DOCTOR OF ECONOMICS AND BUSINESS MANAGEMENT

Essays on the economics of nongovernmental organisations.

Morales Belpaire, Joaquin

Award date:
2015

Awarding institution:
University of Namur

University of Namur

Faculty of Economics, Social Sciences and Business Administration

Department of Economics

ESSAYS ON THE ECONOMICS OF NONGOVERNMENTAL ORGANIZATIONS

A Thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in Economics

Joaquín Morales Belpaire

August 2015

Supervisors of the Thesis

Prof. Gani Aldashev (ULB)

Prof. Jean-Philippe Platteau (UNamur)

Composition of the Jury

Prof. Emmanuelle Auriol (TSE)

Prof. Patrick Legros (ULB)

Prof. Jean-Marie Baland (UNamur)

President of the Jury

Prof. Mathias Hungerbühler (UNamur)

Graphisme de couverture : © Presses universitaires de Namur

Rempart de la Vierge, 13
B - 5000 Namur (Belgique)

Imprimé en Belgique
ISBN : 978-2-87037-912-7
Dépôt légal: D/2015/1881/43

Remerciements

Je suis extrêmement reconnaissant à mes promoteurs, Jean-Philippe Platteau et Gani Aldashev, pour leur précieux conseil et leur soutien pendant la consolidation de cette thèse. Leur expérience, intelligence, et talents rédactionnels ont fortement amélioré les brouillons initiaux de ce manuscrit. Ils ont toujours été très respectueux de mon autonomie et de mes idées ; ils m'ont offert une énorme liberté de création tout en affichant un grand enthousiasme envers mes projets. J'ai fortement apprécié les discutions enrichissantes que j'ai pu avoir avec eux, souvent en dehors du sujet de la thèse.

Je remercie fortement le jury, Emmanuelle Auriol, Mathias Hungerbühler, Patrick Legros et Jean-Marie Baland pour leurs précieux commentaires et leur lecture sérieuse de ma thèse. Je remercie en particulier le rapport rédigé par le professeur Legros, qui a réalisé un effort considérable pour détecter les erreurs importantes de ma thèse ; ces remarques ont mené à des améliorations fondamentales de la version ici présente.

J'ai profité à Namur d'une expérience de travail et d'échange d'idées exceptionnelle. J'ai eu la chance d'encadrer les séances de travaux pratiques d'Alain de Crombrugghe, Guilhem Cassan, Mathias Hungerbühler, Bertrand Verheyden, Stéphanie Weynants, et Xavier Wauthy. Je suis très reconnaissant envers Paul Reading qui a toujours été d'une sympathie incomparable. J'ai en particulier apprécié l'encadrement des TPs de Microéconomie de Catherine Guirkinger, qui a toujours été à l'écoute des propositions d'innovation des assistants, et d'Econométrie, de Vincenzo Verardi, avec qui j'ai apprécié les improbables discussions sur l'aéronautique bolivienne. Je suis aussi très reconnaissant des centaines d'étudiants que j'ai pu voir passer, pas toujours très bosseurs, mais toujours très aimables et souvent drôles.

A Namur, tous mes collègues ont rapidement pris le rôle d'amis. Je suis plein de gratitude envers Marie-Hélène et son efficacité inégalable, Wouter et Giulia et leur force tranquille, Renate et ses exigences de chocolat, Anne et ses rapports étendus sur la vie sociale du CRED. Je remercie Pierrette, qui gère la faculté, Jérémie et son engagement, Camille et sa sympathie, Roberta et Timothée et leur amour pour la nature, Anders et ses talents de danseur, Benjamin et ses pouvoirs de super-héros, Abhimaniu et sa curiosité inépuisable, Modeste et sa modestie, Françoise et sa franchise, Matteo et son cachondeo, Caroline et sa disposition citadine. J'ai aussi beaucoup apprécié Olivier et son respect du bon protocole, Nicolas et sa permanente remise en cause du protocole, Alex G. et sa belgophilie, Ombeline et son sourire permanent, Isabelle et son caractère inébranlable, Hélène L. et son énergie positive, Simone et son anarchisme, Cecilia et son coopérativisme, Elias et son incomparable gentillesse, Astrid et sa bonne humeur. Elena S., co-autrice d'un des chapitres de cette thèse, a droit à une mention spéciale car elle contribue à elle seule à 50% de l'énergie du 6me étage. Je remercie aussi Begum et Elise pour la bonne musique et Maëlys et son humour loufoque. Le plus grand

merci est réservé à François, mon collègue de bureau pendant 6 ans, qui est doué d'une intelligence et d'une gentillesse redoutables. François m'a sauvé la mise d'innombrables fois.

