will eventually kick in. For instance, Robinson (1992, p. 38) notes about non-profits working in rural areas that "ambitious attempts to expand or replicate successful projects can founder on the paucity of appropriately trained personnel who are experienced in community development". Similarly, Hodson (1992) states that

"Upgrading the management capability [of a development non-profit] usually implies new talent. Unfortunately, the story-book scenario under which the original team continues to develop its management capability at a rate sufficient to cope with rapid growth rarely comes true..." (p. 132)

Concerning the second reason that motivates our assumption, the type of tasks that a non-profit organization typically carries out tends to change along its expansion path. The first activities tend to concentrate on some form of emergency: saving individuals from imminent physical danger or starvation, helping to avoid some irreversible health problem, etc. In this sense, the marginal returns are extremely high at the beginning. However, the next activities of the non-profit's project involve usually tasks which are less emergency-driven and more oriented towards making the livelihoods of beneficiaries sustainable (e.g. putting children to school, providing economic activities so that beneficiaries can earn their living). Smillie (1995) argues that these types of tasks are much harder to accomplish successfully and involve a much longer period of time to realize. Such long-run perspective also implies that many organizations prefer to concentrate on the emergencies; however, the resulting competition among them for "saving lives" limits their expansion, as has been underlined by observers of large-scale humanitarian emergencies such as the 2004 tsunami (Mattei, 2005). In our case, this implies that, for a given non-profit organization, the slope of its production function is fairly steep at low levels of funding (when it first deals with emergency activities), while becomes flatter at higher levels of funding (as the non-profit moves its focus to sustainable development activities).

4.2. Informational Asymmetries and Lack of Contractibility

Throughout the paper we have assumed that motives for giving are unrelated to the performance of non-profit firms.²⁴ This assumption would become untenable if motivated non-profit managers could find a way to signal their motivation to donors. One possibility for such signalling would result from allowing non-profit managers to "burn money". In such case, a separating equilibrium where motivated types engage in "burning" enough money (so as to discourage self-interested types from joining the non-profit sector) could arise. It is hard to envision, however, a practical way of carrying out these sort of actions. One possibility could be allowing for self-imposed

24. Note, however, that Section 3.1 deals with the case where donations respond to the average motivation in the non-profit sector, but the level of donations received by each non-profit there is still assumed to be proportional to aggregate donations.

restrictions on overheads. Yet, to be credible, such a scheme would require a third-party certification of such restrictions (for example, by the government, bringing up additional credibility issues to the model.²⁵

More generally, our model has implicitly assumed that non-profits' output is completely unobservable or unverifiable. This assumption underlies the severe non-contractability of managers' allocation decisions in the non-profit sector. Non-contractability problems means that motivation serves as a substitute for contracts in our model, as it is exactly this problem that attracts selfish individuals into non-profits when this sector is flooded with large amounts of donations. Clearly, some degree of output measurability would ease the problem of adverse selection. However, it is exactly those sectors where output is poorly measured where the role of non-profits is greater, as has been argued by Glaeser and Shleifer (2001). In fact, in sectors where output can be measured relatively well the production could be fully taken care of by for-profit firms.

4.3. Absence of Non-pecuniary Incentives

Our model assumed away any form of non-pecuniary incentives, such as those that have been studied in the organizational economics literature (Besley and Ghatak, 2008; Bradler et al., 2015). This seems quite relevant in our context, since non-pecuniary incentives could well be heterogeneously valued by agents with different levels of intrinsic motivation. If social prestige associated with working in the non-profit sector is valued relatively more by motivated types (for example, because altruistic agents care more about the social signalling built around contributing to the production of public goods) this would enlarge the range of parameters displaying an H-equilibrium. However, it could be that social prestige is valued more strongly by self-interested agents (if there are large indirect pecuniary benefits that social prestige can deliver), and the range of parameters with an H-equilibrium would thus shrink. Lastly, there could also be non-pecuniary externalities associated to the presence of monetary rewards, as those in Benabou and Tirole (2006); when this is the case, large scope for earnings in the non-profit sector may lead to the crowding out of pro-socially motivated non-profit managers who fear being (incorrectly) perceived as monetarily driven.

5. Case Studies

In this section, we present two groups of case studies that illustrate the applications of our model to large-scale recent real-life phenomena in international development efforts. The first group presents the analysis of the NGO sector in developing countries

25. Another form of signalling is possible if conditionally warm-glow donors differ in size, and large donors can obtain information (even if noisy) about the non-profit managers' types at some cost. The models by Vesterlund (2003) and Andreoni (2006), where obtaining a large leadership donation serves as a credible signal of quality, can serve as a microfoundation for this type of analysis.

(Uganda and Pakistan) and its governance problems, in particular related to the inflows of foreign aid. The second focuses on the international NGO humanitarian efforts and the dynamics of post-reconstruction by international NGOs, following the natural disasters (specifically, the December 2004 tsunami in the Indian Ocean and the January 2009 earthquake in Haiti).

5.1. The NGO Sector in Developing Countries

5.1.1. Uganda. Substantial narrative evidence for several developing countries indicates that generous financing by foreign aid can lead to perverse effects by triggering opportunistic behavior and elite capture in these local NGO projects (see, e.g., Platteau and Gaspart, 2003; Platteau, 2004; the contributions in Bierschenk et al., 2000; Gueneau and Leconte, 1998). Here, we discuss one of the best-documented analyses, that of the NGO sector in Uganda. This analysis was conducted by a team of development economists at Oxford University's Center for Study of African Economies (see Barr et al. 2003, 2005; Fafchamps and Owens 2009; Burger and Owens 2010, 2013).

The analysis is based on a unique representative national survey of NGOs, collected by Abigail Barr, Marcel Fafchamps, and Trudy Owens in 2002, and financed by the World Bank and the Japanese government. The aim of the study was to collect information about Ugandan NGOs' activities, their sources of funding, and their personnel. The surveys were conducted with about 300 NGOs (out of about 3500 registered ones), and the main descriptive findings were published as a CSAE report to the Government of Uganda in December 2003 (Barr et al. 2003).

Several interesting facts emerge from this study. The bulk of funding of Ugandan NGOs comes from international NGOs. These latter often conduct their own monitoring, but despite this, the authors argue that it is difficult to exclude that there are "crooks" in the sector. The authors note:

"It is possible that the fluidity of the NGO sector and the focus on non-material services (e.g., 'talk' and 'advocacy') enable unscrupulous individuals to take advantage of the system... There is indeed a suspicion among policy circles that not all Ugandan NGOs genuinely take public interest to heart. [Some] accounts speak of crooks and swindlers attracted to the sector by the prospect of securing grant money... In a context where most charity funding comes from international benefactors, new incentive problems emerge. One is that of opportunistic NGOs whereby talented Ugandans initiate a local NGO not so much because they care about public good but because they hope to attract external funding to pay themselves a wage" (Barr et al. 2003: 4-7).

