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

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Abstract

We build an occupational-choice general-equilibrium model of an economy with the non-profit sector financed through 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. If motivated donors give more than unmotivated ones, there exist two stable (motivational) equilibria. Linking donations to the motivational composition of the non-profit sector or a tax-financed public funding of non-profits can eliminate the bad equilibrium.

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

JEL codes: L31, D64, J24, D5.

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1 Introduction

One of the major recent phenomena in both developing and developed countries is the rising importance of the provision of public goods through private non-profit organizations. In the developing world, the non-governmental organizations (NGOs) play a key role in provision of health and education services and are fundamental actors of empowerment of socially disadvantages groups (such as women and minorities) and of monitoring the adherence by firms to environmental and labor standards. The number of international NGOs wordwide increased from less than 5 000 in mid-1970s to more than 28 000 in 2013 (Union of International Associations 2014; see also Werker and Ahmed 2008).

Similarly, in the OECD countries, the role of non-profit organizations in providing public goods is considerable, especially in health, arts, education, and poverty relief (see Bilodeau and Steinberg 2006, Section 3.2, for a detailed analysis of the scope of the non-profit sector). This sector has a large weight in terms of employment: on average, 7.5% of the economically active population is employed in the non-profit sector, and for some countries (Belgium, Netherlands, Canada, U.K., Ireland) this share exceeds 10% (Salamon 2010).

One distinctive feature concerning the provision of public goods by non-profits and NGOs is their financing structure: while a part of these organizations' operational cost is covered by government grants and by user fees, voluntary private donations play a key role in the financing of their budgets. Bilodeau and Steinberg (2006: 1285) report that, on average, for the 32 countries for which comparable data on non-profits is available, over 30% of their financing comes from voluntary private giving. More than three-quarters of this amount actually consists of small donations. Given the public-good nature of the services typically provided by non-profits, and the fact that small donors could hardly expect their contributions to have any meaningful effect on total provision, this evidence suggests that private contributions to non-profits must be partially motivated by some strong form of impure altruism.

Recent research in public and experimental economics has indeed shown that rationalizing empirical regularities about giving requires the acknowledgment of private psychological benefits accruing to the donor from the act of giving. This is the so-called "warm-glow" motivation, first modelled by Andreoni (1989). Using a panel of donations and government funding from the U.S. to 125 international relief and development organizations, Ribar and Wilhelm (2002) find that only the warm-glow motive is consistent with the observed absence of crowding out of private donations to non-profits.[1] In laboratory experiments, Andreoni and Miller (2002) and Korenok et al. (2013) find that voluntary giving tends to respond to income variations in a way that is more in line with the warm-glow motive than with pure altruism. A field experiment by Tonin and Vlassopoulos (2010) reaches analogous results. The authors analyze the behavior of student workers who had to exert real effort on a data entry task, and find that in an environment that elicits warm glow altruism workers respond by increasing effort, while additionally eliciting pure altruism has no further effect on effort.

Non-profit organizations rely then heavily on private donors' contributions, which are to a large extent the result of some intrinsic "joy of giving".[2] The prevalence of impure altruism by donors means that the link between the motivation to give to non-profit organizations and the ultimate provision of public-goods by them is weak. In addition, the very nature of the goods and services provided by these organizations is such that it is virtually impossible to write contracts that condition payment or future donations on the output produced by these entities (see Hansmann, 1996, Chapter 12; and Bilodeau and Slivinski, 2006a, Section 4.1, for detailed discussions). These features, combined with the fact that individual producers' intrinsic motivation is private information, imply that the non-profit sector is subject to large scope for funds diversion and rent-seeking by the founders/managers of non-profits.

There is some evidence of opportunistic behavior in the non-profit sector. One typical way through which the society tries to limit the scope for funds diversion is the non-distribution constraint, which entails that the organization cannot distribute profits but must reinvest them towards the fulfillment of its mission (Hansmann, 1996: 229-230). However, a clear downside of this policy is that it lowers the incentives to cut costs. Moreover, given the difficulty to control how these costs are calculated, it often spurs in-kind diversion. For instance, Smillie (1995: 151-153) describes how development-oriented non-profits use inflated and hidden overheads to engage in the in-kind diversion of funds. Frumkin and Keating (2001) analyze the non-profit executive pay patterns and conclude that "CEO compensation is significantly higher in non-profit organizations where free cash flow is present". Malani

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

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

and Choi (2005) exploit the executive compensation data from 2700 nursing homes in the U.S. and find that non-profit managers behave as if they cared about profits as much as their counterparts in for-profit firms. Finally, Fisman and Hubbard (2005) find that non-profits in the U.S. states with weaker oversight have managerial compensation that is more highly correlated with donation flows and allocate a smaller percentage of donations to the firm's endowment. One important implication of these facts is that the financing of the non-profit sector might have an impact on the composition of the sector, particularly in terms of the level of intrinsic motivation of its managers.[3]

Economists have so far analyzed separately the issues of non-contractability and poor monitoring in the non-profit sector, sorting into mission-oriented organizations, and the optimal financing of non-profit organizations. However, we still lack a model that ties all these key elements together within a tractable general equilibrium framework. Complementing the previous literature with a general equilibrium analysis is crucial, given that the relative size of the non-profit sector in numerous countries (both developing and developed) is large enough to imply that policies that influence the behavior of non-profit managers and entry into the sector might importantly affect the returns in both the non-profit and for-profit sectors. As a consequence, partial equilibrium approaches may lead to wrong policy conclusions (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 model with for-profit firms, non-profit organizations and endogenous private donations. The model relies on four key assumptions. First, private donors give to non-profits essentially because of warm-glow motives (i.e., with a weak link to the expected public-good output generated by the particular donation). Second, individuals self-select either into the for-profit or non-profit sectors. Third, monitoring the behavior and knowing the intrinsic motivation of the non-profit managers is inherently difficult. Fourth (and also resulting from the non-measurability of non-profits' output), private donations to the non-profit sector are shared among the existing non-profits firms in a manner that is not strictly related to their performance.

The model aims at addressing the following set of questions. What is the equilibrium

[3]There is substantial narrative evidence several developing countries that generous financing by foreign aid, together with a strong new emphasis on decentralized development, has led 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, for Chad; and Bano, 2008, for Pakistan).

composition of the non-profit and for-profit sectors in terms agents' intrinsic motivation? What are the implications of the external financing on the behavior of the non-profit sector? What types of policies can improve the motivational composition of the non-profit sector? What happens when donations respond positively to a better perceived motivational composition of the non-profit sector?

The main mechanism in our model rests on the notion that self-selection into either the for-profit or non-profit sectors is altered by the level of donations received by non-profit firms in equilibrium. Imperfect monitoring of managers in the non-profit sector, together with warm-glow motives by private donors, implies that the scope for rent-seeking in this sector expands when private giving grows. We show that warm-glow altruism and self-selection, in a context of asymmetric information about non-profits managers' motivation, interact sometimes in non-monotonic ways, leading in certain cases to inefficient equilibrium outcomes and allocations. Our model generates the following five main results.

First, there exist cases in which rent-seeking motives crowd out altruistic motivation from the non-profit sector. When this occurs, the non-profit sector ends up being managed by intrinsically self-interested agents who exploit the lack of monitoring to divert funds for their private use. Moreover, since the scope for rent-extraction rises with the level of donations received by each non-profit firm, this misallocation problem is exacerbated in richer economies and in economies where private donors give more generously.

Second, foreign aid intermediation through the non-profit/NGO 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 implication of this result is that, in our model, total output of the non-profit sector becomes a non-monotonic function of the amount of foreign aid. At low levels of foreign aid, a small increase in aid leads to higher total NGO output, since the allocation of motivation in the non-profit sector remains intact, and the motivated managers can produce more with more funds. However, with larger increases in foreign aid, as soon as the motivational composition of the sector starts to change (because of the crowding out effect), total non-profit output declines. Such inverted U-shaped relation, in turn, can help explaining the micro-macro paradox observed by empirical studies of aid effectiveness (i.e. the absence of empirical positive effect of aid on output at the aggregate level, combined with numerous positive findings at the micro level).

Third, if pro-socially motivated donors exhibit a higher propensity to give out of their private income than unmotivated ones, the model exhibits multiple equilibria. In particular, for intermediate ranges of private income, the model sustains two very different types of equilibria. In one equilibrium there is a high level of pro-social motivation in the non-profit sector, while in the other one the non-profit sector is fully managed by unmotivated agents. The underlying reason for equilibria multiplicity is that when the private sector is rich in altruistic motivation, a large amount of aggregate donations are given to the non-profit sector, thereby expanding the scope for rent-extraction by non-profit managers. Conversely, when the private sector rich in self-interested agents, only altruistic motivated agents end up being attracted to the non-profit sector in dearth of private donations.

Fourth, if donors' warm-glow motivation somehow responds positively to the expected productivity of the non-profit sector, the low-motivation equilibrium disappears. However, our model shows that, even in these cases, when the amount of donations becomes sufficiently large, unmotivated agents will still end up constituting an important share of the pool of non-profit managers, hurting thus the aggregate provision of public goods.

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 and eliminate the low-motivation equilibrium. This occurs because taxation alters the occupational choice of individuals in two ways: it reduces the returns in the private sector and increases the aggregate transfers to the non-profit sector. In a partial equilibrium setup, both channels would make the non-profit sector relatively more attractive for both motivated and unmotivated agents. However, in our framework, the implicit general equilibrium re-allocations imply that if public financing is able to increase the aggregate funding of the non-profit sector, while at the same time it sufficiently increases the number of non-profit managers so that the funding that each non-profit firm obtains from the aggregate pool is lower, this policy will lead to entry of motivated and exit of unmotivated agents from 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 pro-social motivation and non-profit organizations: Lakdawalla and Philipson (1998), Glaeser and Shleifer (2001), François (2003, 2007), Besley and Ghatak (2005), and Aldashev and Verdier (2010). We contribute to this line of research by endogenizing the occupational choice decision of individuals and exploring the general equilibrium implications of the financing of the non-profit sector.

The second related strand of literature is the occupational choice models applied to the selection into the public sector and politics (e.g., Caselli and Morelli, 2004; Macchiavello, 2008; Delfgaauw and Dur, 2010; Bond and Glode, 2012; Jaimovich and Rud, 2013). We extend this line of ongoing research by analyzing how the selection mechanisms apply to the non-profit/NGO sector within a context of endogenous voluntary donations.

Finally, there is growing theoretical literature that studies the effects of the modes and level of foreign aid financing on its effectiveness (see, for example, the survey in Bourguignon and Platteau, 2013a). Among these studies, an early paper by Svensson (2000) underlines how short-term increases in aid flows may trigger rent-seeking "wars" among competing elites in a developing country. Another interesting contribution is a recent paper by Bourguignon and Platteau (2013b), which concentrates on moral hazard issues related to the increasing amounts of foreign aid (in particular, the effect of domestic monitoring on the ultimate use of aid flows). Our model studies a separate and novel channel, previously unaddressed by the foreign aid literature: 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 introduces and analyzes the effects of foreign aid and public financing on the efficiency of the non-profit sector. Section 3 provides an alternative setup with endogenous fundraising effort by non-profit organizations, and shows that our main results remain essentially intact. Section 4 presents two further key extensions of the baseline model: allowing the donations by private entrepreneurs to be related to their degree of altruism, and letting donations depend positively on the expected output of the non-profit sector. Section 5 discusses the main premises and modelling choices, as well as the generalizability of our results to relaxing these assumptions. Section 6 discusses the main applications of our model, explores several avenues for future work, and concludes.

2 Basic model

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

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

2.1 For-profit sector

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

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

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

Private-sector entrepreneurs derive utility from their consumption of the private good (c). In addition, they also enjoy warm-glow utility from donating to the non-profit sector (d). In particular, we assume all entrepreneurs have the same Cobb-Douglas type utility function:[4]

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

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

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

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

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

[4] In Section 4.1 we relax the assumption that warm-glow donations by private entrepreneurs are independent of their level of pro-social motivation by letting δ be type-specific (δ_i), with $\delta_L = 0$ and $0 < \delta_H \leq 1$.

As can be readily observed from (4) the total amount of donations increases with the productivity of the private sector (A), the number of private firms ($1 - N$), and the parameter determining the marginal utility of warm-glow giving (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, for instance, in the seminal paper by Besley and Ghatak, 2005) with a narrow mission targeting one particular social problem (e.g., child malnutrition, air pollution, fighting malaria, saving whales, etc.).