J'ai eu l'aubaine de supporter les Diables Rouges pendant la coupe du monde 2014 depuis l'Université d'Oxford, en compagnie de Renaud Foucard, Isabelle Dubuisson, Olivier Sterck et Imane Chaara. Étonnant, vu que je n'aime pas le foot. J'ai été très heureux des rencontres dans la communauté de jeunes économistes ailleurs en Europe. Je remercie Paola, Mara S., Stéphane, Abdel, Andrea A., Mara P., Rytis, Claudia, Manuel F., Monica, Marion, Mikel, Corinna, Annette, Saraly et Julien.

Ma vie à Bruxelles a été éclairée par des colocataires hauts en couleur : Jacques et Ariane ont rempli notre appartement d'objets aussi incroyables qu'inutiles, Olivier m'ai fait découvrir les plaisirs du Japon, Maru a développé l'intrigue avec les mystères d'investigation criminelle, et Mercedes a achevé cette intrigue avec ses épices pour chien. Margherita, ma colocatrice pendant 5 ans, a été à la fois mère, épouse, fille, collègue, prof, hôtesse et invitée. Sans aucun des avantages qui y sont associés. A Bruxelles, j'ai eu mes plus belles discussions avec Serge, Alex et Myriam. Nos papotes autour d'une Westmalle Triple ont souvent été plus formatrices et certainement plus intéressantes que pas mal de séminaires en économie. J'ai formé des très belles amitiés avec Deborah, chef de l'avant-garde des droits des peuples autochtones de l'Amazonie, Maya, la péruvienne la plus haute du monde, Ana, exploratrice de la planète, Stéphanie, la femme qui murmure à l'oreille des chiens, et Maui, chienne extraordinaire.

Avant mon expérience en Belgique, j'ai passé 5 belles années avec mes frères Toulousains : Laurie, Seb, Céline, Alex, Fanny, Paul-Marie, Guillaume, Hélène, Julie et Jérémie. J'ai découvert que tout ce qu'on dit sur les français est vrai. A Toulouse, Eluska a eu une influence cruciale sur ma vision du monde. A la Moederland – à La Paz–, mes amis ont formé mon caractère : Chesko, Hongo, Luis A., Carla, Jaime, Géraldine, Lucho et Eleonora, Riguer, ont tous fait de moi ce que je suis aujourd'hui (il n'y a pas de quoi être fier).

Il ne me reste qu'à remercier la famille. Mes parents, Cécile et Juan Antonio, m'ont toujours enseigné la rigueur et l'originalité. Ils ont piqué en moi l'intérêt pour l'économie, l'environnement, les sciences et les arts. Je n'ai pas de mots pour exprimer ma gratitude. Mes frères et mes beaux-frères n'ont que renforcé cette influence : Isabel et Manuel, Adriana et Benjo, et Esteban et Bea ont toute mon admiration et mon affection. Je remercie Antonin, notre chien, qui m'a accompagné pendant la rédaction de cette thèse dans notre jardin à La Paz.

Finalmente, quiero dedicar esta tesis a mis sobrinos: Cecilia, Adrián, Nicolás, Emiliano, Ignacio y Valeria. Tienen un carácter extraordinario. No cabe duda, el futuro solo les puede reservar un destino así, extraordinario.

Joaquín Morales, 4 de Agosto del 2015

"As for charity, it is a matter in which the immediate effect on the persons directly concerned, and the ultimate consequence to the general good, are apt to be at complete war with one another."

– John Stuart Mill, *The Subjection of Women*, 1869

Contents

Introduction

The analysis of the non-governmental aid sector by development economists is still at an early stage. Other social sciences, notably sociology and political science, have debated the advantages and disadvantages of providing foreign aid through NGOs at length. Compared to official aid, this literature often claims that NGOs are closer to the needs of beneficiaries, more innovative, and less influenced by geopolitical interests (Edwards and Hulme, 1996; Bebbington et al., 2008). NGOs also came under fire: critics accused the sector of being uncoordinated, ideology-driven, ingenuous, or even ill-intentioned (Petras, 1997; Mercer, 2002; Roy, 2004).