In a companion paper, Barr et al. (2005) write:

"According to respondents, per diems to staff and beneficiaries account for less than 2% of the total expenditures for the sample as a whole (slightly more for small NGOs). However, we suspect these data are not fully accurate and that there may be additional per diems included in program and miscellaneous costs. Ugandan NGOs are well aware that they are scrutinized by members and donors for excessive salary and per diem payments. They may therefore be tempted to hide these payments in other costs, or to simply misreport them. Given the poor quality of financial accounts provided by surveyed NGOs, it is

difficult to determine the extent to which NGO profits are redistributed to staff via the payment of per diems. What is clear, however, is that most surveyed NGOs do not have transparent accounts" (Barr et al. 2005: 667)

If the Ugandan NGO sector is facing a serious problem of fraud, why is it unable to create institutions that screen or limit such behavior? The report provides some answers to this:

"Developed countries all have instituted sophisticated legislation regulating charities. This is because unscrupulous individuals may solicit funds from the public without actually serving the public good they are supposed to serve. Hit-and-run crooks may take the money and disappear. More sophisticated crooks may set up an organization that partly serves its stated objective, but at the same time either divert funds directly to their pocket or spend part of the money on perks, allowances, and excess salaries. This kind of behaviour is damaging to charitable organizations at large because it undermines the public's trust in them and reduces funding. It is therefore in the interest of bona fide charities to regulate the industry so as to weed out crooks... Reporting requirements, however, impose an additional burden of work in charities. Moreover, they are useless unless they are combined with the Charities Commission's capacity to investigate the veracity of the reports provided. Crooks smart enough to defraud granting agencies are also smart enough to produce a fake report for the Charities Commission" (Barr et al. 2003: 7)

Would peer monitoring be a solution to this problem? The report indicates that certain Ugandan NGOs tried to create such institutions, but they do not seem to function:

"While some NGO networks have actively sought to promote good governance among their member organizations, to our knowledge, none has sought to set up a formal certification system. Instead, networks and umbrella organizations have sought to be inclusive and have welcomed new members with little or no attempt at quality control" (Barr et al. 2005: 675).

The only mechanism that limits the misbehavior of NGOs seems to be donors' (imperfect) control. In fact, the international NGOs seem to concentrate most of their financing in a few Ugandan NGOs. The authors argue that "one possible explanation is that foreign donors cannot identify the most promising NGOs and therefore concentrate their activities on a small number of trusted NGOs. Another possibility is that many sampled NGOs are engaged in a 'rent seeking' process by which they seek self-employment by attracting grants. Donors may have correctly identified them as undeserving and denied them funding" (Barr et al. 2003: 27).

5.1.2. Pakistan. Another interesting case study comes from Pakistan and is based on the analysis by Bano (2008). Motivated by the recent trend of aid policies aiming at strengthening the local civil society, this study focused on the effects of channeling development aid through local NGOs. The author conducted a comparative in-depth survey of 40 local Pakistani NGOs: 20 NGOs that rely on foreign aid for their financing and 20 that rely only on domestic financing. Although the sample is relatively small, the author tried to maximize the national coverage in selecting the organizations across all the regions of Pakistan and focusing strictly on the organizations providing

public goods (i.e., excluding the organizations aimed at providing benefits only to their members).

The main findings of the study are three. First, the NGOs that relied on foreign aid were much more likely to have no members. Interestingly, several authors (Henderson, 2002; Tvedt, 1998) previously had documented that the absence of members usually implies high salary of the NGO leader and poor overall performance of the organization. Thus, it is likely that these NGOs relying on foreign aid in many cases were just "empty shells".

Secondly, there were large motivational differences between the NGOs relying on foreign aid and those relying on domestic financing (see Table 4 in Bano, 2008). For instance, nearly all the aid-financed NGOs, the leader drew a salary above the governmental scale (while this happened in none of the domestic-financed ones). The offices of all the aid-financed NGOs located in luxury areas of the cities (none for domestic-financed ones), the majority of aid-financed NGOs had four-wheel drive cars (none for domestic-financed ones), and in all of aid-financed NGOs the project was designed first and beneficiaries chosen after (while the opposite was true for the domestic-financed NGOs).

Finally, NGOs relying on foreign aid exhibited lower organizational performance, as measured by fluctuation in annual budgets and the stability of the type of activities. The aid-financed NGOs showed dramatic fluctuations in their annual budgets, in response to aid flows, whereas the budgets of domestic-financed NGOs were quite stable. The activities of aid-financed NGOs kept changing in response to aid flows, while the focus of the domestic-financed organizations' activities remained stable.

Although the study relied on interviews and the causal identification of aid financing was not feasible quantitatively, on the basis of additional qualitative evidence Bano (2008) argues foreign aid led to a modification of material aspirations among leaders of NGOs, which in turn resulted in lower performance. For instance, one of the interviewed NGO leaders noted that, as an organization starts to rely on foreign aid, "the people who are more interested in personal gains start getting attracted to the organization" (Bano, 2008: 2303).

Although our model assumes that the inflow of foreign aid is distributed equally among NGOs, the above findings can still be explained in the light of our model's main mechanism, and can be interpreted as a transition stage when moving from the equilibrium without foreign aid to the one with foreign aid. Our model predicts that, starting with an honest equilibrium without foreign financing, an aid inflow would trigger entry into the NGO sector by selfish agents seeking rents. The 20 organizations in the study that rely on foreign aid can be thought of as such entrants. In the meanwhile, the NGOs without foreign aid financing still operate as under the "no foreign aid" regime. Over time, as selfish agents enter the NGO sector in even higher numbers, the motivated agents start to quit the sector. If our model is valid, we should observe over time that the number (and the share) of NGOs in Pakistan that do not rely on foreign aid financing with their leaders showing relatively low material aspirations should decrease. This is an interesting prediction that hopefully can be tested in the future work.

5.2. Humanitarian Emergencies and International NGOs

5.2.1. *The 2004 Tsunami.* On December 26, 2004, a tsunami of unprecedented power, triggered by the Sumatra-Andaman undersea earthquake, hit the coastal areas of 14 countries in Asia and Africa (with Indonesia and Sri Lanka receiving the strongest impact). It was one of the deadliest natural disasters in recent history, killing close to 230 000 people and displacing over 1.75 million people. The scale of the disaster, coinciding with it happening right after Christmas and fed by a large-scale international media coverage, led to a massive humanitarian response, both through public and private channels. The amount of private donations to international NGOs was huge: for example, Save the Children USA received over 6 million USD in just four days, whereas Catholic Relief Services collected over 1 million USD in three days. In total, U.S.-based charities raised about 1.6 billion USD for tsunami relief (Wallace and Wilhelm 2005), whereas total international response (both public and private) amounted to 17 billion USD (Jayasuriya and McCawley 2010).

The evolution of the resulting humanitarian relief activity presents an interesting story. It started off with early successes: for instance, Inderfurth et al. (2005) write:

"The tsunami will be remembered as a model for effective global disaster response... Because of the speed and generosity of the response, its effectiveness compared to previous (and even subsequent) disasters, and its sustained focus on reconstruction and prevention, we give the overall aid effort a grade of 'A'...".