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

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

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

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

In line with the evidence discussed in the Introduction, we assume that the non-profit sector suffers from poor monitoring by donors. For simplicity, we take the extreme assumption that non-profit managers enjoy full discretion in setting their own wage (subject to the feasibility constraint $w_i \leq \sigma_i$). In addition, we assume that the pool of total donations D is equally shared by all non-profit firms.[5] Then, donations collected by each non-profit firm

[5] In Section 3 we relax this equal-sharing assumption by explicitly modelling fundraising effort by non-profit managers.

are:

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

Notice that σ_i is decreasing in N through two distinct channels: firstly, because total donations D decrease when the mass of private entrepreneurs $(1-N)$ is smaller; secondly, because a rise in the mass of non-profit firms N means that a given total pool of donations D 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 g, and set accordingly $w_H^* = 0$. As a result, choosing to become a non-profit manager gives to a *motivated* agent the indirect utility equal to

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

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

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

We can now state the following:

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

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

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

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

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

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 the two occupations.

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

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 footnote below). Still, the type of agents (in terms of their pro-social motivation) who self-select into the non-profit sector will depend in an interesting manner 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 'dishonest equilibrium'), and an equilibrium where $0 = N_L < N_H = N$ (which we dub as 'honest equilibrium').[7]

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

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

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

[7] The above-mentioned two cases exclude the set of parametric configurations for which $\widehat{N} = N_0$, where N_0 is defined below in (9). When $\widehat{N} = N_0$, *all* individuals in the economy will be indifferent in equilibrium

Dishonest equilibrium

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

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

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

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

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

From (9) we may observe that $N_0 < 1/2$. As a result, in a 'dishonest equilibrium' it must necessarily be the case that $N = N_L = N_0$, so that the unmotivated agents turn out to be indifferent between the for-profit and non-profit sectors. Indifference by m_L-types leads a mass $1/2 - N_0$ of them to become private entrepreneurs, allowing thus "markets" to clear. Notice, finally, that $U_H^*(N_0) < V_P^*(N_0)$ needs to be satisfied, hence the crucial parametric condition leading to a 'dishonest equilibrium' boils down to $N_0 < \widehat{N}$.

Honest equilibrium

This type of equilibrium takes place when all unmotivated individuals prefer to found private firms, whereas all motivated ones 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 be sufficiently large in size: $N > \widehat{N}$. The condition $U_L^*(N) < V_P^*(N)$ requires that $N > N_0$ (this is because the unmotivated agents prefer to stay out of the non-profit sector when the size of this sector is too large, as the available rents per manager are too low in that case). Unlike in the previous case, in the 'honest equilibrium' one cannot rule out the possibility of full sectorial specialization of the two motivational types of agents (i.e., in principle, an 'honest equilibrium' may well feature $N_L = 0$ and $N_H = 1/2$).

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across the two available occupations. Moreover, because of that, there is actually equilibrium multiplicity, and the set equilibria is given by $\left\{ N_H^* + N_L^* = N_0, \middle| \, 0 \leq N_H^* \leq \frac{1}{2}, 0 \leq N_L^* \leq \frac{1}{2} \right\}$. Hereafter, for the sake of brevity, we skip this knife-edge case.

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

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

Equilibrium characterization

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

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

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

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

Proof. *See Appendix A.* ■

Proposition 1 characterizes the three main types of equilibria that may arise in the model, depending on the specific parametric configurations. These three cases are depicted in Figure 1, panels A, B, and C, respectively. This figure portrays the indirect utilities of motivated and unmotivated agents in the non-profit sector (U_H and U_L, respectively) and of individuals in the private sector (y), as a function of the size of the non-profit sector, N.

[Insert Figure 1 about here]

Consider Figure 1A, and suppose that the non-profit sector is initially of size zero. This situation is not an equilibrium, since both U_H and U_L lie above y when $N = 0$, and the utility differential would attract both types of agents into the non-profit sector. As the size of the non-profit sector grows, the utility differential shrinks for both types of agents. At the intersection of the U_H-curve with y-curve, the motivated types are indifferent between the two sectors, but the m_L-types still prefer the non-profit sector. Therefore, the non-profit sector must still grow further. The equilibrium is only reached when the size of the non-profit sector equals N_0, at which point the unmotivated agents are indifferent between the profit and non-profit sectors while all motivated agents prefer the private sector.

The situation plotted in Figure 1B is analogous, except that the utility differential for unmotivated types vanishes earlier than it does for the motivated ones, which serves as the basis for the honest equilibrium (with non-profit sector size equal to N_1). Finally, in the case depicted in Figure 1C, once all the existing motivated agents have entered the non-profit sector, the utility differential is positive even for the last entrant. The size of the non-profit sector is thus equal to $\frac{1}{2}$ and is rationed by the number of m_H-agents.

An interesting implication of Proposition 1 is that more productive economies (i.e., those with a relatively large A) tend to exhibit a 'dishonest 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 to compensate for the higher opportunity cost of managing a non-profit firm (i.e., the fact of *not* becoming a private entrepreneur). This result has interesting implications for an initially poor economy on a positive growth path. As the productivity parameter A increases from an initial level below $1/(1+\delta)^{1-\alpha}$, some non-profit m_H-type managers start leaving the non-profit sector to found their private firms, which are becoming increasingly profitable. Importantly, while this process takes place, the level of donations received by each of the remaining non-profits firms will also grow. As private productivity keeps rising over time, A will eventually surpass the threshold $1/(1+\delta)^{1-\alpha}$, and the economy will experience a radical transformation in their non-profit sector: all motivated managers leave the non-profit sector to found a private firm, while a mass N_0 of unmotivated agents leave the private sector to found non-profit firms.

A similar intuition applies to the effect of a higher warm-glow utility from giving; that is, a greater δ.[8] This yields a larger amount of total donations, D, for a given mass of non-profits

[8] A rise in δ could be caused, for instance, by the effects of stronger social norms of giving, or by an increase in the social prestige associated with observable giving by private-sector managers.

N, making the non-profit sector relatively more attractive to unmotivated agents than to motivated ones. Again, beyond some threshold of δ, this in turn will lead to a reshuffling of the motivational composition of the non-profit sector, analogous to the one described just above for an increase in A.

In terms of policy implications, the results obtained above imply that the value-added of better accountability for the performance of the non-profit sector increases with the aggregate generosity in the economy. In other words, donations and accountability are *complementary* inputs in the aggregate production function of the non-profit sector. A larger D –either resulting from higher aggregate private income or larger δ– corresponds to an increase of only one input into the aggregate production function of the non-profit sector. However, such a rise in D, without an accompanying increase in the other input (i.e., accountability), may turn out to be actually negative for the functioning of the non-profit sector.

2.4 Effect of foreign aid on the equilibrium allocation

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

What 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 approach this question. To do so, we slightly modify the previous model to allow an injection of amount $\Delta > 0$ of foreign aid (outside donations) 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:

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

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

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

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

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

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

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

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

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

Assumption 1 $A \leq 1$.

Note that if $A > 1$, then the condition $A\,(1+\delta)^{1-\alpha} < 1$ for an 'honest equilibrium' in Proposition 1 could never hold, and the model would always deliver –by construction– a 'dishonest equilibrium'.[9]

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

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

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

   (a) *When* $0 \leq \Delta < \Delta_0$*, all non-profit firms are managed by* m_H*-types:* $0 < N_H^* < \frac{1}{2}$ *and* $N_L^* = 0$*, where* N_H^* *is strictly increasing in* Δ*.*

   (b) *When* $\Delta_0 < \Delta \leq \Delta_A$*, all non-profit firms are managed by* m_L*-types:* $0 < N_L^* \leq \frac{1}{2}$ *and* $N_H^* = 0$*, where* N_L^* *is strictly increasing in* Δ *whenever* $N_L^* < \frac{1}{2}$*.*

   (c) *When* $\Delta > \Delta_A$*, non-profit firms are managed by a mix of types with* m_L*-type majority, namely:* $N_L^* = \frac{1}{2}$ *and* $0 < N_H^* < \frac{1}{2}$*, where* N_H^* *is strictly increasing in* Δ *and* $\lim_{\Delta \to \Delta_A} N_H^* = 0$*.*

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

   (a) *When* $0 \leq \Delta \leq \Delta_B$*, all non-profit firms are managed by* m_H*-types:* $0 < N_H^* \leq \frac{1}{2}$ *and* $N_L^* = 0$*, where* N_H^* *is strictly increasing in* Δ *whenever* $N_H^* < \frac{1}{2}$*.*

   (b) *When* $\Delta_B < \Delta \leq \Delta_0$*, non-profit firms are managed by a mix of types with* m_H*-type majority, namely:* $N_H^* = \frac{1}{2}$ *and* $0 < N_L^* < \frac{1}{2}$*, where* N_L^* *is strictly increasing in* Δ *and* $\lim_{\Delta \to \Delta_B} N_L^* = 0$*.*

   (c) *When* $\Delta > \Delta_0$*, non-profit firms are managed by a mix of types with* m_L*-type majority, namely:* $N_L^* = \frac{1}{2}$ *and* $0 < N_H^* < \frac{1}{2}$*, where* N_H^* *is strictly increasing in* Δ *and* $\lim_{\Delta \to \Delta_0} N_H^* = \underline{N} - \frac{1}{2} > 0$*.*

Proof. *See Appendix A.* ■

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

[Insert Figure 2 about here]

Figure 2 depicts the above-mentioned results when $A(1+\delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$. The solid lines represent $U_H^*(N)$ and $U_L^*(N)$ when $\Delta = 0$, the dashed lines shows non-profit managers' payoffs when $\Delta_0 < \Delta \leq \Delta_A$, and the dotted lines plots those payoffs when $\Delta > \Delta_A$. 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, given that the utility differential between the two sectors remains negative for the unmotivated types. Beyond the amount of aid $\Delta = \Delta_0$, this utility differential becomes positive for the unmotivated types, whereas it turns negative for the motivated ones. At that point, 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 $\frac{1}{2}$. 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 use donations to produce the mission-oriented output g_i, an implication of Proposition 2 is that $G(\Delta)$ is *non-monotonic* in Δ. In particular, in the case where $A(1+\delta)^{1-\alpha} < 1 < 2^{1-\alpha}A$, non-profit output grows initially with the amount of foreign aid, up to the level when $\Delta = \Delta_0$ when it reaches $G(\Delta_0) = \underline{N}$; this 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 unmotivated 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 is illustrated by Figure 3, which depicts the total output of the non-profit sector as a function of foreign aid inflow.

[**Insert Figure 3 about here**]

Similar results are obtained when $2^{1-\alpha}A < 1$. In this case, $G(\Delta)$ increases monotonically with Δ for all $\Delta < \Delta_0$, reaching $G(\Delta_0) = \frac{1}{2}$. However, as soon as Δ rises above Δ_0, aggregate non-profit output falls discretely to $\underline{N} - \frac{1}{2}$. Thereafter, for all $\Delta > \Delta_0$, $G(\Delta)$ grows again monotonically with Δ, starting from $G(\Delta) = \underline{N} - \frac{1}{2}$.

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

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

Note that our mechanism is quite different from the several arguments previously raised concerning the perverse effects of foreign aid on the functioning of the public sector (for example, due to higher corruption, break-up of accountability mechanisms of elected officials, triggering ethnic-based rent-seeking; see Svensson 2000). Our model shows that even when foreign aid is channeled through the NGO sector (therefore, by-passing the public bureaucracy) perverse effects might still arise, since more massive aid inflows may lead to a worsening of motivational composition of the NGO sector in the recipient country.

In that regard, our results also help shedding light on the so-called micro-macro paradox found in the empirical foreign aid literature (Mosley 1986). This paradox refers to the fact that, at the microeconomic level, there are numerous studies that find the positive effect of foreign-aid financed projects on measures of welfare of beneficiaries, while at the aggregate level most studies actually fail to find a significant positive effect. Our model explains this paradox as follows: when aid inflows are small (or, alternatively, when you hold the motivational composition of the NGO sector constant) the general equilibrium effect described in our model becomes negligible (or, alternatively, disappears altogether). Under such circumstances, empirically, one finds a positive effect of aid projects. However, when aid inflows are sufficiently large (e.g. when the well-functioning micro-level projects are scaled up), the general equilibrium effects kick in, and the motivational adverse selection effect may neutralize the positive effect found at the micro level.

2.5 Taxes and public financing of non-profits

In most economies, an important part of non-profits' revenues comes from public grants financed by taxes. This raises two questions: What is the effect of partial public financing on the motivational composition and size of the non-profit sector? Can public financing generate an improvement on the composition of the non-profit sector, as compared to the decentralized equilibrium, and if so, how should such financing be designed? In this section, we address these questions by adding a set of public policy variables into our basic model.