For more than half a century, cross-country analysis tried – unsuccessfully – to assess if *aggregated* foreign aid leads poor countries to development. Today, economists can rigorously test how successful the intervention of an *individual* NGO is, in particular thanks to randomized controlled trials. There is no middle ground: the disconnection between individual projects and cross-country analysis incarnates a modern version of Mosley's Micro-Macro paradox (Mosley, 1986). The paradox, stated almost 30 years ago, observes that despite the apparent success of foreign aid at the project level, aggregate effects where invisible at the country level. There is a pressing need to understand if the overall impact of the NGO sector is equal to the sum of its parts. This raises the following questions: how do NGOs influence those that do not directly benefit from their projects? How do NGOs interact with each other, with governments, or with other components of the Civil Society? How do NGOs change market equilibria, influence vote, or impact productivity?

Answering these questions is crucial to assess the efficiency of the new landscape of development assistance. This doctoral thesis hopes to contribute to the knowledge on NGOs by theorizing on their impact at the level of a country, or a large region of a country. The thesis is composed of three chapters: two of them are theoretical models concerned with the political economy of developing countries hosting foreign NGOs; the third chapter combines a theoretical model with empirical evidence to assess the effect of specific policies designed by governments, which it outsources to NGOs for their implementation.

The first chapter, *Decentralized Aid and Democracy*, develops a theoretical model in which a large operational NGO provides a public good in a democracy. It shows that

this type of aid provides incentives to voters to reduce support for taxation and redistribution. Poor citizens not targeted by the NGO suffer from reduced electoral support for redistribution. The chapter characterizes conditions under which decentralized aid can be harmful to poor non-beneficiaries.

A natural follow-up to exploring the effect of decentralized aid in democracies is to explore its effect under autocratic regimes. The second chapter, *Advocacy NGOs*, co-authored with Elena Serfilippi, looks at advocacy NGOs confronted to a high-handed ruler. We discuss the conditions under which advocacy activities can grant new rights to the poor. We find that NGOs will sub-optimally provide advocacy activities because they convey the characteristics of a public good. NGOs can solve under-provision issues through coordination, but if a ruler who is unwilling to grant new rights anticipates this, he will not allow the NGO sector to thrive under his rule. It results that full coordination among NGOs is suboptimal for their beneficiaries.

While in the previous case coordination among NGOs might be suboptimal, the reality is that NGOs do not usually coordinate: they often compete with each other. In chapter 3, *Encouraging Private Ownership of Public Goods: Theory and Evidence from Belgium*, we look at the market for land in Belgium, in which NGOs compete for land purchases with the view of creating natural reserves. This chapter is co-authored with Gani Aldashev, François Libois, and Astrid Similon. We look at the introduction of a subsidy to land purchases by NGOs in the Wallon region. While the subsidy initially increases the price of land, in the long-run prices fall, and land purchases thrive. We posit that NGOs can convince sellers to accept lower prices in exchange for contributing to a 'good cause'; incentives affect market equilibria for nonprofits in ways that diverge greatly from their for-profit counterpart.

Chapter 1

Decentralized Aid and Democracy

Abstract

This paper uses a model of vote over public finances to show that when nongovernmental organisations deliver development aid, beneficiaries have incentives to reduce electoral support for state-led redistribution. As a result, NGOs can crowd out governmental spending, turning private aid into a negative externality for the poor who do not directly benefit from it. I model the choice of a representative NGO, which faces a trade-off between targeting beneficiaries with higher needs, and reducing costs. I characterize the conditions under which this targeting affects the size of the externality and describe how it affects the welfare of beneficiaries and non-beneficiaries.

JEL Classification: D72, H44, L31, L33, O19.
Keywords: private development assistance, democracy, governance, NGOs, nonprofits, foreign aid, taxation, public goods.

1.1 Introduction

International NGOs, foundations, philanthropies, and other private nonprofits play an increasingly important role in the new landscape of foreign development assistance. Worthington and Pipa (2011) estimate that in 2008, private aid reached $49 billion, around a third of total aid disbursed by member states of the OECD. Donor countries have substantially outsourced their development assistance to NGOs: from negligible amounts in the mid-eighties, today 15% of all official aid is channelled through NGOs (OCDE, 2011).