However, quite soon, numerous problems in relief activities started to emerge. These included inefficiencies in the distribution of funds, unsatisfactory plans for the rebuilding of houses, cost escalations, and coordination failures (Jayasuriya and McCawley 2010: 4). This is summarized by the Joint Evaluation Report of the Tsunami Evaluation Coalition:

" Exceptional international funding provided the opportunity for an exceptional international response. However, the pressure to spend money quickly and visibly worked against making the best use of local and national capacities... Many efforts and capacities of locals and nationals were marginalized by an *overwhelming flood of well-funded international agencies* (as well as hundreds of private individuals and organisations), which controlled immense resources" (Telford et al. 2006: 18-19).

The observers underline several mechanisms behind this failure. One of them was the pressure to rapidly disburse huge amount of donations, which weakened the control mechanisms on how the money was spent. Maxwell et al. (2012) note that:

"During the response to the 2004 tsunami, many agencies reported intense pressure to speed up the rate at which donations were being expended, in part to ensure an ongoing flow of funds. Sometimes, however, the need to act swiftly may result from the situation on the ground, not just from donor or media pressure. While pressure to spend speedily does not, in itself, cause corruption, it may mean that standard checks and systems intended to prevent corruption are overridden or ignored" (Maxwell et al. 2012: 143).

A related mechanism is the rush of too many NGOs to carry out highly visible activities in disaster-prone areas:

"One of the striking features of the relief effort was the presence of a horde of small, often newly formed, foreign organizations with little if any experience in disaster relief but motivated by a strong humanitarian impulse that 'something had to be done'. Throughout the tsunami affected areas small groups and individuals from a wide range of countries were active in all sorts of activities. For instance, a Slovakian organization was engaged in boatbuilding, while an Austrian NGO assisted in constructing houses. Neither had any previous experience of South Asia or disaster relief. Similarly individuals from Europe, North America and Asia whose only prior knowledge of Sri Lanka came from news bulletins arrived in the country and proceeded to do whatever they thought useful" (Stirrat 2006: 14)

This dynamics fits well the main predictions of our model. A sudden natural disaster creates a sharp increase in the willingness to give of individual donors (an increase in δ) and/or a large increase in foreign aid (a big increase in Δ). This attracts a mass of agents to enter the non-profit sector (here, founding new NGOs). However, given that many of these agents were mostly driven by ego-utility obtained from high visibility, our model would predict that a large fraction of the donations will end up being spent in projects that do not necessarily help the beneficiaries (or possibly help them only in the short run, but prove to be useless in the medium run).

An alternative explanation to the above patterns is the lack of experience and knowledge of certain NGOs that entered the donation market during natural disasters. As Willitts-King and Harvey (2005, Section 2.4) note, administrative inefficiency in humanitarian relief is different from corruption, although both are harmful for the performance of the humanitarian aid system. However, on the basis of an in-depth study and interviews with humanitarian relief professionals, conducted shortly after the massive inflow of humanitarian relief organizations into the tsunami-hit areas, they also provide a detailed list of major corruption risks at various levels of the humanitarian relief chain, including inflating overheads, setting up bogus NGOs, kickbacks from procurement, field staff collusion with diversion, listing phantom staff, etc. For instance, they write:

"Once funds have been passed to an agency [NGO], there are many opportunities for individuals to make personal gain. This normally entails some collusion between agency staff internally, or between staff and outside suppliers or authorities. At field level, staff might be 'paid off' for turning a blind eye to the false registration of relatives on a distribution list, or theft from a warehouse. Staff might themselves extract payments directly to include people on beneficiary lists who do not fit vulnerability criteria. Procurement, storage and transport offer widespread opportunities for corruption. Staff might accept kickbacks or bribes to favour a particular supplier or agree an inflated quote, or relatives might be preferred even though the quality or price is uncompetitive... Other experiences included the use of agency vehicles to provide paid rides, taxi services, or in some cases public bus services" (Willitts-King and Harvey, 2005: 21-22)

Given this analysis, it is difficult to imagine that the main source of failure of the humanitarian aid system after the tsunami is driven only by the administrative

inefficiency. More likely, it is the combination of entry of unscrupulous or visibility-seeking actors at various layers of the aid chain with administrative inefficiency and lack of coordination that generated the poor outcomes of the overall system²⁶.

5.2.2. The 2010 Haiti Earthquake. On January 12, 2010, a 7.0-magnitude earthquake hit Haiti, the poorest country of the Western hemisphere. This also was an extremely violent natural disaster, killing more than 200 000 people in a very short period of time, and destroying most of the administrative capacity of the state. Similarly to the case of 2004 tsunami, the international humanitarian response to this disaster was massive. Between 2010 and 2012, the total amount over 8 billion USD (of which 3 billion came through international NGOs) was given by the international community for the post-earthquake reconstruction activities. One of the largest French NGOs, Medecins Sans Frontieres (MSF), noted that its Haiti intervention was the largest in the long history of this organization (Biquet 2013: 130).

This rush in international humanitarian efforts fuelled by generous donations, made NGOs key players in the reconstruction efforts. The presence of NGOs, already considerable before the earthquake, became so massive as for Haiti being dubbed in international circles as "the Republic of NGOs" (Klarreich and Polman 2012). Similar to the post-tsunami reconstruction, early successes were followed by disappointing outcomes later on: the lack of coordination between NGOs and the complex overlapping system of aid actors that emerged became a problem rather than a solution. This was made most apparent during the cholera epidemics that hit Haiti in October 2010. Biquet (2013) reports that more than 80% of patients in the three months following the outbreak of the epidemics were taken care of by two actors (Cuban medical brigades and the MSF) acting outside the 'Health Cluster' which concentrated all the other NGOs with health-related activities (there were more than 600 international organizations in this cluster).

One key explanation proposed for the failure of international humanitarian assistance in Haiti is the lack of accountability of organizations carrying out interventions, coupled with massive budgets. Klarreich and Polman (2012) argue that this resulted in a complete disconnection from the needs of the local population and exclusion of local civil society, more knowledgeable about the local conditions and needs, from the reconstruction effort:

"From the very beginning, NGOs followed their own agendas and set their own priorities, largely excluding the Haitian government and civil society... The money that did reach Haiti has often failed to seed projects that truly respond to Haitians' needs. The problem is not exactly that funds were wasted or even stolen, though that has sometimes been the case. Rather, much of the relief wasn't spent on what was most needed... [As a

26. Most of the existing discussions of the performance of humanitarian aid to the 2004 tsunami concern international or Northern NGOs. In the context of our model, given that these NGOs were founded in different countries, they could be facing different types of occupational equilibria. However, Willitts-King and Harvey (2005) show that the diversion of funds during humanitarian relief can occur both at the international organizations' level and at the local level (and probably, both levels were subject to this problem). Therefore, our analytical framework still applies to this context.

result] the recovery effort has been so poorly managed as to leave the country even weaker than before." (Klarreich and Polman 2012)

As in the case of 2004 tsunami, the massive increase in the number of NGOs carrying out activities was driven by donors' willingness to give, in the absence of any - even minimal - certification of NGOs. Haver and Foley (2011) state that "the response to the Haiti earthquake of 2010 [was one] in which thousands of NGOs, many of them unqualified 'cowboy NGOs', rushed in to help". The authors argue that instituting a certification scheme would have curbed (at least in part) this drive; however, they also acknowledge that such a scheme would have been quite difficult to implement (for instance, it would have turned away many local or regional NGOs for whom the paperwork related to such certification would have been prohibitively complicated or costly).