Let the government impose a proportional tax on income in the for-profit sector and use its proceeds as (unconditional) grants to non-profits. Thus, the payoffs of individuals in the private sector becomes:

$$V_P^* = (1-t)\,y, \tag{13}$$

where y is as stated in (1). The level of donations collected by each non-profit in this case are given by:

$$\sigma_i = \frac{D}{N} = \frac{\overbrace{\delta\,(1-t)\,(1-N)y}^{\text{private donations}} + \overbrace{t(1-N)y}^{\text{public grant}}}{N}. \tag{14}$$

Public financing via such a tax/grant system alters occupational choices of individuals via two distinct channels. On the one hand, we can see in (13) that taxation lowers returns in the private sector. On the other hand, as the public sector donates back all the taxes it collects while the private sector only gives a fraction δ of its net income, σ_i in (14) 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 altruistic or for self-interested 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 'dishonest equilibrium': $A(1+\delta)^{1-\alpha} > 1$.

[Insert Figure 4 about here]

Consider now an increase in taxes, with the transfer of all the proceeds to nonprofits as grants. For such policy to induce a motivational improvement in the nonprofit sector, it is crucial that, in the new equilibrium (after taxes), the dishonest individuals who were initially managing the nonprofit 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 nonprofit sector, such that this entry sufficiently dilutes the amount of funds per non-profit firm, 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 3 *For $A(1+\delta)^{1-\alpha} = 1+\epsilon$, where $0 < \epsilon < \overline{\epsilon}$, there exist a feasible range of tax rates $[\underline{t}, \overline{t}]$, where $\underline{t} > 0$ and $\overline{t} \equiv (1-\delta)/(2-\delta)$, such that when $t \in [\underline{t}, \overline{t}]$ an 'honest equilibrium' arises.*

Figure 4 (Panel A) plots the equilibrium regions for different combinations of values of A and t (see Appendix A 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 'honest 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 a 'dishonest 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 threshold of A splitting the 'honest' and 'dishonest' equilibrium regions is increasing in t (up to the point in which $t = \overline{t}$). As a consequence, there exist situations in which introducing public funding of non-profits via (higher) taxes on private incomes can make the economy switch from a 'dishonest' to an 'honest' equilibrium.

This is depicted in Figure 4 (Panel B) by the dashed line arrow. This result rests on a subtle general equilibrium interaction. Consider an economy with no taxes that is on the 'dishonest equilibrium' region, located, for example, at point Z. At Z, all m_H-types prefer the private sector, while m_L-types are indifferent between the non-profit sector.[10] Since a higher tax rate makes the non-profit sector more attractive, by sufficiently raising t we can make all 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 $[\underline{t}, \overline{t}]$, the new equilibrium allocation induced by the increase in t leads to an increase in total funding of the non-profit sector but reducing the value of per-organization funding (σ_i) strongly enough such that only motivated agents are attracted to the non-profit sector.[11]

It is important to note that this motivational reshuffling will not occur if the public financing policy is too small. In particular, a mild increase in taxes will actually make things even worse for the non-profit sector, as this would only raise the total funding of the non-profit sector without altering its motivational composition. Graphically, this would corresponds to any increase in taxes below the level $\underline{t}$ in Figure 4 (Panel B).

A well-designed tax/grant public policy will then to increase the variety (number) of non-profit firms enough so as to simultaneously reduce the per-nonprofit financing (made of voluntary donations and the grant). What are the implications of this insight for public policies towards the non-profit sector? In our setting, exactly like the donors, the policy-maker is subject to the same asymmetric information regarding the motivational type of each specific agent. However, the policy-maker can change the relative returns in the two sectors so as to induce the motivational "cleansing" of the nonprofit sector by scaling-up funding through expanding the extensive margin (i.e., inducing a greater number of non-profit organizations), while simultaneously shrinking the intensive margin (i.e., reducing per-organization funding level). In other words, in our setting "small is indeed beautiful": starting from a dishonest equilibrium, the policy-maker should make sure that the funding received by each non-profit firms decreases. In our general equilibrium framework, this is

[10] Hence, in the equilibrium at Z, a part of the m_L-types will choose the private sector and the other part will found non-profit firms.

[11] 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 (14) 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 $[\underline{t}, \overline{t}]$, a mass N_L^* of unmotivated non-profit managers will be replaced by a mass N_H^* of motivated non-profit managers, where $N_H^* > N_L^*$.

achieved by inducing a massive entry of new non-profit managers.

In terms of actual implementation, our result imply that it may be advisable to give starting grants to new nonprofits, possibly even at the expense of cutting the financing to the existing larger ones. For instance, consider the recent proposals to do "philanthropy through privatization" (see Salamon 2013), which consists in returning part of proceeds from the privatization of public sector assets to foundations and 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 nonprofits: the latter risks worsening the motivational composition of the sector by attracting unmotivated agents, whereas the former ensures that the returns in the non-profit sector remain low enough to attract only highly motivated managers.

3 Endogenous fundraising effort

In the basic model in Section 2, we have assumed that total donations are split (quite mechanically) between all non-profit firms. It is well known, however, that non-profits compete for donations and engage actively in fundraising. For instance, in his analysis of the humanitarian relief NGOs, De Waal (1997) describes the so-called Gresham's Law of the NGO sector:

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

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

> "On 21 December 1984, unable to resist the allure of Ethiopian famine pictures, World Vision ran an Australia-wide Christmas Special television show calling on the public in that country to give it funds. In so doing it broke an

explicit understanding with the Australian Council of Churches that it would not run such television spectaculars in competition with the ACC's traditional Christmas Bowl appeal. Such ruthless treatment of 'rivals' pays, however: the American charity is, today, the largest voluntary agency in Australia."

In this section, 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 can influence the share of funds they obtain from the pool of total donations by exerting fundraising effort. More precisely, we assume that each non-profit manager i is endowed with one unit of time, which she may split between fundraising and working towards the mission of her non-profit organization (project implementation). Fundraising effort allows the non-profit manager to attract a larger share of donations (from the pool of aggregate donations) to her own non-profit, while implementation effort is required in order to make those donations effective in addressing the non-profit's mission. We denote henceforth by $e_i \geq 0$ the effort exerted in fundraising and by $\varsigma_i \geq 0$ the implementation effort. The time constraint implies that $e_i + \varsigma_i \in [0, 1]$.

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

$$g_i = 2(\sigma_i - w_i)\varsigma_i. \tag{15}$$

Notice, however, that (15) implies that undistributed donations $(\sigma_i - w_i)$ and implementation effort (ς_i) are complements in the production function of the non-profit.

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

$$\sigma_i = \frac{D}{N} \times \frac{e_i}{\overline{e}} = \frac{\delta A \left(1 - N\right)^{\alpha}}{N} \times \frac{e_i}{\overline{e}}, \tag{16}$$

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

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

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

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

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

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

$$e_H^* = \varsigma_H^* = \frac{1}{2}, \tag{17}$$

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

$$U_H^* = \frac{1}{2\overline{e}}\frac{D}{N} = \frac{1}{2\overline{e}}\frac{\delta A(1-N)^{\alpha}}{N}. \tag{18}$$

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

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

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

$$e_L^* = \begin{cases} 0, & \text{if } \overline{e}^{-1}D/N < 1, \\ 1, & \text{if } \overline{e}^{-1}D/N \geq 1. \end{cases} \tag{19}$$

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

$$U_L^* = \max\left\{\frac{D}{N}\frac{1}{\overline{e}} - 1, 0\right\}. \tag{20}$$

Note that the indirect utility of the unmotivated agent decreases, as before, with the size of the non-profit sector; however, it reaches zero at an interior value, whereas in the basic model it reached zero only when $N = 1$. This is because now donations are not simply "manna from heaven" but must be obtained through exerting costly effort. 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 the necessary effort cost. This means that an unmotivated 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 unmotivated managers would optimally choose to exert no effort and collect zero donations, which accordingly yields $U_L^* = 0$).

Honest equilibrium

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

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

Recalling (3), (18) and (20), we can observe that an honest equilibrium exists if and only if $\sigma_H^* \leq 1$ when motivated agents are indifferent between the non-profit and the for-profit sectors. Hence, an honest equilibrium exists if and only if

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

where N_H^* solves $U_H^*(N = N_H^*, \overline{e} = 0.5) = V_P^*(N = N_H^*)$. Proposition 4, presented below, shows that the necessary and sufficient parametric condition for an honest equilibrium to exist is that $A \leq 1/\left(1 + \delta\right)^{1-\alpha}$, and that this equilibrium is unique.

Dishonest equilibrium

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

$$\sigma_L^* = \frac{\delta A \left(1 - N_L^*\right)^{\alpha}}{N_L^*}. \tag{22}$$

Using again (3), (18) and (20), it follows that a dishonest equilibrium exists if and only if $\sigma_L^* > 2$ when unmotivated agents are indifferent between sectors. Therefore, a dishonest equilibrium exists if and only if

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

where N_L^* solves $U_L^*(N = N_L^*, \bar{e} = 1) = V_P^*(N = N_L^*)$. Proposition 4 shows that the necessary and sufficient parametric condition for the existence of a dishonest equilibrium is $A \geq [2/(2+\delta)]^{1-\alpha}$, and that this equilibrium is unique.

Mixed-type equilibrium

In a mixed-type equilibrium all agents are indifferent across occupations and the non-profit sector is managed by a mix of m_H and m_L types. That is, a mixed-type equilibrium is characterized by $U_H^*(N^*) = U_L^*(N^*) = V_P^*(N^*)$, where $N^* = N_L^* + N_H^*$ and $0 < N_L^*, N_H^* \leq 1/2$. Equality among (18) and (20) 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 be equal to one, which, using (3), implies that in mixed-type equilibrium the total mass of non-profits must be equal to $N^* = 1 - A^{\frac{1}{1-\alpha}}$. In addition, since $e_H^* = 0$ while $e_L^* = 1$, then the fact that $\bar{e}_{mixed} = 0.5 \times (D/N)$ together with $N^* = 1 - A^{\frac{1}{1-\alpha}}$ pin down the exact values of N_L^* and N_H^*, so as to ensure indifference across the two occupations by all agents. Proposition 4 shows that the necessary and sufficient parametric condition for the existence of a mixed-type equilibrium is $1/(1+\delta)^{1-\alpha} < A < [2/(2+\delta)]^{1-\alpha}$, and that this equilibrium is unique.

Equilibrium characterization with fundraising effort

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

Proposition 4 *The type of equilibrium allocation that arises is always unique and depends of the specific parametric configuration of the model:*

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

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

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* $N^*_{mixed} = 1 - A^{\frac{1}{1-\alpha}}$*, where*

$$N^*_H = 2\left[1 - A^{\frac{1}{1-\alpha}}(1+\delta/2)\right], \quad \textit{and} \quad N^*_L = A^{\frac{1}{1-\alpha}}(1+\delta) - 1. \tag{23}$$

Motivated non-profit managers set $e^*_H = \varsigma^*_H = 0.5$*, while unmotivated agents set* $e^*_L = 1$ *and* $\varsigma^*_L = 0$*. The average level of fundraising effort is then:*

$$\overline{e}_{mixed} = \frac{1}{2}\frac{\delta A^{\frac{1}{1-\alpha}}}{1 - A^{\frac{1}{1-\alpha}}}. \tag{24}$$

Proof. *See Appendix A.* ■

[Insert Figure 5 about here]

The result of an 'honest equilibrium' when $A \leq 1/(1+\delta)^{1-\alpha}$ is the analogous to that one previously obtained in the basic model (as shown graphically in Figure 5, Panel A). Similarly, when $A \geq [2/(2+\delta)]^{1-\alpha}$ the model features a pure 'dishonest equilibrium' (see Figure 5, Panel B). However, in this alternative setup, we can observe the set of parameters under which such an equilibrium arises is actually smaller than in the basic model in Section 2. Moreover, a novelty of this alternative setup is that for the intermediate range of A there exists a "mixed-type" equilibrium (one under which the non-profit sector is populated by both types of agents). 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 unmotivated 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).

It is interesting to compare the findings of this model to those of Aldashev and Verdier (2010), where more intense competition for funds leads to higher diversion of donations by non-profit managers. This occurs because when agents have to spend more time raising funds, less time is then left to be devoted to 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, interestingly, a more intense competition for funds *mitigates* the severity of this adverse selection problem.