The privatization of aid has been severely understudied by economists (a few exceptions are Yontcheva and Masud (2005); Dreher et al. (2007); Koch (2007)). On the contrary, scholars from other disciplines, including sociology and the political sciences, have produced an abundant literature on the political repercussions of nongovernmental aid (Arellano-López and Petras, 1994; Petras, 1997; Lorgen, 1998; Mercer, 2002). These authors claim that NGOs promoted the disengagement of the state in emerging democracies by encroaching on the prerogatives of the State. This literature asserts that when external private actors provide social services, they undermine the accountability of the State towards its citizens.

Many emerging markets deal with the issue of consolidating democracy while struggling with persisting pockets of poverty. As these countries become on average richer, they also turn less eligible to benefit from bilateral or multilateral aid. However, because they still struggle with inequality and large impoverished sectors of society, many nongovernmental organizations are willing to cater to the poor, sometimes acting as surrogates of the state. India is the prime example of an emerging market and a consolidated democracy in which NGOs are overwhelmingly present at all levels of society. Brazil, South Africa, and other poor-to-middle income democracies are no different. It is worth exploring how does the private provision of aid affects the role of the government in democracies.

I build upon Anthony Downs (1957) model of vote over public finances to show that private aid can reduce electoral support for redistribution. When NGOs provide services substitutable to those provided by the government, any voter benefiting from a project would favour a low taxation-low expenditure policy platform. Voters have incentives to do so because while foreign donors finance NGOs, national taxes finance governmental services. Therefore, for a similar service a citizen can afford to pay fewer taxes. By skewing the distribution of preferred policies toward a smaller government, private aid pulls the median voter away from poor non-beneficiaries. As a result, the preferred policies of poor non-beneficiaries become more distant from the new equilibrium policy: private aid turns into a negative externality for the poor, and into a positive externality for the rich.

This externality is independent from assumptions on corrupt authorities, devious NGO managers, or geopolitical interests. Instead, aid provided by NGOs can have undesirable effects even in the absence of institutional dysfunctions. Modelling emerging

democracies as endowed with perfect institutional environments is unrealistic, but it leads us to the important conclusion that good institutions are not enough to guarantee the efficiency of NGO-delivered aid. Additional institutional imperfections would mostly reinforce the validity of the main findings.

The crucial assumption driving the results of the model is that, contrary to the state, the NGO is not accountable to all society. In words, it is institutionally and politically easier for the NGO to target specific sectors of the population, while the state in bounded by the fact that it is accountable to all taxpayers. If non-recipients of a project feel that the state has unfairly allocated resources to other groups, they can punish politicians either at the pooling stations, in the streets, or by refusing to pay taxes. However, if and NGO allocates a project to some group, there is not much that non-recipients can do to punish the organization.

The model contributes to the debate over the private provision of aid. It theoretically quantifies the effects of a private and non-coordinated project on governmental expenditures and taxation. Because NGO targets a specific fraction of the population, it can choose between prioritizing the size of its project, and targeting would-be beneficiaries with higher needs. The underlying assumption is that reaching the poor is costlier, due to access costs to remote locations, saliency of needs, hostile environments, etc.

For instance, an education NGO could decide to implement alphabetization programmes. To obtain the same result in terms of beneficiaries reached and quality of alphabetization, the NGO endure higher costs by targeting isolated native communities than by targeting the urban middle classes, which have already some formal instruction. This type of trade-off will be determinant in understanding how different types of projects affect the governmental provision of public goods.

The main findings of the paper are:

(i) private aid crowds out governmental expenditures, harming poor non-recipients most;

(ii) targeting poorer beneficiaries mitigates the effect of this externality on poor non-beneficiaries; and

(iii) an utilitarian social welfare function is maximized by targeting poorer-than-average individuals when aid resources are limited;

The rest of the paper unfolds as follows: section 2 positions this paper in the relevant

literature; section 3 sets up the model, which is solved in section 4; section 5 analyses welfare implications; and section 6 concludes.