6. Conclusion

We built a tractable general equilibrium model of private provision of public goods via endogenous voluntary contributions to the non-profit sector. Our model shows that rent-seeking or ego-utility seeking motives may attract selfish individuals to the non-profit sector, which in turn may end up crowding out intrinsically motivated agents from this sector. Selfish motives and the possibility of motivational crowding out become increasingly severe as economies get richer and give more generously to the non-profit sector. The main applications of our theory belong to two domains.

The first is foreign aid intermediation by NGOs. Aid is being increasingly channelled via NGOs. This is to a large extent the result of the growing disillusionment in government-to-government project aid, often considered to be politicized and easily corruptible (see, for instance, Alesina and Dollar (2000) and Kuziemko and Werker (2006)). The rise of NGO intermediation has meant an increasing emphasis of project ownership, decentralization, and participatory development. However, no theoretical analysis has been conducted so far concerning the general-equilibrium implications of such massive channelling of aid via NGOs.²⁷ The application of our theory to foreign aid sheds light on these issues. In particular, a key implication of our results is that, as the NGO channel of aid expands, the investment into better accountability in the NGO sector becomes increasingly important, so as to curb self-interested motives. In other words, optimal aid delivery through NGOs requires harder controls accompanying the scaling-up of aid efforts.

The second application pertains to the recent debates on the accountability and performance-based pay in the non-profit sector in developed countries. The existing literature recognizes that firms in the non-profit sector are often prone to agency problems, due to the inherent difficulty of measuring their performance. Understanding

27. In a partial-equilibrium framework, this issue has been studied in the contributions mentioned in the introduction and in a recent review by Mansuri and Rao (2013).

the conditions under which these problems are most salient is an open issue in the public economics literature. Our analysis contributes to this debate by indicating that the role of (endogenously determined) outside options of selfish and motivated individuals inside the non-profit sector is crucial. In particular, what matters is whether it is motivated or selfish agents that exit more intensively the non-profit sector when donations from the private sector decrease. If selfish agents exit more intensively, then recessions can have a cleansing effect regarding the motivational composition of the non-profit sector. This is, in our view, an interesting hypothesis that could be tested empirically in future work.

Two further promising avenues for future research are worth mentioning. The first is the role of specific public policy instruments towards the non-profit sector. Several recent studies on the economic of charities and non-profits have explored the effectiveness of direct versus matching grants (Andreoni and Payne (2003, 2011); Karlan et al. (2011)). Our analysis indicates that matching grants might have an additional effect that operates through the motivational composition of the non-profit sector: such financing induces non-profits to engage more actively in fundraising (and thus to reduce their internal resources devoted to working on their projects), and this might induce the motivated individuals to quit the non-profit sector. A more complete analysis of the effectiveness of matching grants as compared to direct ones, that takes into account these various effects, looks very promising.

The second relates to the disconnection between who finances and who benefits from the activity of the non-profit sector. The resulting monitoring problems create the need to coordinate the scaling up of financing with investment into improved monitoring. As suggested by Ruben (2012), evaluation of aid effectiveness may generate social benefits even when one can learn relatively little from the evaluation exercise. This is because the very fact of being evaluated makes the misallocation of aid resources more difficult and thus help improve the motivational composition in the non-profit sector. Our framework may allow to study these indirect effects of evaluation of development projects.

Appendix A: Endogenous Fundraising Effort

Our benchmark model assumed that total donations are equally split (quite mechanically) between all non-profit firms. It is well known, however, that non-profits actively compete quite intensely for donations via fundraising activities.²⁸ Here we relax the 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

28. See, for example, De Waal (1997) and Hancock (1989) for some poignant recounts of the fundraising effort spent by non-profit organizations by using the social media both in the developed and developing world.

can influence the share of funds they obtain from the pool of total donations by exerting fundraising effort.

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. 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 means that $e_i + \varsigma_i = 1$.

As before, the non-profit manager collects an amount of donations i from the aggregate pool of donations D . One part of i , equal to w_i , is allocated for the perks, while $i - w_i$ is used as input for the non-profit's production. In this section, in the sake of algebraic simplicity, we assume that the output of a non-profit firm is linear in undistributed donations, namely:

$$g_i = 2(i - w_i)\varsigma_i. \quad (\text{A.1})$$

An important feature of g_i in (A.1) is the fact that undistributed donations ($i - w_i$) 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 affects the division of D 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

$$i = \frac{D}{N} \times \frac{e_i}{\bar{e}} = \frac{\delta A (1 - N)^\alpha}{N} \times \frac{e_i}{\bar{e}}, \quad (\text{A.2})$$

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

Again, non-profit managers derive utility from the two dimensions, 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

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

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

$$e_H^* = \varsigma_H^* = \frac{1}{2}, \quad (\text{A.3})$$

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

$$U_H^* = \frac{1}{2\bar{e}} \frac{D}{N} = \frac{1}{2\bar{e}} \frac{\delta A (1-N)^\alpha}{N}. \quad (\text{A.4})$$

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

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

which, given the linearity of both the benefit and the cost of effort, trivially yields

$$e_L^* = \begin{cases} 0, & \text{if } \bar{e}^{-1} D/N < 1, \\ 1, & \text{if } \bar{e}^{-1} D/N \geq 1. \end{cases} \quad (\text{A.5})$$

The utility that a selfish agent obtains from becoming a non-profit manager is thus:

$$U_L^* = \max \left\{ \frac{D}{N} \frac{1}{\bar{e}} - 1, 0 \right\}. \quad (\text{A.6})$$

Note that the indirect utility of the selfish agent decreases, as before, with the size of the non-profit sector. However, it now reaches zero at an interior value, whereas in the basic model that occurred only when $N = 1$. The reason for this is that donations must now be obtained through exerting effort, which is costly to m_H -types. For a sufficiently large size of the non-profit sector, the level donations per non-profit firm that can be obtained through fundraising effort is just too small to justify their effort cost. This means that a selfish agent will choose to stop competing for donations if the number of non-profits firms N reaches a certain critical level (beyond such critical level of N selfish managers would optimally choose to exert no effort and collect zero donations, which accordingly yields $U_L^* = 0$).

H-equilibrium. In an H-equilibrium all non-profit managers are of m_H -type and set $e_H^* = 0.5$. This implies that each non-profit manager ends up raising

$$\sigma_H^* = \frac{\delta A (1 - N_H^*)^\alpha}{N_H^*}. \quad (\text{A.7})$$

Recalling (4), (A.4) and (A.6), we can observe that an H-equilibrium exists if and only if $\sigma_H^* \leq 1$.