4 Extensions

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

4.1 Extension 1: Pure and impure altruism

The model presented in Section 2 assumes that all private entrepreneurs (regardless of their pro-social motivation) donate an identical fraction of their income to the non-profit sector. However, if warm glow giving is actually the result of some sort of altruistic behavior, it seems more reasonable to expect the propensity to donate out of income to be increasing in the degree of pro-social motivation. Here, we modify the utility function in (2) by letting the propensity to donate be 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 $m_i = m_L$.[12]

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

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

$$\frac{D}{N} = \frac{\delta_H \, A \left(\frac{1}{2} - N_H\right)}{\left(1 - N_H - N_L\right)^{1-\alpha} \left(N_H + N_L\right)}. \tag{25}$$

When the total amount of donations to the non-profit sector depends positively on the fraction of pro-socially motivated private entrepreneurs, the model exhibits multiple equi-

[12]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.

libria. The main reason for equilibrium multiplicity is that, when δ_i is increasing in m_i, the ratio between U_H^* and U_L^* does not depend *only* on the level of N – as it was the case with (7) and (8) in Section 2 – but, looking at (25), it follows that it *also* depends on how N breaks down between N_H and N_L. Such dependence on the ratio N_H/N_L generates 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 5 *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,*

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

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

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,*[13]
   a) an 'honest equilibrium' where $\delta_H/(2+2\delta_H) < N_H^* < \frac{1}{2}$ and $N_L^* = 0$;
   b) a 'dishonest equilibrium' where $N_L^* = \delta_H/2$ and $N_H^* = 0$;
   c) a 'mixed-type equilibrium' where $N_H^* = \frac{1}{2} - \frac{1-A^{1/(1-\alpha)}}{\delta_H}$ and $N_L^* = \frac{\left[1-A^{1/(1-\alpha)}\right](1+\delta_H)}{\delta_H} - \frac{1}{2}$.

Proof. *See Appendix A.* ■

Proposition 5 shows that for A sufficiently small the economy will exhibit an 'honest equilibrium', whereas when A is sufficiently large the economy will fall in a 'dishonest equilibrium'. These two results are in line with those previously presented in Proposition 1.

However, Proposition 5 also shows that there exists an intermediate range, $(1-\delta_H/2)^{1-\alpha} < A < [1-\delta_H/(2+2\delta_H)]^{1-\alpha}$, in which the economy displays multiple equilibria. For those intermediate values of A, the exact type of equilibrium that takes place will depend on how agents' expectations coordinate. If agents expect a large mass of m_H-types to choose the non-profit sector (case a above), then the total mass of private donations (for a given N) will be relatively small, stifling the incentives of m_L-types to become non-profit managers.

[13]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.

Conversely, if individuals expect a large mass of m_H-types to become private entrepreneurs (case b above), the value of D (for a given N) will turn out to be large, which will enhance the incentives of m_L-types to enter into the non-profit sector more than it does so for m_H-types. Notice that the range of productivity A for which multiple equilibria occur increases with the (relative) generosity of the motivated individuals, δ_H. This is depicted in Figure 6: the range of values of A subject to multiple equilibria vanishes as δ_H approaches zero.

[Insert Figure 6 about here]

Finally, there is also the possibility of intermediate consistent expectations (case c above), in which both motivated and unmotivated agents are indifferent across occupations, and a mix of m_L- and m_H-types share the non-profit sector.

4.2 Extension 2: Conditional warm glow giving

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

In this subsection, we relax to some extent the assumption of impure altruism, although we do not go all the way to assuming pure altruism by private entrepreneurs with rational expectations.[14] More precisely, we extend our model in Section 4.1 to allow δ_H to rise with the fraction of motivated non-profit managers, by postulating that m_H-type private entrepreneurs have the following utility function:

$$V_H(c,d) = \left[\widetilde{\delta}_H^{\widetilde{\delta}_H}(1-\widetilde{\delta}_H)^{1-\widetilde{\delta}_H}\right]^{-1} c^{1-\widetilde{\delta}_H}\, d^{\widetilde{\delta}_H}, \quad \text{where } \widetilde{\delta}_H = f\,\delta_H \text{ and } f \equiv \frac{N_H}{N_H+N_L}. \tag{26}$$

The utility function (26) displays *conditional* warm glow altruism, in the sense that the intensity of the warm glow giving parameter ($\widetilde{\delta}_H$) is linked to the likelihood that the donation ends up in the hands of a motivated non-profit manager.

[14] We must stress that our desire to maintain some impure altruism component is not just due to modelling convenience, but also for consistency: Andreoni (1988) shows that under pure altruism, voluntary contributions to public good provision would vanish when the number of donors is sufficiently large.

When pro-socially motivated private entrepreneurs are characterized by (26), the level of donations obtained by a non-profit firm will be given by:

$$\frac{D}{N}=\frac{\delta_H\,A\left(\frac{1}{2}-N_H\right)N_H}{\left(1-N_H-N_L\right)^{1-\alpha}\left(N_H+N_L\right)^2}. \tag{27}$$

Proposition 6 *Let the propensity to donate be given by $\widetilde{\delta}_i = f\,\delta_i$, where $\delta_H \in (0,1]$, $\delta_L = 0$ and $f \equiv N_H/\left(N_H+N_L\right)$. Then, defining $\Lambda \equiv \left[(2+\delta_H)/(2+2\delta_H)\right]^{1-\alpha}$:*

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

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

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

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

Proof. See Appendix A. ■

Proposition 6 states that when warm glow weights depend on the fraction of motivated agents within the pool of non-profit managers, the possibility of multiplicity of equilibria disappears. The responsiveness of $\widetilde{\delta}_H$ to f in (26) counterbalances the effect that a larger mass of m_H-type entrepreneurs has on total donations in (25), and thus neutralizes the source of interaction that leads to multiple equilibria in Proposition 5. In addition, conditional warm glow altruism removes the possibility that the non-profit sector is managed fully by unmotivated agents, since in those cases motivated private entrepreneurs would refrain from donating any of their income. 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 6 shows that the fraction of dishonest non-profit managers is monotonically increasing in A.

5 Discussion

In this section, we discuss several key assumptions and modelling choices on which our analysis is built, as well as the robustness of our results to varying them.

5.1 Decreasing returns in the non-profit sector

One key assumption of the model is the decreasing returns in the non-profit sector ($0 < \gamma < 1$). It underlies the single-crossing result (Lemma 1).

The nature of the functioning of the non-profit sector organizations indicates that this assumption is appropriate. As non-profit organizations are defined by their missions, the fundamental scarce resource of these organizations is motivated labor, i.e. individuals who believe into (or aligned with) the mission of a particular non-profit. The practitioners of the sector 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 (this has also been highlighted by the matching-to-mission model of Besley and Ghatak, 2005). A fundamental difference of this sector with respect to for-profit firms is that money cannot easily buy time (but time can buy money, through fundraising activities). Thus, when the funding of a non-profit expands, while its motivated labor remains fixed, the diminishing marginal product of funds guarantee that the returns are decreasing. For instance, Robinson (1992) notes, concerning development non-profit 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" (p. 38). 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)

In addition, beyond a certain scale, the successful projects of non-profits have to rely on public infrastructure and employees (for instance, at a national level). As underlined by Edwards and Hulme (1992), this immediately clashes with the usual government inefficiencies of developing countries:

> "Effective development work on a sustainable and significant scale is a goal which has eluded [development non-profits, because of] the failure to make the right linkages between their work at micro-level and the wider systems and structures of which they form a small part. For example, village co-operatives are undermined by deficiencies in national agricultural extension and marketing systems; 'social-action groups' can be overwhelmed by more powerful political interests within the state or local economic elites; successful experiments in primary health care cannot be replicated because government structures lack the ability or willingness to adopt new ideas..." (p. 15)

Secondly, the type of tasks that a non-profit organization typically carries out, especially in developing countries, changes along its expansion path. The first activities usually 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. Unfortunately, there is no shortage of such problems to solve, and very often, the observation of similar severe problems is exactly what motivates numerous motivated individuals to establish a non-governmental organization that targets it. However, the next activities of the non-profit's project involve 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). This is typically the stage of "teaching how to fish rather than providing fish". Smillie (1995) argues that this second type of tasks is much harder to accomplish successfully and involves a much longer period of time before results can be observed. 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, graphically, the slope of g is fairly steep at low levels of funding (the emergency activities), and becomes flatter beyond certain level (sustainable development activities).

5.2 Informational asymmetries in the non-profit sector

We have assumed (except in the extension with conditional warm-glow giving) that motives for giving are disconnected from the performance of the non-profit sector. This assumption also implies that non-profits are unable to signal their (motivational) type to donors. In theory, such signalling would be possible by allowing non-profit managers to "burn money" (in such case, in a separating equilibrium, the altruistic types would engage in burning money whereas selfish types would not). However, in practice it is difficult to imagine an easy way of doing so. One possibility is to allow for self-imposed restrictions on overheads; but, to be credible, such a scheme would require a third-party certification of such restrictions (e.g. by the government). Assuming away such credibility problems, the possibility of self-imposed restrictions would not destroy our main mechanism, but is likely to reduce the range in which multiple equilibria occur.

Another form of signalling is possible if conditionally warm-glow donors differ in size (e.g. a few large and many small donors), and large donors can obtain (even imperfect) information about the non-profit managers' types at a reasonable cost.[15] Again, this would reduce the range of parameters in which the bad equilibrium exists (both in the unique-equilibrium and the multiple-equilibria cases).

5.3 Lack of contractibility of non-profit output

Third, we have assumed severe contractual problems on non-profits' output; in particular, we have imposed that it is completely unobservable or unverifiable. The existence of these contractual problems has a double implication for the model: motivation serves as a substitute for contracts; however, it is exactly this non-contractibility that attracts low-motivation individuals into the non-profit sector. Clearly, making the non-profits' output measurable would ease the problem of adverse selection. However, in the sectors where output is well measurable, the role of non-profits is less important (at the extreme, if the output is perfectly measurable, the production can be fully taken care of by for-profit firms), as has been argued by Glaeser and Shleifer (2001). Thus, the strong assumption that we impose is justified by the scope of the applications of our analysis.

5.4 Absence of non-pecuniary incentives

Finally, we have assumed away other (not strictly pecuniary) forms of incentives, that have been studied in the organizational economic literature (see, for instance, Besley and Ghatak 2008 and Bradler et al. 2013). It is possible that such incentives are asymmetrically valued

[15] 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.

by motivated and unmotivated types. If, for instance, the prestige associated with working in the non-profit sector, independent from the level of output, is valued relatively more by motivated types, this shifts the U_H curve upwards and thus increases the range of parameters with honest equilibrium. On the contrary, if prestige is valued more by unmotivated types (e.g. because of the indirect pecuniary benefits that such prestige can deliver), the range of honest-equilibrium parameters would shrink.

6 Conclusion

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

The first is foreign aid intermediation by NGOs. Aid is being increasingly channelled via NGOs, essentially driven by increasing emphasis of project ownership, decentralization, and participatory development. This emphasis is mostly driven by the disillusionment in government-to-government project aid, which is often considered to be politicized and/or easily corruptible (see, for instance, empirical evidence by Alesina and Dollar 2000 and Kuziemko and Werker 2006). However, little analysis so far has been made concerning the implication of massive channelling of aid via NGOs (with the exception of the few papers mentioned earlier and the recent review study by Mansuri and Rao, 2013). The application of our theory to foreign aid allows to explore these implications, in particular, the two effects of aid inflows on the functioning of the NGO sector: dilution (increase in N) and selection (unmotivated agents' entry into the NGO sector). The key implication of our results is that as the NGO channel of aid expands, the investment into better accountability in the NGO sector (e.g. restrictions on diversion of funds for private perks) is fundamental, so as to prevent the appearance of the dishonest equilibrium. Optimal aid delivery through NGOs requires harder controls accompanying the scaling-up of aid efforts.

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

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 in Section 3 indicates that matching grants might have an additional effect that operates through 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 possibility relates to the key specificity of the non-profit/NGO sector: the disconnection between who finances and who benefits from the activity of this sector. The resulting monitoring problems create the need in coordinating scaling up of financing with investment into better monitoring of the sector. As suggested by Ruben (2012), evaluation of aid effectiveness can generate social benefits even when one can learn relatively little from the evaluation exercise, because the very fact of being evaluated makes rent extraction more difficult and therefore might improve the motivational composition on non-profit/NGO sector. The framework developed in this paper might allow to build an analysis of these indirect effects of evaluation of development projects.