1.2 Literature Review

Surprisingly few studies on aid efficiency categorize outcomes by type of development assistance, private or official. Empirical evidence on the topic suffers from chronic data unavailability (Kharas, 2007). Databases contain information either at the donor country level (Dreher et al., 2007), or are estimated based on governmental subsidies granted to NGOs (Yontcheva and Masud, 2005; Yontcheva and Nancy, 2006), keeping private donations unaccounted. This is troublesome because official founding to NGOs is but a small fraction of the overall budget of these agencies, and there is large variation in the origins of founds across organizations and donor countries (Navarra, 2013). These limitations hamper the empirical assessments concerning the effectiveness of private aid.

Theoretical analysis of the private provision of public goods has been more fruitful. Drawing back from the literature of nonprofits based on transaction cost theories (Hansmann, 1980; Rose-Ackerman, 1986; Weisbrod, 1986), this literature has recently been updated to include elements of behavioural economics (Andreoni and Payne, 2001; Scharf, 2014) and applications to development economics (Besley and Ghatak, 2001a, 2005a; Aldashev and Verdier, 2010). The present paper adds to this last strand of literature by looking at the political repercussions of projects financed by private aid. By doing so, it should help bridge the gap between the effects of aid at the project level and its consequences at the country level. Indeed, while project evaluation techniques become increasingly sophisticated (Banerjee and Duflo, 2011a), our knowledge of the overall impact of micro-projects at the macro level remains limited (Mosley, 1986; Deaton, 2009).

Political economy models have been the predominant tool to address the repercussions of official development assistance at the state level (Svensson, 2000; Acemoglu et al., 2003; Platteau et al., 2011). Few of them address directly the question of private aid. Azam and Laffont (2003) model NGOs founded by the local elite in a dysfunctional democracy. By contrast, the present paper explores NGOs founded by foreign donors, and operating in countries endowed with sound institutions. The setting in this paper allows addressing the question of the privatization of international aid, and of

the inefficiencies arising even when institutional dysfunctions are absent.

This paper hopes to provide microfoundations explaining some of the paradoxical results found in the empirical literature on overall aid effectiveness. Good institutions have been deemed as a necessary condition to have aid affect growth (Burnside and Dollar, 2000; Collier and Dollar, 2004). However, foreign aid has been found to deteriorate governance (Rajan and Subramanian, 2007, 2008; Djankov et al., 2008), and to aggravate inequalities (Layton and Fuller, 2008; Herzer and Nunnenkamp, 2012). In countries with good institutions, we have that aid fosters growth but also widens inequality. In particular, Bjørnskov (2010) finds that if a recipient country is a democracy, then aid increases inequality. All these results are consistent with the model presented here. However, one must be cautious that the aforementioned empirical studies look at aid in general and not at aid provided specifically by NGOs. We do not know what type of aid, official or private, is at the origin of this divergence between efficiency and fairness. Koch et al. (2009) find that NGOs typically follow official aid; because of this positive correlation, we cannot rule out that indeed private aid hampers fairness.

1.3 Set up of the Model

1.3.1 The Basic Model of Vote over Public Finances

The model builds on the framework proposed by Anthony Downs (1957). Consider a continuum of voters indexed i, each of whom detains income y_i. Incomes are distributed according to a uniform distribution function with support $[0, 1]$.

Any voter values private consumption, c, and a public good, G. Their pay-off function is

$$\omega_i(c, G) = c + G - \frac{G^2}{2}. \tag{1.1}$$

In it, welfare increases linearly with private consumption, and increases in the level of the public good, but with diminishing marginal returns[1].

The public good is financed through a flat tax τ on income such that $G = \tau \int_i y_i di = \tau$. After taxation, agent i has a disposable income $(1-\tau)y_i$ which she devotes to private

[1] In equilibrium, G will never be in the decreasing part this functional form; monotonicity of G is preserved in the relevant domain. The quadratic form provides useful closed-form solutions.

consumption. Any citizen i chooses her preferred policy, denoted G_i, such that

$$G_i = \arg\max_{G} \ (1-G)\, y_i + G - \frac{G^2}{2}.$$

The preferred policy of i is

$$G_i = 1 - y_i. \tag{1.2}$$

Poor voters will prefer a higher level of public good and therefore higher taxation. Given the tax rate is flat, poor agents gain more from high taxation levels, as it forces rich agents to contribute proportionally more to the public good. The monotonous relation between income share and preferred policies allows us to draw a uniform distribution of preferred policies G with support $[0, 1]$. Denote the associated cumulative distribution function is $F(G_i) = G_i$ with support $[0, 1]$. Following Persson and Tabellini (2002, p.21-23), if politicians care only about getting elected, and citizens only care about public finances, then the median voter theorem predicts that the outcome policy is

$$G^* = 1/2 \tag{1.3}$$

in which $1/2$ is the income of the median voter. For any agent poorer than the median voter, the provision of public good by the state is insufficient. Agents richer than the median consider that there is too much taxation.