L-equilibrium. In an L-equilibrium all non-profit managers are of m_L -type and set $e_L^* = 1$. In this case, each non-profit manager raises

$$\sigma_L^* = \frac{\delta A (1 - N_L^*)^\alpha}{N_L^*}. \quad (\text{A.8})$$

Using again (4), (A.4) and (A.6), it follows that an L-equilibrium exists if and only if $\sigma_L^* > 2$.

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 (A.4) and (A.6) requires that average fundraising effort satisfies $\bar{e}_{mixed} = 0.5 \times (D/N)$, which in turn means that $U_H^*(N^*) = U_L^*(N^*) = 1$. The returns in the private sector must then also equal to one, which, using (4), implies that $N^* = 1 - A^{1/1-\alpha}$. In addition, since $e_H^* = 0.5$ and $e_L^* = 1$, then $\bar{e}_{mixed} = 0.5 \times (D/N)$, together with $N^* = 1 - A^{1/1-\alpha}$, pin down the exact values of N_L^* and N_H^* .

Equilibrium Characterization with Fundraising Effort. We now fully characterize the type of equilibrium that arises in the model with fundraising effort.

PROPOSITION A.1. *The equilibrium allocation that arises is always unique and depends on the specific parametric configuration of the model.*

1. If $A \leq 1/(1 + \delta)^{1-\alpha}$, the economy exhibits an ‘H-equilibrium’ with $N^* = N_H^* = \delta/(1 + \delta)$. All non-profit managers exert the same level of fundraising and project implementation effort: $e_H^* = \zeta_H^* = 0.5$.
2. If $A \geq [2/(2 + \delta)]^{1-\alpha}$, the economy exhibits an ‘L-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 $\zeta_L^* = 0$.
3. 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 $N_{mixed}^* = 1 - A^{1/1-\alpha}$, where

$$N_H^* = 2 \left[1 - A^{\frac{1}{1-\alpha}} (1 + \delta/2) \right], \quad \text{and} \quad N_L^* = A^{\frac{1}{1-\alpha}} (1 + \delta) - 1. \quad (\text{A.9})$$

Motivated non-profit managers set $e_H^* = \zeta_H^* = 0.5$, while m_L -types set $e_L^* = 1$ and $\zeta_L^* = 0$.

The result of an ‘H-equilibrium’ when $A \leq 1/(1 + \delta)^{1-\alpha}$ is the analogous to that one previously obtained in the basic model. Similarly, when $A \geq [2/(2 + \delta)]^{1-\alpha}$ the model features a pure ‘L-equilibrium’. One novelty of this alternative setup is that for the intermediate range of A there exists a “mixed-type” equilibrium. Intuitively, the necessity of competition for donations reduces the utility of the unmotivated agents. As a consequence, this creates parameter configurations under which, in the absence of fundraising competition the non-profit sector would be populated only by selfish agents, whereas in the presence of competition a fraction of them moves into the private sector (and are in turn replaced by a fraction of motivated agents).²⁹

29. It is interesting to compare these findings to those of Aldashev and Verdier (2010), where more intense competition for funds actually leads to higher diversion of donations by non-profit managers. This

Appendix B: Altruism-dependent Private Donations

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 driven by (impure) altruism, it is reasonable to expect the propensity to donate to be increasing in the degree of pro-social motivation of an individual. Here, we modify the utility function in (3) by letting the propensity to donate be type-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 $m_i = m_L$.³⁰

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 that the mass of total donations is equally split between the mass of non-profits. In addition, we let the payoff functions by motivated and selfish non-profit entrepreneurs be given again by (8) and (9), respectively. Donations collected by a non-profit are now given by:

$$\frac{D}{N} = \frac{\delta_H A \left(\frac{1}{2} - N_H\right)}{(1 - N_H - N_L)^{1-\alpha} (N_H + N_L)}. \quad (\text{B.1})$$

When the total amount of donations to the non-profit sector depends positively on the fraction of pro-socially motivated private entrepreneurs, the model gives room to 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 (8) and (9) in Section 2. Instead, observing (B.1), one sees 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 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 B.1. *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,*

occurs because when agents have to spend more time raising funds, then less time is left for working towards the non-profit mission, and thus the opportunity cost of diverting money for private consumption falls. In that model, all agents are intrinsically identical, and thus the issue of more intense competition lies in *aggravating* a moral hazard problem. Here, instead, the existence of motivationally heterogeneous types implies that the main problem is one of adverse selection, and a more intense competition for funds *mitigates* the severity of this adverse selection problem.

30. 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.

1. *Unique ‘H-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 $N_L^* = 0$.
2. *Unique ‘L-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 $N_H^* = 0$.
3. *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,³¹
 - (a) an ‘H-equilibrium’ where $\delta_H / (2 + 2\delta_H) < N_H^* < \frac{1}{2}$ and $N_L^* = 0$;
 - (b) an ‘L-equilibrium’ where $N_L^* = \delta_H/2$ and $N_H^* = 0$;
 - (c) a ‘mixed-type equilibrium’ where

$$N_H^* = 1/2 - \frac{1 - A^{1/(1-\alpha)}}{\delta_H} \quad \text{and} \quad N_L^* = \frac{[1 - A^{1/(1-\alpha)}](1 + \delta_H)}{\delta_H} - 1/2.$$

Proposition B.1 shows that for A sufficiently small the economy will exhibit a high-effectiveness equilibrium, whereas when A is sufficiently large the economy will fall into a low-effectiveness equilibrium. These two results are in line with those previously shown in Proposition 1.

However, Proposition B.1 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 the coordination of agents’ expectations. If agents expect a large mass of m_H -types to choose the non-profit sector (case *a*), 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. Conversely, if individuals expect a large mass of m_H -types to become private entrepreneurs (case *b*), 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. Notice that the range of productivity A for which multiple equilibria occur increases with the (relative) generosity of the motivated individuals, δ_H .³²

Finally, Proposition B.1 also shows that, within the range of multiple equilibria, there is also the possibility of intermediate consistent expectations (case *c*). When this happens, both motivated and selfish agents are indifferent across occupations, and a mix of m_L - and m_H -types will end up populating the non-profit sector.

31. 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.