Appendix A: Omitted Proofs

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

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

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

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

$$\mathcal{N}_H^{-\gamma}\left[\delta A\left(1-\mathcal{N}_H\right)^{\alpha}+\Delta\right]^{\gamma}\left(1-\mathcal{N}_H\right)^{1-\alpha} \equiv A; \tag{28}$$

in raw words, $\mathcal{N}_H$ denotes the level of N that equalizes (1) and the utility obtained by a motivated non-profit manager when D/N is given by (11). From (28), it is easy to observe that when $\Delta = 0$, $\mathcal{N}_H = N_1$. In addition, differentiating (28) with respect to $\mathcal{N}_H$ and Δ, we obtain that $\partial\mathcal{N}_H/\partial\Delta > 0$. Let now

$$\Delta_0 \equiv 1 - A^{\frac{1}{1-\alpha}}(1+\delta), \tag{29}$$

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

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

$$\Delta_A \equiv 2^{-\alpha}A\left[\left(2^{1-\alpha}A\right)^{\frac{1-\gamma}{\gamma}} - \delta\right]. \tag{30}$$

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

$$\left[\frac{\delta A\left(1-\mathcal{N}_L\right)^{\alpha}+\Delta}{\mathcal{N}_L}\right]\left(1-\mathcal{N}_L\right)^{1-\alpha} \equiv A, \tag{31}$$

while for all $2^{-\alpha}A\left(1-\delta\right) < \Delta < \Delta_A$, $\mathcal{N}_L(\Delta) = \frac{1}{2}$. Lastly, when $\Delta = 2^{-\alpha}A\left(1-\delta\right)$, the expression in (31) implies $\mathcal{N}_L = \frac{1}{2}$, proving that $\mathcal{N}_L(\Delta) : (\Delta_0, \Delta_A] \to \left(\underline{N}, \frac{1}{2}\right]$ is continuous and weakly increasing.

(c) First, note that when $\Delta > \Delta_A$, the expression in (28) delivers a value of $\mathcal{N}_H > \frac{1}{2}$. As a result, motivated agents must necessarily be indifferent in equilibrium between the two occupations, since some of them must choose to actually work as non-profit managers to allow $\mathcal{N}_H > \frac{1}{2}$. In addition, since by definition of Δ_A in (30), $\delta A\left[\left(1-N\right)^{\alpha}+\Delta_A\right]/N > y(N)$

when $N = \frac{1}{2}$, all unmotivated agents must be choosing the non-profit sector when $\Delta > \Delta_A$. Let thus $\mathcal{N}_{LH}$ be implicitly defined by the following condition:

$$\mathcal{N}_{LH}^{-\gamma}\left[\delta A\left(1-\mathcal{N}_{LH}\right)^{\alpha}+\Delta\right]^{\gamma}\left(1-\mathcal{N}_{LH}\right)^{1-\alpha}\equiv A. \tag{32}$$

Differentiating (32) with respect to $\mathcal{N}_{LH}$ and Δ, we can observe that $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. From (32), we can also observe that $\lim_{\Delta\to\Delta_A}\mathcal{N}_{LH} = \frac{1}{2}$ and $\lim_{\Delta\to\infty}\mathcal{N}_{LH} = 1$. As a result, we may write $\mathcal{N}_{LH}(\Delta) : (\Delta_A, \infty) \to \left(\frac{1}{2}, 1\right)$, with $\partial\mathcal{N}_{LH}/\partial\Delta > 0$. Moreover, since $N_L^* = \frac{1}{2}, \forall\,\Delta > \Delta_A$, it must be the case that in equilibrium $N_H^* = \mathcal{N}_{LH}(\Delta) - \frac{1}{2}$.

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

$$2\left[\delta A\left(\tfrac{1}{2}\right)^{\alpha}+\Delta_B\right] = 2^{1-\alpha}A, \tag{33}$$

and note that the right-hand side of (33) equals $y(\frac{1}{2})$, while its left-hand side equals D/N when $N = \frac{1}{2}$ and $\Delta = \Delta_B$. Furthermore, notice that $2[\delta A\left(\frac{1}{2}\right)^{\alpha} + \Delta]$ is strictly increasing in Δ. As a consequence, it follows that in equilibrium, $N_L^* = 0$ for any $0 \leq \Delta \leq \Delta_B$. In addition, denoting by $\mathfrak{N}_H(\Delta) = \min\{\frac{1}{2}, \chi\}$, where χ is the solution of $\left[\delta A\left(1-\chi\right)^{\alpha}+\Delta\right]/\chi = A/(1-\chi)^{1-\alpha}$, the result, $N_H^* = \mathfrak{N}_H(\Delta)$ for any $0 \leq \Delta \leq \Delta_B$ obtains.

(b) This part of the proof follows from the definition of Δ_0 in (29), together with the fact that $2[\delta A\left(\frac{1}{2}\right)^{\alpha} + \Delta] > 2^{1-\alpha}A$, for all $\Delta > \Delta_B$. As a result, we may implicitly define the function $\mathfrak{N}_{HL}(\Delta)$ by

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

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

(c) This part of the proof follows again from the definition of Δ_0 in (29), which implies that for all $\Delta > \Delta_0$, the expression in (11) yields $D/N > 1$ when $N = \underline{N}$. For this reason, whenever $\Delta > \Delta_0$, the m_H-types must be indifferent across occupations in equilibrium, while all m_L-types will strictly prefer the non-profit sector. We can then implicitly define the function $\mathfrak{N}_{LH}(\Delta)$ by

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

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

Proof of Proposition 4. **Part (*i*).** First, recall that in an honest equilibrium $\overline{e} = \frac{1}{2}$. Second, using (21) and (3) when $N = N_H^*$, we have that

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

Therefore, an honest 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 (19) it follows that this solution is a Nash equilibrium, as the best response by m_L-type non-profit managers would be $e_L = 0$ when $2A(1+\delta)^{1-\alpha} < 1$, while $e_L = 1$ otherwise. In both cases, $A(1+\delta)^{1-\alpha} \leq 1$ implies that unmotivated agents should prefer the private sector to the non-profit sector. Moreover, this must be the unique Nash equilibrium solution, since the incentives for an m_L-type agent to start a non-profit will decline with the average level of $\overline{e}$, which in equilibrium will never be below 0.5 as implied by (17).

Part (*ii*). Preliminarily, let first define $\widetilde{N} \equiv \delta/(2+\delta)$. Note then that, when $\overline{e} = 1$, the payoff functions (18) and (3) are equalized when $N = \widetilde{N}$; namely, $U_H^*(\widetilde{N}) = V^*(\widetilde{N})$. Next, notice that, for a given $\overline{e}$, both (18) and (20) are strictly decreasing in N, while they grow to infinity as N goes to zero. Hence, to prove that a dishonest equilibrium exists, it suffices to show that the condition $A \geq [2/\,(2+\delta)]^{1-\alpha}$ implies $U_H^*(\widetilde{N}) \leq U_L^*(\widetilde{N})$. To prove that the dishonest equilibrium is the unique equilibrium, notice first that an honest equilibrium is incompatible with $A \geq [2/\,(2+\delta)]^{1-\alpha}$. Therefore, the only other alternative would be a mixed-type equilibrium with all agents indifferent between the private and non-profit sector. Yet, for (18) and (20) to be equal, it must be that $D/N = 2\overline{e}$. This equality in turn implies that all activities must yield a payoff equal to 1, however, when $A \geq [2/\,(2+\delta)]^{1-\alpha}$, this would be inconsistent with $\overline{e} < 1$, therefore a mixed-type equilibrium cannot exist either.

Part (*iii*). First of all, following the argument in the proof of part (i) of the proposition, notice that an honest equilibrium cannot exist, since when $A(1+\delta)^{1-\alpha} > 1$ unmotivated agents would like to deviate to the non-profit sector and set $e_L = 1$. Secondly, notice that a necessary condition for a dishonest equilibrium to exist is that $U_H^* > 1$ when $N = \widetilde{N}$ and $\overline{e} = 1$, but replacing $N = \widetilde{N}$ and $\overline{e} = 1$ into (18) 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 (3) we obtain that $V_P^*(N^*) = 1$ implies

$N^*_{mixed} = 1 - A^{\frac{1}{1-\alpha}}$. In addition, $U^*_H(N^*) = U^*_L(N^*)$ requires that $2\overline{e}_{mixed} = D/N$, which using $N^*_{mixed} = 1 - A^{\frac{1}{1-\alpha}}$ leads to (24). Therefore, using the facts that $e^*_H = 0.5$ and $e^*_L = 1$, the levels of N^*_H and N^*_L in (23) immediately obtain. Lastly, to prove that this equilibrium is unique, notice that e^*_{mixed} in (24) 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 5. First of all, notice that $N_H = 0.5$ cannot hold in equilibrium, as (25) implies that in that case $D/N = 0$, an no agent would then choose the non-profit sector. We can then focus on three equilibrium cases: (i) $N^*_L = 0$ and $0 < N^*_H < 0.5$, with m_L-types strictly preferring the private sector (ii) $N^*_L \leq 0.5$ and $N^*_H = 0$, with m_H-types strictly preferring the private sector (iii) $0 \leq N^*_L \leq 0.5$ and $0 \leq N^*_H < 0.5$, will all types indifferent across occupations.

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

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

For $U^*_L(N_H, 0) < y(N_H, 0)$ in (34) to hold, $N_H > \delta_H/(2 + 2\delta_H)$ must be true. Next, since $U^*_L(N_H, 0) < U^*_H(N_H, 0) \Leftrightarrow U^*_L(N_H, 0) < 1$, and $y(N_H, 0)$ is strictly increasing in N_H while $U^*_H(N_H, 0)$ is strictly decreasing in it and $U^*_H(\frac{1}{2}, 0) = 0$, a sufficient condition for (34) to hold in equilibrium is that

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

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

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

$$\underbrace{\left[\frac{\frac{1}{2}\delta_H A}{\left(1 - N_L\right)^{1-\alpha} N_L}\right]^{\gamma}}_{U^*_H(0,N_L)} < \underbrace{\frac{A}{\left(1 - N_L\right)^{1-\alpha}}}_{y(0,N_L)} \leq \underbrace{\frac{\frac{1}{2}\delta_H A}{\left(1 - N_L\right)^{1-\alpha} N_L}}_{U^*_L(0,N_L)}. \tag{35}$$

Using the expressions in (35), 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 (35) to hold in equilibrium is that

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

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

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

$$\underbrace{\frac{A}{(1-N_H-N_L)^{1-\alpha}}}_{y(N_H,N_L)} = \underbrace{\frac{\delta_H A\left(\frac{1}{2}-N_H\right)}{(1-N_H-N_L)^{1-\alpha}(N_L+N_H)}}_{U_L^*(N_H,N_L)} = 1. \tag{36}$$

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

$$N_H = \frac{1}{2} - \frac{1-A^{\frac{1}{1-\alpha}}}{\delta_H}. \tag{37}$$

Next, using again the definition of $\underline{N}$ in (12), we may obtain $N_L = \left[1-A^{1/(1-\alpha)}\right] - N_H$, which using (37) yields:

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

Lastly, (37) implies that $N_H > 0 \Leftrightarrow A > (1-\delta_H/2)^{1-\alpha}$, while (38) means that $N_L > 0 \Leftrightarrow A < [(2+\delta_H)/(2+2\delta_H)]^{1-\alpha}$, completing the proof. ■

Proof of Proposition 6. First of all, from (27), it is straightforward to observe that neither $N_H = 0.5$, nor $0 = N_H < N_L$ can possibly hold in equilibrium, as both situations would imply $D/N = 0$, an no agent would thus choose the non-profit sector.