1.3.2 Nongovernmental Organizations

Introduce an NGO to the model. Formally speaking, the NGO provides a local public good, denoted g, to a targeted fraction n of the population. The NGO is averse to poverty, so that targeting richer agents reduces its utility. The programme of the NGO is

$$\begin{aligned} \underset{n,g,y_t}{\text{Max}} \quad & \frac{ng}{{y_t}^{2\left(\frac{1-z}{2-z}\right)}} \\ s.t \quad & b \geq (n+g)\tfrac{1}{1+y_t} \end{aligned} \tag{1.4}$$

where $z \in]0, 1]$ denotes aversion to poverty. The payoff of the NGO is larger if it reaches more beneficiaries (n) and if the level of the public good is higher (g). y_t represents the income of a typical targeted beneficiary, such that targeting richer individuals decreases

its utility. Since $y_t < 1$, an increase in parameter z increases the exponent over y_t, and therefore raises the disutility from targeting richer individuals. It follows that z measures aversion to poverty. The NGO finances its project with budget b, which allows it to finance a larger project g and to reach more beneficiaries n. I assume that the cost of these endeavours increases as the NGO targets poorer individuals. Indeed, poorer individuals might be harder to reach, for example if most of them live in remote locations, or if their needs are more salient. Notice that if this assumption does not hold, the NGO trivially targets only the poorest due to poverty aversion. The solution of this program is

$$\begin{aligned} y_t^* &= 1 - z \\ n^* &= \left(1 - \frac{z}{2}\right) b \\ g^* &= \left(1 - \frac{z}{2}\right) b \end{aligned} \tag{1.5}$$

Appendix A provides the details. The first condition states that poverty-averse NGOs target poorer individuals. This comes at the cost of reducing the level of the public good provided as well as the number of beneficiaries reached, as stated in the following conditions. I impose the restriction that $b < 1$ to avoid corner solutions; it should be noted however that because national income is 1, this restriction is not too demanding. A larger budget allows the NGO to invest more in both reach and depth of the project. By (1.2), the typical beneficiary of the NGO is the agent with preferred policy

$$G_t = z.$$

Dropping the asterisks to alleviate notation, vector (n, g, z) represents the characteristics of the project. A fraction n of the population is a continuum of beneficiaries lying in the neighbourhood of targeted beneficiary z. Identify the poorest amongst all beneficiaries with $\overline{G}$ and the richest with $\underline{G}$, which are their respective preferred policies. Then $n = \overline{G} - \underline{G}$. Any agent within this interval is a beneficiary: she gets access to g, additionally to the public good G provided by the state. To obtain a well-behaved solution, assume the following:

Allocation Rule For any given program vector (n, g, z) there is an allocation rule such

that:

$$\begin{aligned} \overline{G} &= z(1-n)+n, \text{ and} \\ \underline{G} &= z(1-n). \end{aligned} \tag{1.6}$$

This assumption prevents the NGO from targeting beneficiaries out of the domain. We now turn to characterize the equilibrium following the introduction of this project.

1.4 Electoral Outcomes at Equilibrium

The timing of the model is as follows: project (g, n) is implemented; beneficiaries update their preferred policy platform; and elections take place. The updated preferred policy for any voter is

$$\widehat{G}_i = \arg\max_{G} \quad (1-G)y_i + G + ga - \frac{(G+ga)^2}{2}$$

in which a is an indicator variable valued one if the voter is a beneficiary of the project. The ex-post preferred policy of voter i, designated with a circumflex accent throughout this paper, is

$$\begin{aligned} \widehat{G}_i &= min\{0, 1-y_i-ga\} \\ &= min\{0, G_i - ga\} \end{aligned} \tag{1.7}$$

The mass of voters with political preferences distributed over the segment $[\underline{G}, \overline{G}]$ shifts to the left (directionally) by a distance g, as Figure 1.1 displays. Denote $J(G_i)$ the ex-post cumulative distribution function (CDF), which can be expressed in terms of G.