32. The range of values of A subject to multiple equilibria vanishes as δ_H approaches zero.

Appendix C: Proofs

Proof of Proposition 1

Part (i). First of all, notice that by replacing $N = N_0$ into (9), it follows that $A(1 + \delta)^{1-\alpha} > 1$ implies $U_L^*(N_0) > 1$. Hence, since $U_L^*(\hat{N}) = 1$, it must necessarily be the case that $N_0 < \hat{N}$. 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, $N_0 > \hat{N}$. Moreover, notice that an equilibrium with $N \leq N_0$ cannot exist, as it would contradict the fact that $N_0 < 0.5$. In turn, because the equilibrium must necessarily verify $N > N_0 > \hat{N}$, only motivated agents will become non-profit managers, while all selfish agents will self-select into the for-profit sector. Now, by the definition of N_1 in (11), 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 this 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 $U_L^*(1/2) < y(1/2) < U_H^*(1/2)$ 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). First of all, recalling (13), notice $2^{1-\alpha}A > 1$ implies $\underline{N} < 1/2$. 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 (11). Let now \mathcal{N}_H be implicitly defined by the following condition:

$$\mathcal{N}_H^{-\gamma} [\delta A (1 - \mathcal{N}_H)^\alpha + \Delta]^\gamma (1 - \mathcal{N}_H)^{1-\alpha} \equiv A; \quad (\text{C.1})$$

in raw words, \mathcal{N}_H denotes the level of N that equalizes (2) and the utility obtained by a motivated non-profit manager when D/N is given by (12). From (C.1), it is easy to observe that when $\Delta = 0$, $\mathcal{N}_H = N_1$. In addition, differentiating (C.1) with respect to \mathcal{N}_H and Δ , we obtain that $\partial\mathcal{N}_H/\partial\Delta > 0$. Let now

$$\Delta_0 \equiv 1 - A^{\frac{1}{1-\alpha}}(1 + \delta), \quad (\text{C.2})$$

and, using (13), notice that $[\delta A(1 - \underline{N})^\alpha + \Delta_0]/\underline{N} = 1$; hence $\mathcal{N}_H(\Delta_0) = \underline{N}$. As a consequence of all this, when $A(1 + \delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$, for all $0 \leq \Delta < \Delta_0$, in equilibrium, $N^* = N_H^* = \mathcal{N}_H(\Delta)$, where $\partial\mathcal{N}_H/\partial\Delta > 0$, and $\mathcal{N}_H(\Delta) : [0, \Delta_0) \rightarrow [N_1, \underline{N})$.

Part (ii). Using again the fact that $[\delta A(1 - \underline{N})^\alpha + \Delta_0]/\underline{N} = 1$, from (12) 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

$$\Delta_A \equiv 2^{-\alpha}A \left[(2^{1-\alpha}A)^{\frac{1-\gamma}{\gamma}} - \delta \right]. \quad (\text{C.3})$$

Using (2) and (12), notice that when $N = 1/2$ and $\Delta = \Delta_A$, the utility obtained by motivated non-profit managers is equal to $y(1/2)$. All this implies that, when $A(1 + \delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$, for all $\Delta_0 \leq \Delta < \Delta_A$, in equilibrium, $N^* = N_L^* = \mathcal{N}_L(\Delta) \leq 1/2$, where $\mathcal{N}_L(\Delta)$ is non-decreasing in Δ . In particular, for all $\Delta_0 \leq \Delta \leq 2^{-\alpha}A(1 - \delta)$ the function $\mathcal{N}_L(\Delta)$ is implicitly defined by

$$\left[\frac{\delta A(1 - \mathcal{N}_L)^\alpha + \Delta}{\mathcal{N}_L} \right] (1 - \mathcal{N}_L)^{1-\alpha} \equiv A, \quad (\text{C.4})$$

while for all $2^{-\alpha}A(1 - \delta) < \Delta < \Delta_A$, $\mathcal{N}_L(\Delta) = 1/2$. Lastly, when $\Delta = 2^{-\alpha}A(1 - \delta)$, the expression in (C.4) implies $\mathcal{N}_L = 1/2$, proving that $\mathcal{N}_L(\Delta) : (\Delta_0, \Delta_A] \rightarrow (\underline{N}, 1/2]$ is continuous and weakly increasing.

Part (iii). First, note that when $\Delta > \Delta_A$, the expression in (C.1) delivers a value of $\mathcal{N}_H > 1/2$. 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 $\mathcal{N}_H > 1/2$. In addition, since by definition of Δ_A in (C.3), $\delta A[(1 - N)^\alpha + \Delta_A]/N > y(N)$ when $N = 1/2$, all selfish agents must be choosing the non-profit sector when $\Delta > \Delta_A$. Let thus \mathcal{N}_{LH} be implicitly defined by the following condition:

$$\mathcal{N}_{LH}^{-\gamma} [\delta A(1 - \mathcal{N}_{LH})^\alpha + \Delta]^\gamma (1 - \mathcal{N}_{LH})^{1-\alpha} \equiv A. \quad (\text{C.5})$$

Differentiating (C.5) with respect to \mathcal{N}_{LH} and Δ , we can observe that $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. From (C.5), we can also observe that $\lim_{\Delta \rightarrow \Delta_A} \mathcal{N}_{LH} = 1/2$ and $\lim_{\Delta \rightarrow \infty} \mathcal{N}_{LH} = 1$. As a result, we may write $\mathcal{N}_{LH}(\Delta) : (\Delta_A, \infty) \rightarrow (\frac{1}{2}, 1)$, with $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. Moreover, since $N_L^* = 1/2, \forall \Delta > \Delta_A$, it must be the case that in equilibrium $N_H^* = \mathcal{N}_{LH}(\Delta) - 1/2$.

PROPOSITION 2 (bis). *If $2^{1-\alpha} A < 1$, there exists a threshold level $\Delta_B \in (0, \Delta_0)$, such that: (i) when $0 \leq \Delta \leq \Delta_B$, all non-profit firms are managed by m_H -types; (ii) when $\Delta_B < \Delta \leq \Delta_0$, non-profit firms are managed by a mix of types with m_H -type majority; (iii) when $\Delta > \Delta_0$, non-profit firms are managed by a mix of types with m_L -type majority.*

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

$$2 \left[\delta A \left(\frac{1}{2} \right)^\alpha + \Delta_B \right] = 2^{1-\alpha} A, \quad (\text{C.6})$$

and note that the right-hand side of (C.6) equals $y(1/2)$, while its left-hand side equals D/N when $N = 1/2$ and $\Delta = \Delta_B$. Furthermore, notice that $2[\delta A (1/2)^\alpha + \Delta]$ 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 $\mathfrak{N}_H(\Delta) = \min\{1/2, \chi\}$, where χ is the solution of $[\delta A (1 - \chi)^\alpha + \Delta]/\chi = A/(1 - \chi)^{1-\alpha}$, the result, $N_H^* = \mathfrak{N}_H(\Delta)$ for any $0 \leq \Delta \leq \Delta_B$ obtains.

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

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

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.

(iii) This part of the proof follows again from the definition of Δ_0 in (C.2), which implies that for all $\Delta > \Delta_0$, the expression in (12) 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

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

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

Proof of Proposition 3

First of all, from (15), 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 $D/N = 0$, and no agent would thus choose the non-profit sector.