Second, set $N_L = 0$ into (27), and take the limit of the resulting expression as N_H approaches zero, to obtain

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

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

Third, suppose $0 < N_H < N_L = \frac{1}{2}$. Using (1) and (27), for this to be an equilibrium, it must necessarily be the case that

$$\frac{\delta_H A\left(\frac{1}{2}-N_H\right)N_H}{\left(\frac{1}{2}-N_H\right)^{1-\alpha}\left(\frac{1}{2}+N_H\right)^2} \geq \frac{A}{\left(\frac{1}{2}-N_H\right)^{1-\alpha}}. \tag{39}$$

However, the condition (39) 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 (34) must be verified, which following the same reasoning as before in the Proof of Proposition 5 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:

$$\frac{D}{N} = \frac{\delta_H \, A \left(\frac{1}{2} - N_H\right) N_H}{\left(1 - N_H - N_L\right)^{1-\alpha} \left(N_H + N_L\right)^2} = y(N) = \frac{A}{\left(1 - N_H - N_L\right)^{1-\alpha}} = 1. \tag{40}$$

Taking into account the definition of $\underline{N}$ in (12), it follows that $y(N) = 1$ requires $N_H + N_L = 1 - A^{\frac{1}{1-\alpha}}$. As a result, (40) boils down to the following condition:

$$\delta_H \left(\tfrac{1}{2} - N_H\right) N_H - \left(1 - A^{\frac{1}{1-\alpha}}\right)^2 = 0 \tag{41}$$

The expression in (41) yields real-valued roots if and only if

$$A \geq \left(1 - \sqrt{\delta_H}/4\right)^{1-\alpha}. \tag{42}$$

When (42) is satisfied, the solution of (41) is given by:

$$N_H = \begin{cases} r_0 \equiv \dfrac{1}{4} - \sqrt{\dfrac{1}{16} - \dfrac{\left[1 - A^{1/(1-\alpha)}\right]^2}{\delta_H}}, \\ r_1 \equiv \dfrac{1}{4} + \sqrt{\dfrac{1}{16} - \dfrac{\left[1 - A^{1/(1-\alpha)}\right]^2}{\delta_H}}. \end{cases} \tag{43}$$

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 (43) to actually be an equilibrium solution, it must then be the case that $r_1 \leq 1 - A^{\frac{1}{1-\alpha}}$. But this inequality is true *only* in the specific case when $A = \left(1 - \sqrt{\delta_H}/4\right)^{1-\alpha}$ and $\sqrt{\delta_H} = 1$, which in turn also implies that $r_1 = r_0$ in (43). 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 (43), and letting $x \equiv 1 - A^{\frac{1}{1-\alpha}}$, an equilibrium with $N_L \geq 0$ when $N_H = r_0$ requires the following condition to hold:

$$\Psi(x) \equiv \frac{1}{4} - \sqrt{\frac{1}{16} - \frac{x^2}{\delta_H}} \leq x, \tag{44}$$

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 (43). ■

Derivation of Equilibrium Regions in Figure 4. *i) Honest Equilibrium Region:* This type of equilibrium arises when $\sigma_i < 1 < V_p^*$ for any $0 \leq N \leq \frac{1}{2}$, where V_p^* is given by (13) and σ_i by (14). For $\sigma_i < V_p^*$ to hold for any $0 \leq N \leq \frac{1}{2}$ it suffices to pin down when it holds for $N = \frac{1}{2}$, which in turn leads to

$$t < \bar{t} \equiv (1-\delta)/(2-\delta). \tag{45}$$

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

$$N < \frac{\delta(1-t)+t}{1+\delta(1-t)}. \tag{46}$$

Therefore, plugging the RHS of (46) into (14), leads to the condition that $\sigma_i < 1$ whenever

$$A < \frac{1}{(1-t)^{\alpha}[1+\delta(1-t)]^{1-\alpha}}. \tag{47}$$

As a result, the region bounded by (45) and (47) features an 'honest equilibrium'.

ii) Dishonest Equilibrium Region: This type of equilibrium needs, first, that condition (47) 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

$$A > \frac{[t+\delta(1-t)]^{\frac{\gamma}{1-\gamma}}}{2^{1-\alpha}(1-t)^{\frac{1}{1-\gamma}}}. \tag{48}$$

Notice now that the RHS of (47) is equal to the RHS of (48) 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 a 'dishonest equilibrium' is given by $A > (1-t)^{-\alpha} [1 + \delta (1-t)]^{\alpha - 1}$ whenever $t \leq \bar{t}$ and by (48) whenever $t > \bar{t}$.

iii) Mixed-type Equilibrium Region with $f > \frac{1}{2}$: From the previous results it follows that when (47) 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 $f < \frac{1}{2}$: From the previous results it also follows that when both (47) and (48) 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. ■

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Figure 1A. Dishonest equilibrium