Proposition 1.1 ***Preferred Policies Ex-post***

Equality $J(G) = 1/2$ defines the ex-post median voter $\widehat{G}$, in which

$$J(G^*) = \begin{cases} G & \text{if} \quad 0 \leq G < \underline{G} - g \\ 2G - z + (1+z)(1-z/2)b & \text{if} \quad \underline{G} - g \leq G < \underline{G} \\ z + (1-z)(1-z/2)b & \text{if} \quad \underline{G} \leq G < \overline{G} \\ G & \text{if} \quad \overline{G} < G \end{cases} \tag{1.8}$$

is a piecewise differentiable, continuous and monotonically increasing function in G, such that $J(G) \geq G$. By the allocation rule described above, the three points at which

the distribution changes slope are:

$$\begin{array}{rrcl} & \underline{G} - g & = & z - (1+z)(1 - z/2)b \\ \overline{G} - g = & \underline{G} & = & z - z(1 - z/2)b \\ & \overline{G} & = & z + (1-z)(1 - z/2)b \end{array} \tag{1.9}$$

Appendix B details the construction of this CDF. The lower right quadrant in Figure 1.1 depicts function $J(G)$. The *ex-ante* cumulative distribution function is first order stochastically dominant with respect to the *ex-post* CDF of preferred policies. The median preferred level of public spending partially reduces except in three regimes described in what follows.[2]

If the intercept is such that that if $J(0) > 1/2$, then there is full disruption of government expenditure (as opposed to partial reduction). This happens when

$$b \geq \frac{2z+1}{(1+z)(2-z)}; \tag{1.10}$$

full disruption results from a very large aid budget and low poverty aversion. The project of the NGO does not change electoral outcomes in two cases: when all beneficiaries are richer than the ex-ante median ($\overline{G} < 1/2$), and when beneficiaries are poor but do not shift beyond the ex-ante median ($\underline{G} - g > 1/2$). These Status Quo regimes happen when

$$b \leq \frac{1-2z}{(1+z)(2-z)} \tag{1.11}$$

or

$$b \leq \frac{2z-1}{(1+z)(2-z)}. \tag{1.12}$$

There is no political impact when the budget is low, and when poverty aversion is either very small or very high.

When conditions (1.10) to (1.12) are violated, there is a partial reduction of public

[2]The size of this shift depends on the assumption that state-provided and NGO-provided public goods are perfectly substitutable. It will be lesser if the two goods are increasingly complementary, for example if the utility function of beneficiaries is $(1-G)y_i + G + gb - (G+gb)^2/2 + \alpha gG$ in which α parametrizes the level of complementarity. The updated preferred policy of i is then $\widehat{G}_i = G_i - (1-\alpha)gb$. The distribution of preferences shifts less as α increases. If α¿1, preferences shift to the right (directionally). The project crowds-in public expenditure, but only if those richer than the median voter are beneficiaries, which is an anomalous circumstance.