Second, set $N_L = 0$ into (15), and take the limit of the resulting expression as N_H approaches zero, to obtain

$$\lim_{N_H \rightarrow 0} \frac{D}{N} \Big|_{N_L=0} = \frac{\delta_H A}{2} \frac{N_H}{(N_H)^2} = \infty.$$

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 $0 < N_H < N_L = 1/2$. Using (2) and (15), for this to be an equilibrium, it must necessarily be the case that

$$\frac{\delta_H A \left(\frac{1}{2} - N_H\right) N_H}{\left(\frac{1}{2} - N_H\right)^{1-\alpha} \left(\frac{1}{2} + N_H\right)^2} \geq \frac{A}{\left(\frac{1}{2} - N_H\right)^{1-\alpha}}. \quad (\text{C.7})$$

However, the condition (C.7) 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 (C.23) must be verified, which following the same reasoning as before in the proof of Proposition B.1 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

$$\frac{D}{N} = \frac{\delta_H A \left(\frac{1}{2} - N_H\right) N_H}{(1 - N_H - N_L)^{1-\alpha} (N_H + N_L)^2} = y(N) = \frac{A}{(1 - N_H - N_L)^{1-\alpha}} = 1. \quad (\text{C.8})$$

Taking into account the definition of \underline{N} in (13), it follows that $y(N) = 1$ requires $N_H + N_L = 1 - A^{\frac{1}{1-\alpha}}$. As a result, (C.8) boils down to the following condition:

$$\delta_H \left(\frac{1}{2} - N_H\right) N_H - \left(1 - A^{\frac{1}{1-\alpha}}\right)^2 = 0 \quad (\text{C.9})$$

The expression in (C.9) yields real-valued roots if and only if

$$A \geq \left(1 - \sqrt{\delta_H/4}\right)^{1-\alpha}. \quad (\text{C.10})$$

When (C.10) is satisfied, the solution of (C.9) is given by:

$$N_H = \begin{cases} r_0 \equiv \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{[1 - A^{1/(1-\alpha)}]^2}{\delta_H}}, \\ r_1 \equiv \frac{1}{4} + \sqrt{\frac{1}{16} - \frac{[1 - A^{1/(1-\alpha)}]^2}{\delta_H}}. \end{cases} \quad (\text{C.11})$$

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 (C.11) 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 $A = (1 - \sqrt{\delta_H}/4)^{1-\alpha}$ and $\sqrt{\delta_H} = 1$, which in turn also implies that $r_1 = r_0$ in (C.11). 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 (C.11), 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:

$$\Psi(x) \equiv \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{x^2}{\delta_H}} \leq x, \quad (\text{C.12})$$

Now, notice $\Psi(x) = x$ when $A = [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$. In addition, noting that $\Psi'(x) > 0$ and $\Psi''(x) > 0$, it then follows that: i) $\Psi(x) < x$, for all $A > [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$; while $\Psi(x) > x$, for all $(1 - \sqrt{\delta_H}/4)^{1-\alpha} < A < [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$. Consequently, when $A \geq [(2 + \delta_H)/(2 + 2\delta_H)]^{1-\alpha}$, 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 (C.11).

Proof of Proposition 4

The conditions for an ‘L-equilibrium’, ‘H-equilibrium’ and a ‘mixed-type equilibrium’ are, respectively, as follows:

$$\left[\delta A \frac{(1 - N_L)^\alpha}{N_L} \right]^y < \frac{A}{(1 - N_L)^{1-\alpha}} \leq \delta A \frac{(1 - N_L)^\alpha}{N_L}, \quad \text{with } N_L \leq 1/2. \quad (\text{C.13})$$

$$\delta A \frac{(1 - N_H)^\alpha}{N_H} - \rho\chi < \frac{A}{(1 - N_H)^{1-\alpha}} \leq \left[\delta A \frac{(1 - N_H)^\alpha}{N_H} \right]^y, \quad \text{with } N_H \leq 1/2. \quad (\text{C.14})$$

$$\begin{aligned} \delta A \frac{(1 - N_H - N_L)^\alpha}{N_H + N_L} - \frac{N_H}{N_H + N_L} \rho\chi &= \frac{A}{(1 - N_H - N_L)^{1-\alpha}} \\ &= \left[\delta A \frac{(1 - N_H - N_L)^\alpha}{N_H + N_L} \right]^y, \quad \text{with } N_H \leq 1/2 \text{ and } N_L \leq 1/2. \end{aligned} \quad (\text{C.15})$$

First of all, note that the condition for a low-effectiveness equilibrium (C.13) is identical to that in Proposition 1, hence when $A(1 + \delta)^{1-\alpha} > 1$ there must still exist a low-effectiveness equilibrium in the model with peer monitoring. Notice also that the

condition for existence of a high-effectiveness equilibrium without peer monitoring is identical to condition (C.14), except for the term $-\rho\chi$ in the first argument of the condition. This implies that, whenever the condition for existence an 'H-equilibrium' without peer monitoring is satisfied, then it must also be satisfied when there is peer monitoring. As a consequence, when $A(1+\delta)^{1-\alpha} < 1$ there must still exist an 'H-equilibrium' in the model with peer monitoring.

Next, recalling the definition of N_1 in (11), from (C.14) it follows that, even when $A(1+\delta)^{1-\alpha} > 1$, an H-equilibrium will exist if the condition

$$\frac{A(1-N_1)^\alpha}{N_1} \left[\delta - \frac{N_1}{1-N_1} \right] < \rho\chi \quad (\text{C.16})$$

holds true. Given that, when $A(1+\delta)^{1-\alpha} > 1$, $N_1 < N_0$, then condition (C.16) requires that $\rho\chi$ is sufficiently large.

Lastly, consider the specific case when $A(1+\delta)^{1-\alpha} > 1$ and condition (C.16) holds true. In a mixed-type equilibrium we must have that:

$$A(1-N)^\alpha \left[\delta - \frac{N}{1-N} \right] = \rho\chi(N - N_L). \quad (\text{C.17})$$

Notice now that when condition (C.16) holds true, then there must necessarily exist some value $0 < N_L < N < N_0$, with $N > N_L$, satisfying condition (C.17). This implies that when $A(1+\delta)^{1-\alpha} > 1$ and condition (C.16) holds true there also exists a mixed-type equilibrium satisfying (C).

Derivation of Equilibrium Regions in Figure 4

(i) *H-equilibrium Region.* This type of equilibrium arises when $\sigma_i < 1 < V_p^*$ for any $0 \leq N \leq 1/2$, where V_p^* is given by (17) and σ_i by (18). For $\sigma_i < V_p^*$ to hold for any $0 \leq N \leq 1/2$ it suffices to pin down when it holds for $N = 1/2$, which in turn leads to

$$t < \bar{t} \equiv (1-\delta)/(2-\delta). \quad (\text{C.18})$$

Next, for $\sigma_i < V_p^*$ we need that

$$N < \frac{\delta(1-t) + t}{1 + \delta(1-t)}. \quad (\text{C.19})$$

Therefore, plugging the RHS of (C.19) into (18), leads to the condition that $\sigma_i < 1$ whenever

$$A < \frac{1}{(1-t)^\alpha [1 + \delta(1-t)]^{1-\alpha}}. \quad (\text{C.20})$$

As a result, the region bounded by (C.18) and (C.20) features a high-effectiveness equilibrium.