$$A(1+\delta)^{1-\alpha} > 1$$

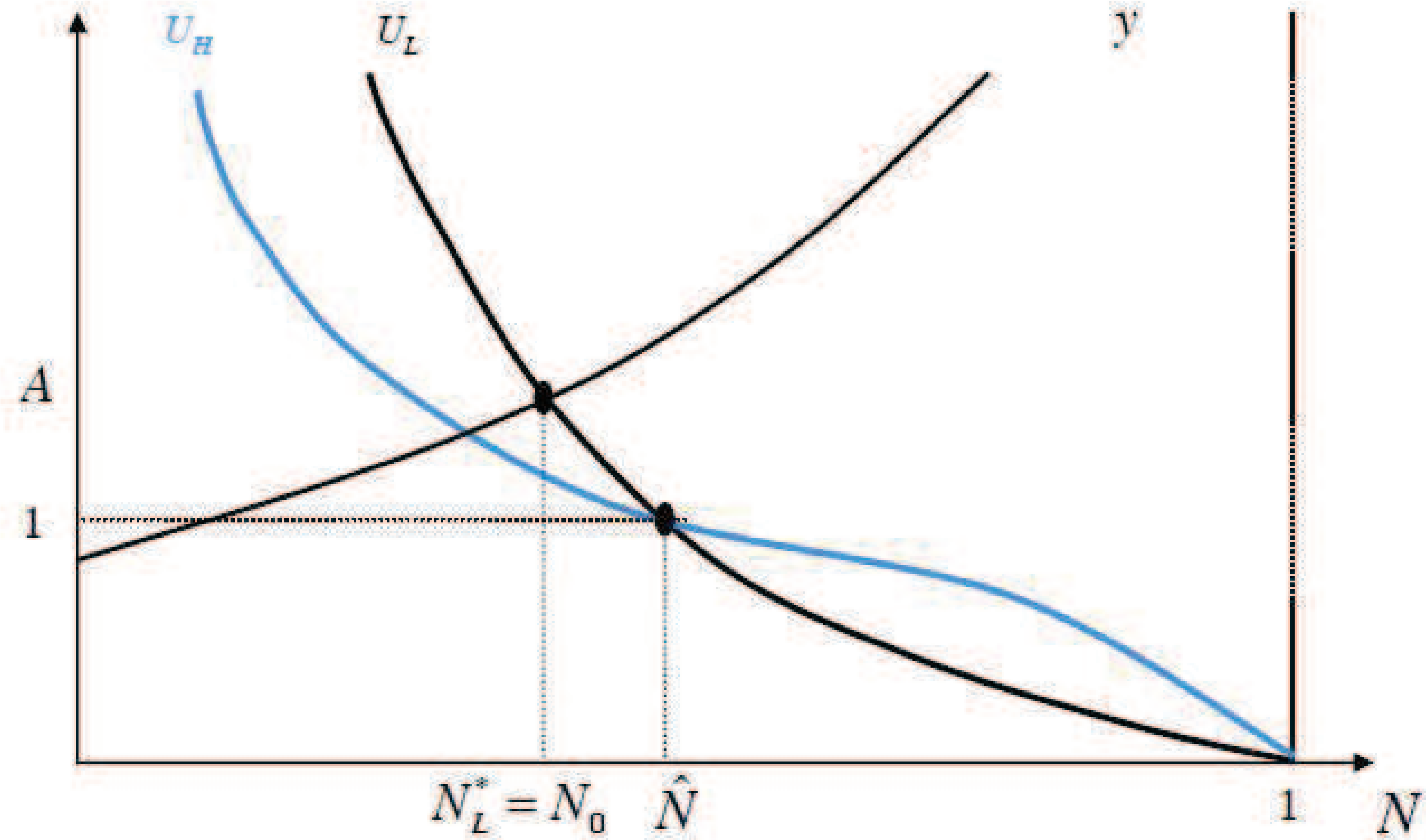

Figure 1B. Honest equilibrium with incomplete sorting

$A(1+\delta)^{1-\alpha} < 1$ and $N_1 < 0.5$

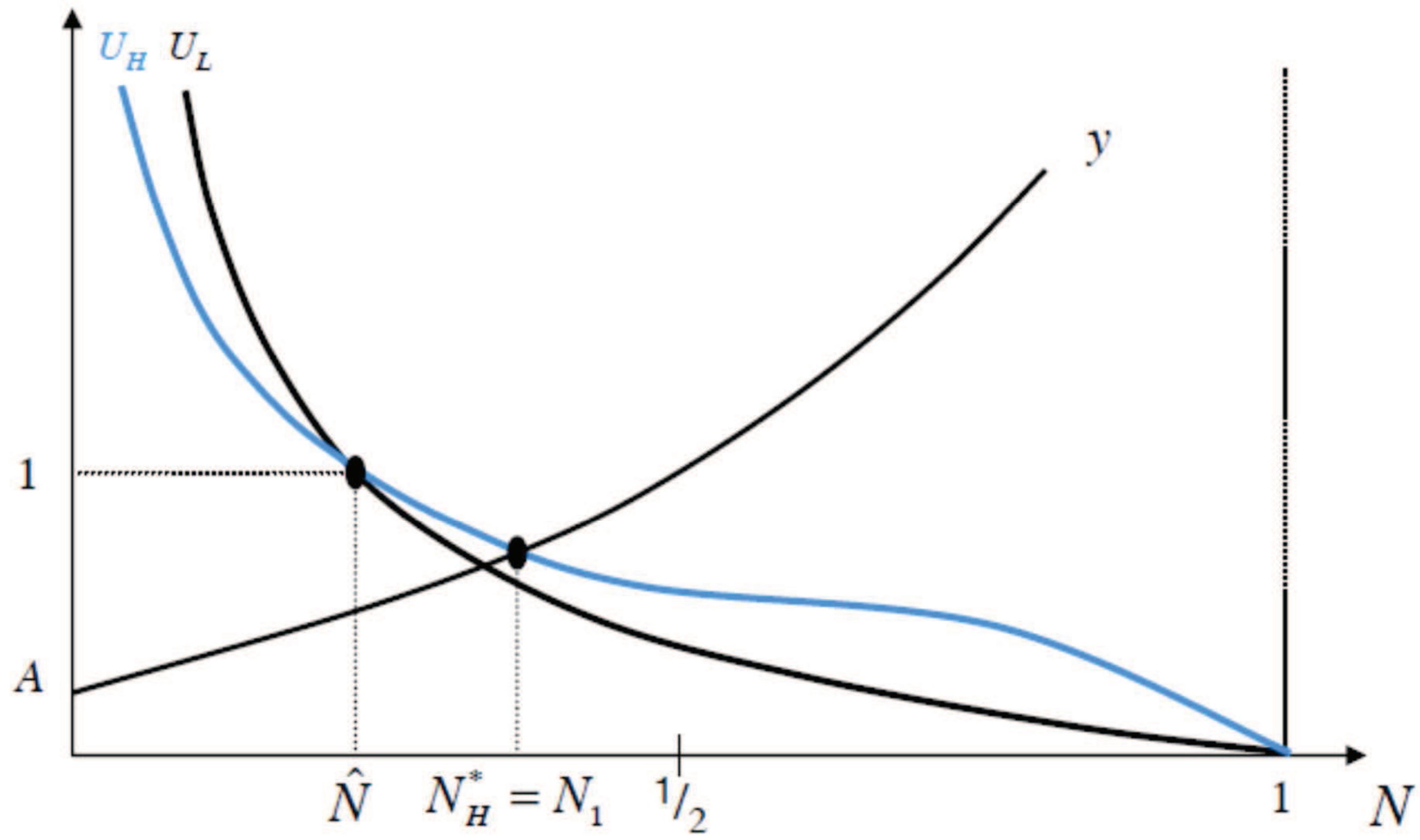

Figure 1C. Honest equilibrium with full sorting

$$A(1+\delta)^{1-\alpha} < 1 \text{ and } N_1 > 0.5$$

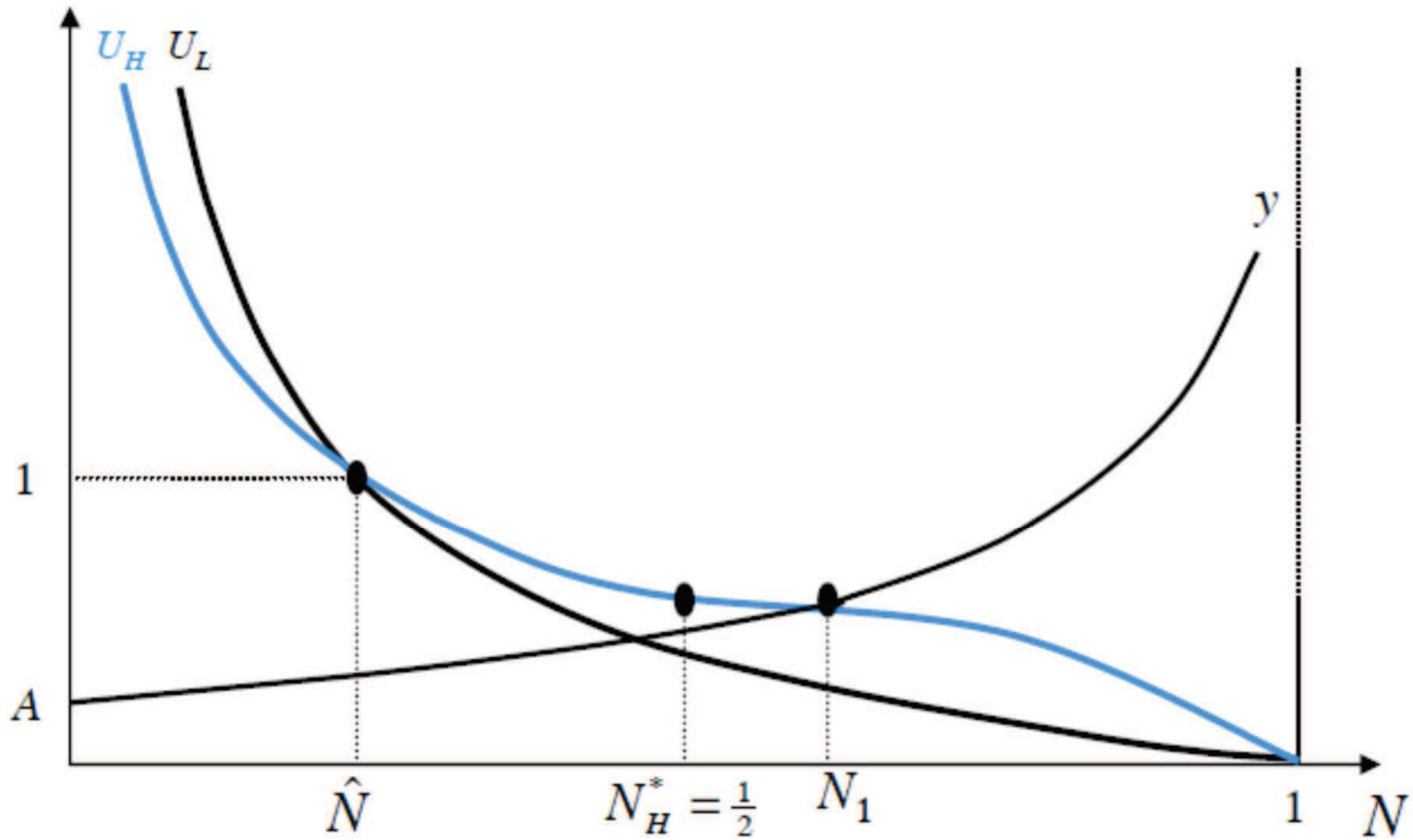

Figure 2. Effect of foreign aid injection

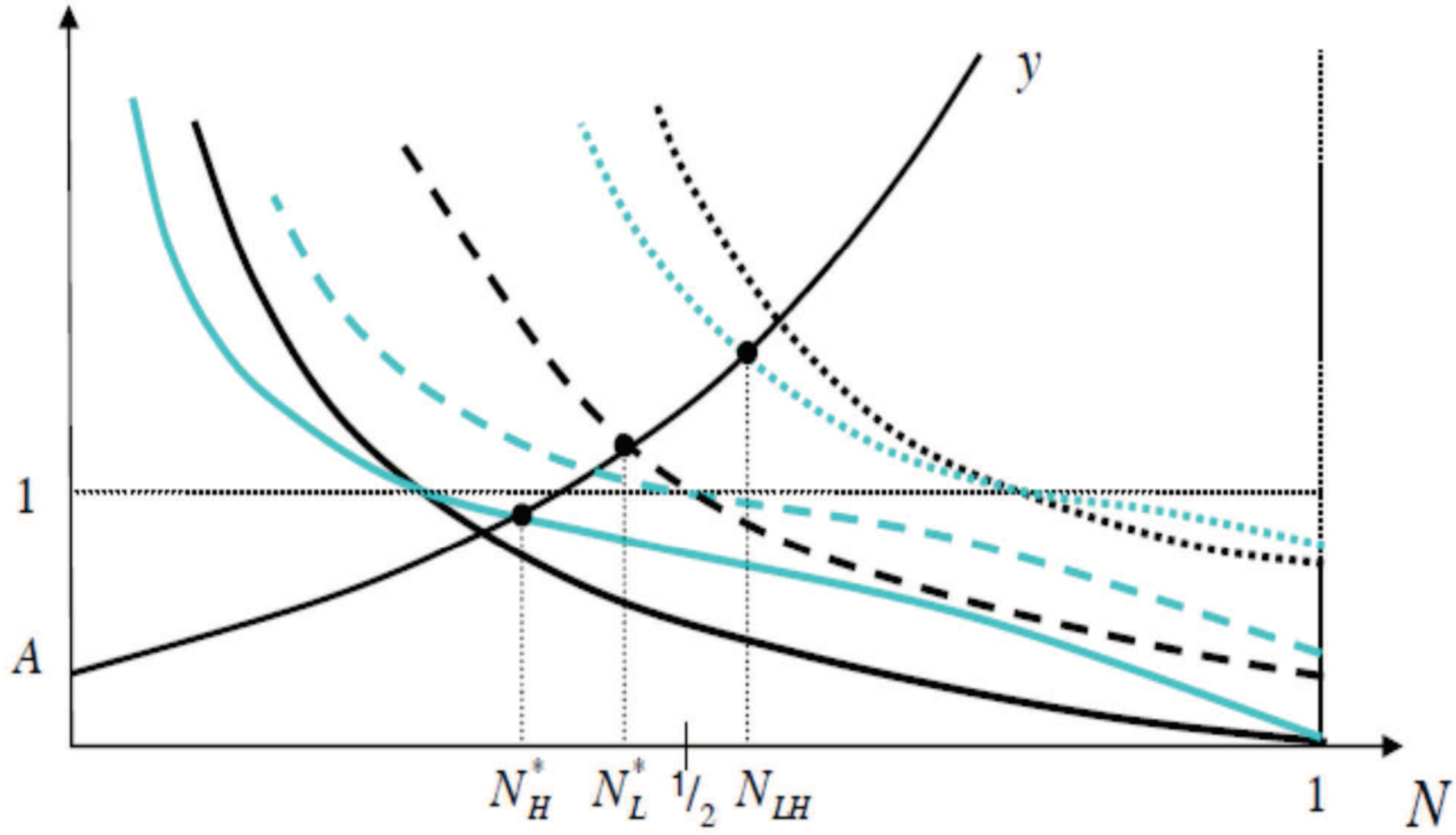

Figure 3. Foreign aid and non-profit sector output