(ii) *L-equilibrium Region.* This type of equilibrium needs, first, that condition (C.20) fails to hold. Second, it also needs that $(\sigma_i)^\gamma < V_p^*$ holds, so that m_H -types choose the private sector. For $(\sigma_i)^\gamma < V_p^*$ to obtain, it must be that

$$A > \frac{[t + \delta(1-t)]^{\frac{\gamma}{1-\gamma}}}{2^{1-\alpha}(1-t)^{\frac{1}{1-\gamma}}}. \quad (\text{C.21})$$

Notice now that the RHS of (C.20) is equal to the RHS of (C.21) when $t = \bar{t}$, while the former lies above (below) the latter when $t < \bar{t}$ (when $t > \bar{t}$). As a consequence, the region exhibiting an ‘L-equilibrium’ is given by $A > (1-t)^{-\alpha} [1 + \delta(1-t)]^{\alpha-1}$ whenever $t \leq \bar{t}$ and by (C.21) whenever $t > \bar{t}$.

(iii) *Mixed-Type equilibrium Region with $f > 1/2$.* From the previous results it follows that when (C.20) holds and $t > \bar{t}$, we must necessarily have an equilibrium in which all m_H -types choose the non-profit sector, while m_L -types lie indifferent between the two sectors, and a fraction of them choose the non-profit sector as well.

(iv) *Mixed-Type Equilibrium Region with $f < 1/2$.* From the previous results it also follows that when both (C.20) and (C.21) fail to hold and $t > \bar{t}$, we must necessarily have an equilibrium in which m_L -types choose the non-profit sector, while m_H -types lie indifferent between the two sectors, and a fraction of them choose the non-profit sector as well.

Proof of Proposition A.1.

Part (i). First, recall that in an H-equilibrium $\bar{e} = 1/2$. Second, using (A.7) and (4) when $N = N_H^*$, we have that

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

Therefore, an H-equilibrium must necessarily feature $N_H^* = \delta / (1 + \delta)$, 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 (A.5) 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 selfish 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 \bar{e} , which in equilibrium will never be below 0.5 as implied by (A.3).

Part (ii). Preliminarily, let first define $\tilde{N} \equiv \delta / (2 + \delta)$. Note then that, when $\bar{e} = 1$, the payoff functions (A.4) and (4) are equalized when $N = \tilde{N}$; namely, $U_H^*(\tilde{N}) = V^*(\tilde{N})$. Next, notice that, for a given \bar{e} , both (A.4) and (A.6) are strictly decreasing in N ,

while they grow to infinity as N goes to zero. Hence, to prove that a low-effectiveness equilibrium exists, it suffices to show that the condition $A \geq [2/(2 + \delta)]^{1-\alpha}$ implies $U_H^*(\tilde{N}) \leq U_L^*(\tilde{N})$. To prove that the low-effectiveness equilibrium is unique, notice first that an H-equilibrium is incompatible with $A \geq [2/(2 + \delta)]^{1-\alpha}$. Therefore, the only other alternative would be a mixed-type equilibrium with all agents indifferent between the private and non-profit sector. Yet, for (A.4) and (A.6) to be equal, it must be that $D/N = 2\bar{e}$. This equality, in turn, implies that all activities must yield a payoff equal to 1, however, when $A \geq [2/(2 + \delta)]^{1-\alpha}$, this would be inconsistent with $\bar{e} < 1$, 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 H-equilibrium cannot exist, since when $A(1 + \delta)^{1-\alpha} > 1$ selfish agents would like to deviate to the non-profit sector and set $e_L = 1$. Secondly, notice that a necessary condition for an L-equilibrium to exist is that $U_H^* > 1$ when $N = \tilde{N}$ and $\bar{e} = 1$, but replacing $N = \tilde{N}$ and $\bar{e} = 1$ into (A.4) yields a value strictly smaller than 1 when $A < [2/(2 + \delta)]^{1-\alpha}$. As a result, when $A(1 + \delta)^{1-\alpha} < A < [2/(2 + \delta)]^{1-\alpha}$ 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 (4) 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 $N_{mixed}^* = 1 - A^{1/1-\alpha}$ leads to

$$\bar{e}_{mixed} = \frac{1}{2} \frac{\delta A^{\frac{1}{1-\alpha}}}{1 - A^{\frac{1}{1-\alpha}}}. \quad (C.22)$$

Therefore, using the facts that $e_H^* = 0.5$ and $e_L^* = 1$, the levels of N_H^* and N_L^* in (A.9) immediately obtain. Lastly, to prove that this equilibrium is unique, notice that e_{mixed}^* in (C.22) 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 B.1

First of all, notice that $N_H = 0.5$ cannot hold in equilibrium, as (B.1) implies that in that case $D/N = 0$, no agent would 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, and (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:

$$\underbrace{\frac{\delta_H A \left(\frac{1}{2} - N_H\right)}{(1 - N_H)^{1-\alpha} N_H}}_{U_L^*(N_H, 0)} < \underbrace{\frac{A}{(1 - N_H)^{1-\alpha}}}_{y(N_H, 0)} = \underbrace{\left[\frac{\delta_H A \left(\frac{1}{2} - N_H\right)}{(1 - N_H)^{1-\alpha} N_H} \right]^y}_{U_H^*(N_H, 0)}. \quad (C.23)$$

For $U_L^*(N_H, 0) < y(N_H, 0)$ in (C.23) 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 $U_H^*(1/2, 0) = 0$, a sufficient condition for (C.23) 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). This case occurs when the following condition holds:

$$\underbrace{\left[\frac{\frac{1}{2}\delta_H A}{(1 - N_L)^{1-\alpha} N_L} \right]^\gamma}_{U_H^*(0, N_L)} < \underbrace{\frac{A}{(1 - N_L)^{1-\alpha}}}_{y(0, N_L)} \leq \underbrace{\frac{\frac{1}{2}\delta_H A}{(1 - N_L)^{1-\alpha} N_L}}_{U_L^*(0, N_L)}. \quad (\text{C.24})$$

Using the expressions in (C.24), 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 (C.24) 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:

$$\underbrace{\frac{A}{(1 - N_H - N_L)^{1-\alpha}}}_{y(N_H, N_L)} = \underbrace{\frac{\delta_H A \left(\frac{1}{2} - N_H\right)}{(1 - N_H - N_L)^{1-\alpha} (N_L + N_H)}}_{U_L^*(N_H, N_L)} = 1. \quad (\text{C.25})$$

Recalling the definition of \underline{N} in (13), $U_L^*(N_H, N_L) = 1$ leads to $[\delta_H (0.5 - N_H)] / [1 - A^{1/(1-\alpha)}] = 1$, from where we obtain:

$$N_H = \frac{1}{2} - \frac{1 - A^{\frac{1}{1-\alpha}}}{\delta_H}. \quad (\text{C.26})$$

Next, using again the definition of \underline{N} in (13), we may obtain $N_L = [1 - A^{1/(1-\alpha)}] - N_H$, which using (C.26) yields:

$$N_L = \left(1 - A^{\frac{1}{1-\alpha}}\right) \frac{1 + \delta_H}{\delta_H} - \frac{1}{2}. \quad (\text{C.27})$$

Lastly, (C.26) implies that $N_H > 0 \Leftrightarrow A > (1 - \delta_H / 2)^{1-\alpha}$, while (C.27) means that $N_L > 0 \Leftrightarrow A < [(2 + \delta_H) / (2 + 2\delta_H)]^{1-\alpha}$, completing the proof.

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