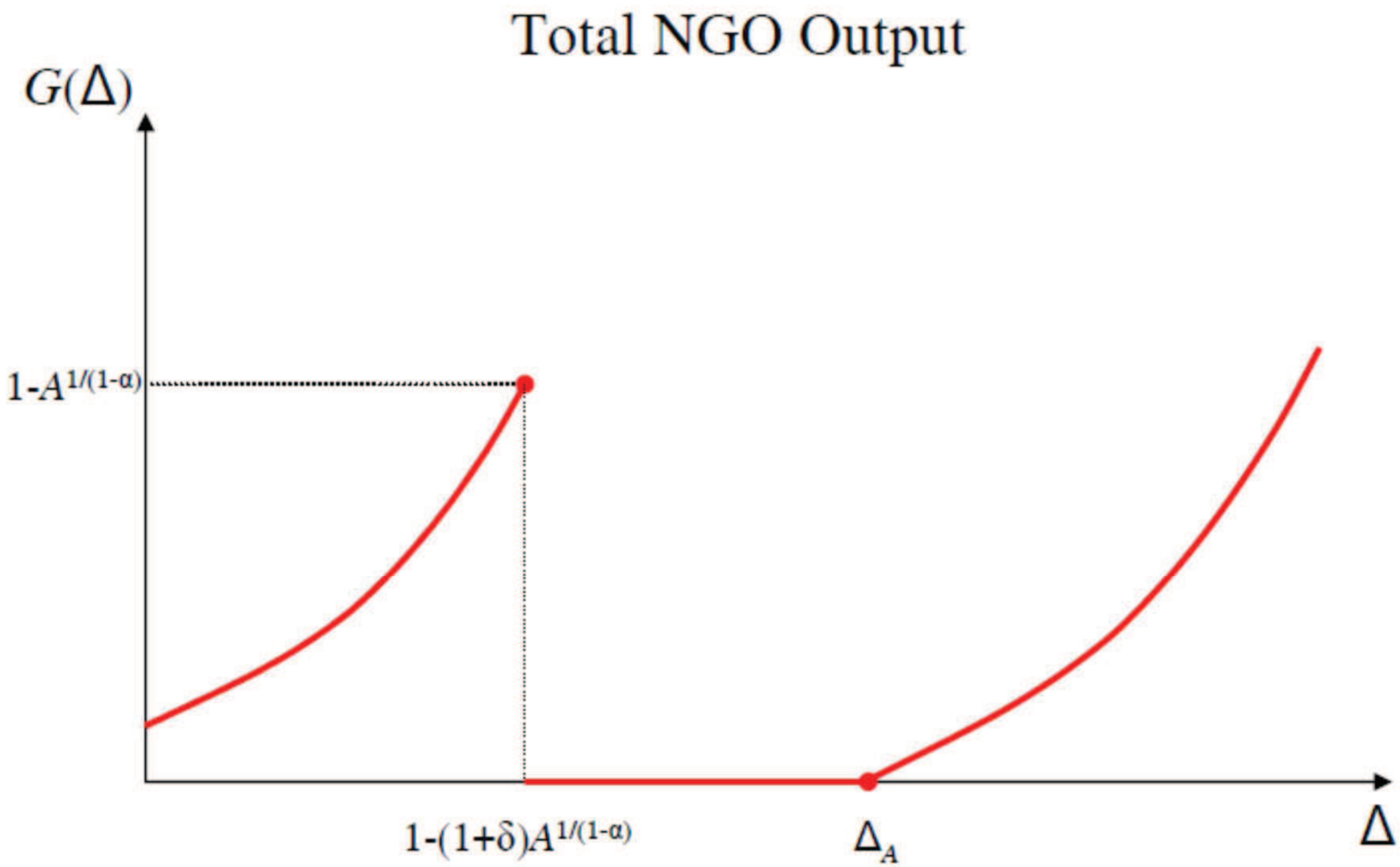

Figure 4A. Public financing of non-profit sector

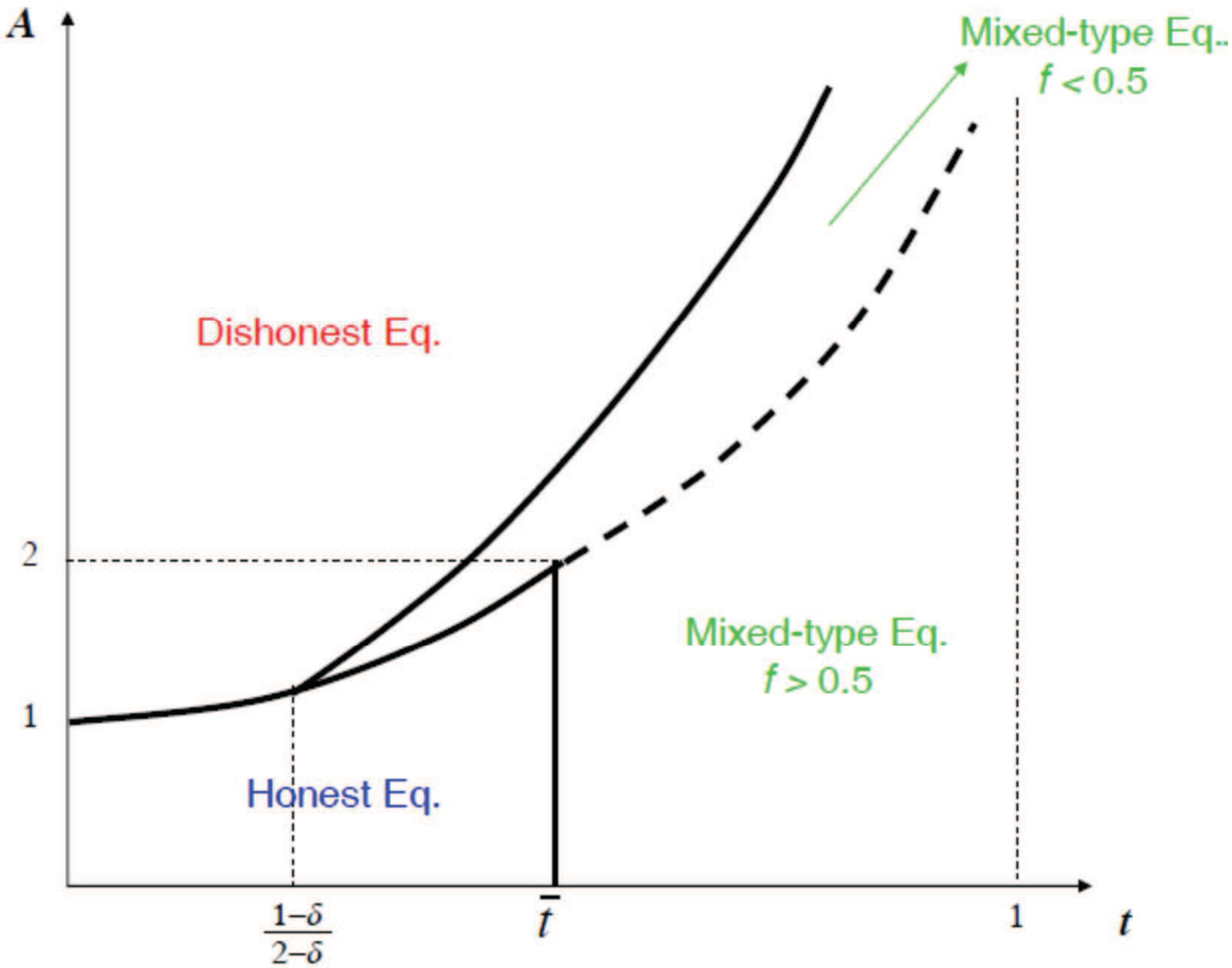

Figure 4B. Public financing of non-profit sector: efficiency-enhancing policies

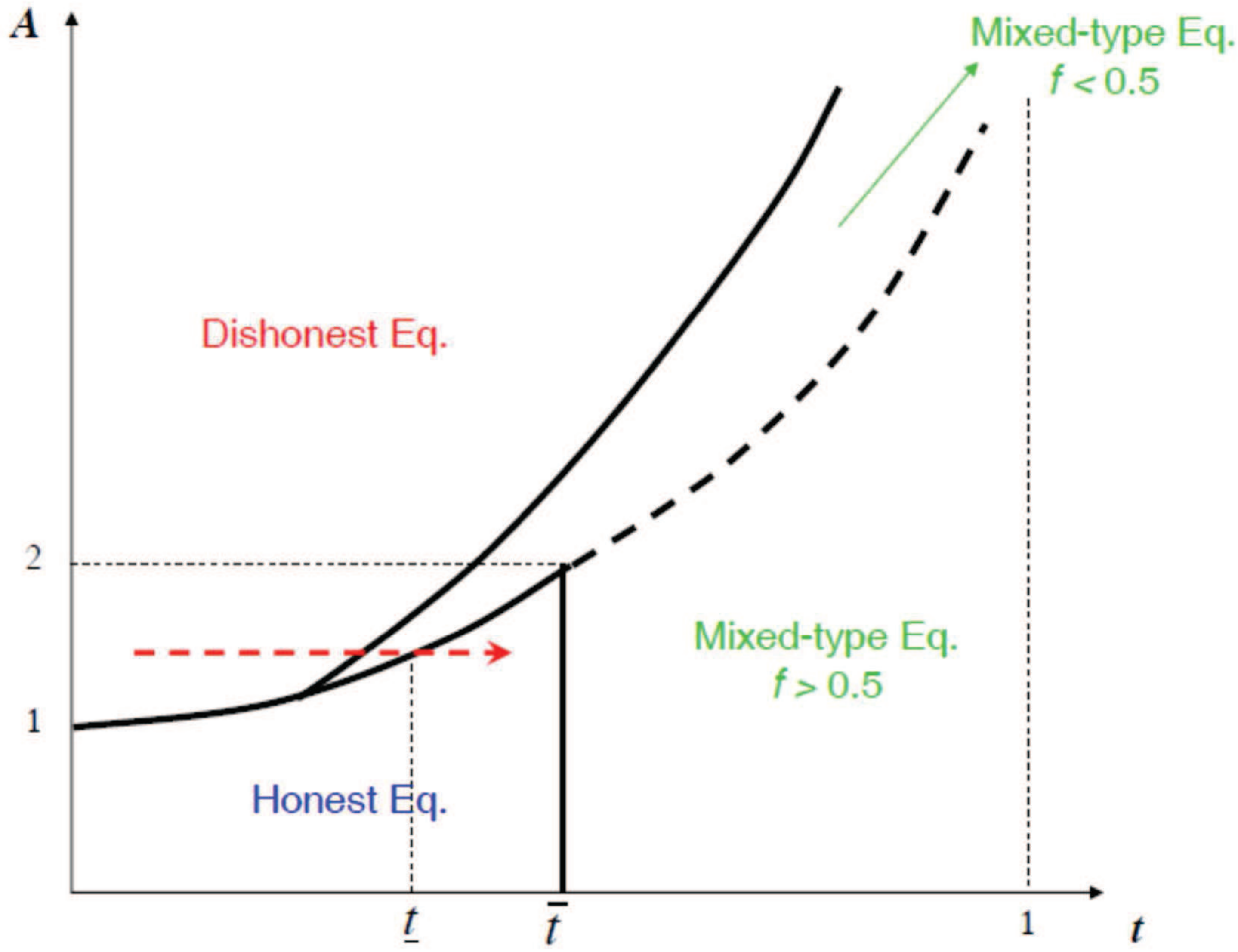

Figure 5A. Endogenous fundraising: honest equilibrium

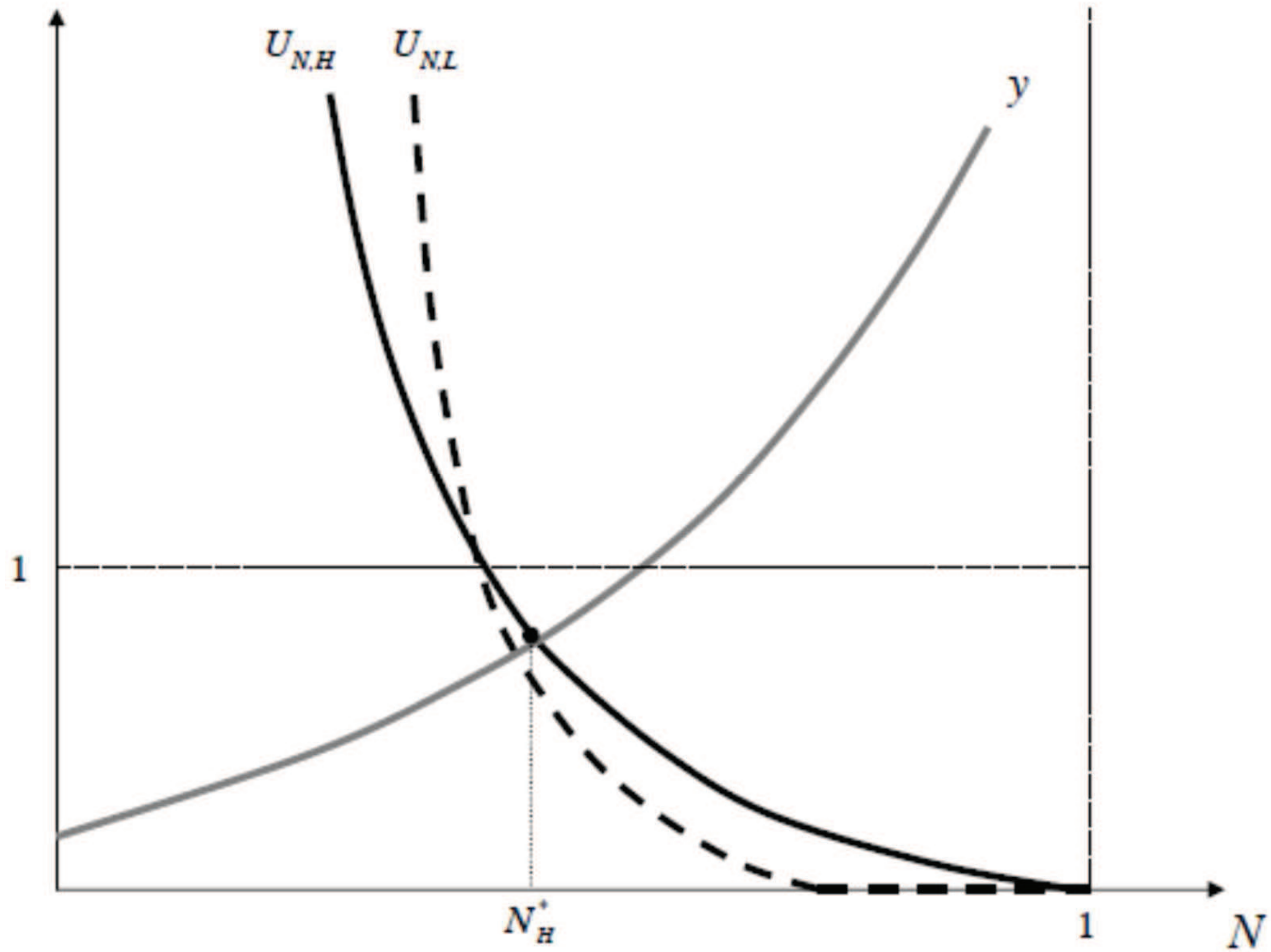

Figure 5B. Endogenous fundraising: effect of higher productivity in for-profit sector

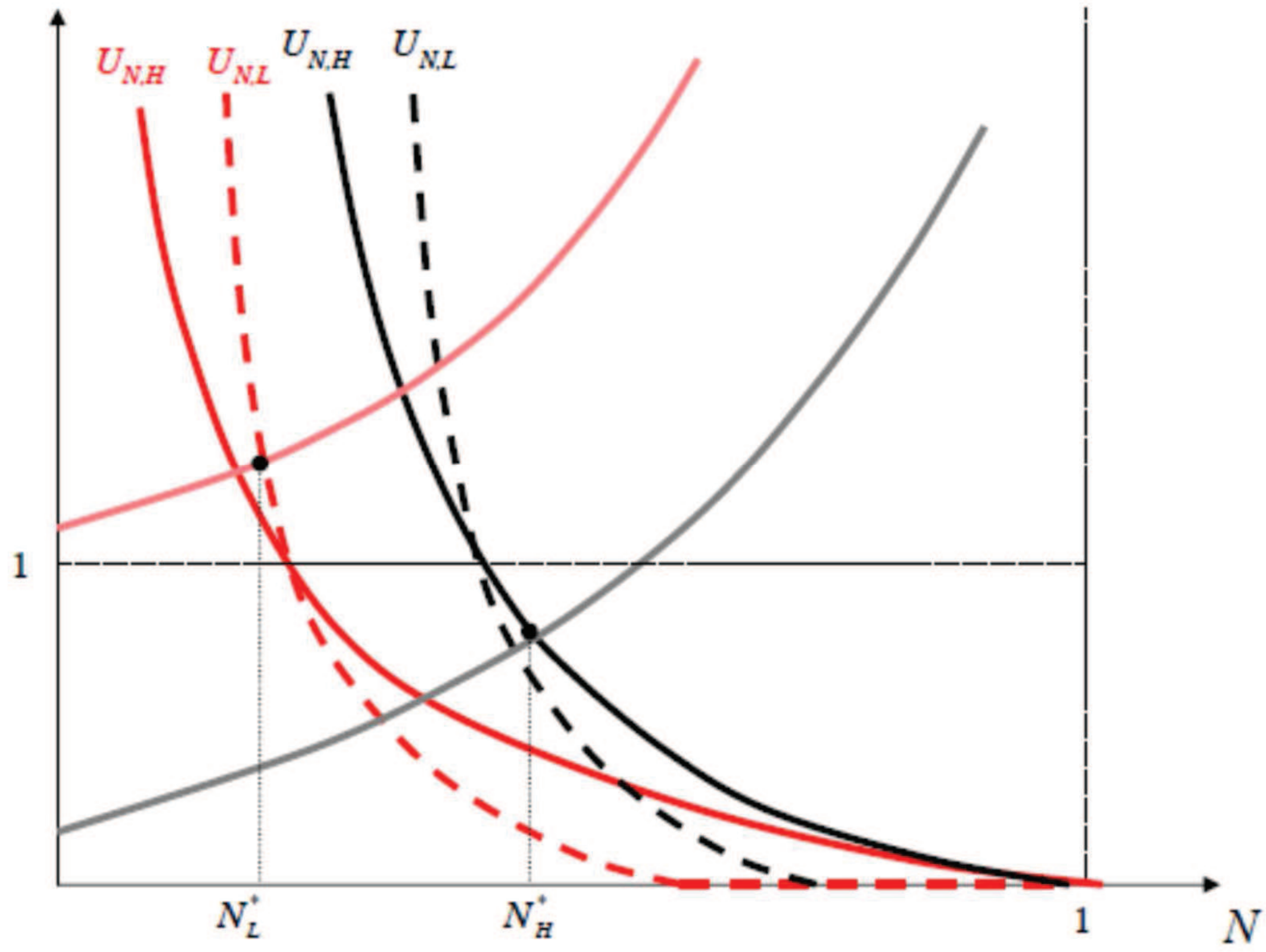

Figure 6. Multiple equilibria