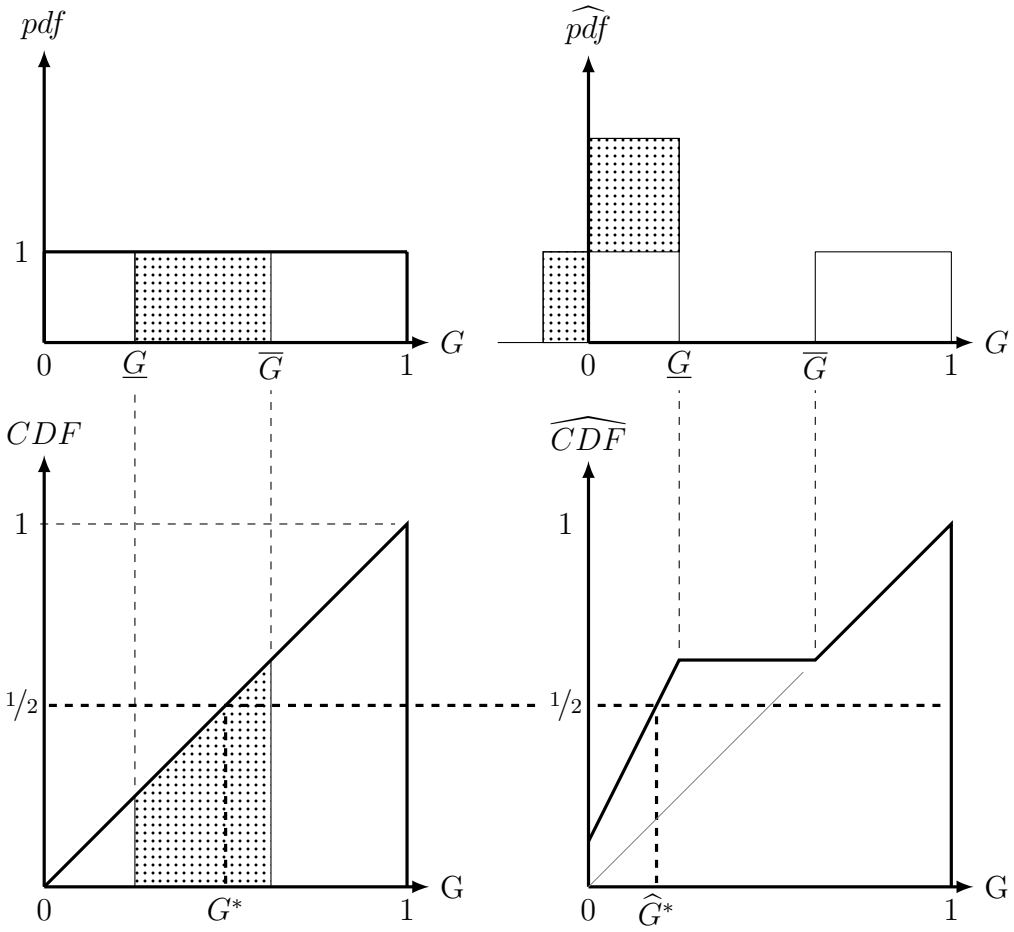

Figure 1.1: Ex-ante and ex-post density distributions.

spending. Define as isoelectoral curves the set of combinations of b and z such that the same electoral outcome $\widehat{G}$ is obtained at equilibrium. These are defined by $J(G) = 1/2$ when $\underline{G} - g < G < \underline{G}$. They can be expressed as

$$b = \frac{1 + 2z - 4\widehat{G}}{(1+z)(2-z)} \tag{1.13}$$

Remark that (1.10) and (1.12) are the limit cases of the partial reduction regime. These regimes are displayed in the $z \times b$ space in Figure 1.2, in which φ is the golden ratio. The arrow over the isoelectoral outcome curves indicates the direction in which the provision of public good by the state decreases. Figure 1.3 displays the levels of electoral outcomes for the different regimes. In the partial reduction regime, provision of the public good by the state decreases as the income of the NGO increases. However, when the NGO is more averse to poverty it mitigates this effect.

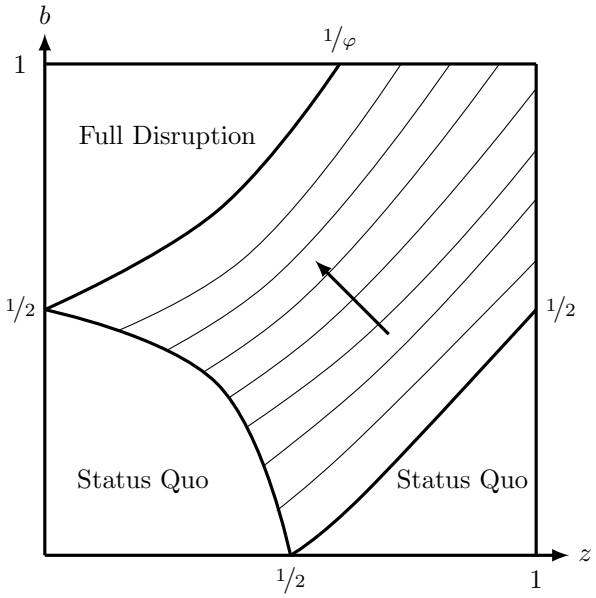

Figure 1.2: Isoelectoral Outcomes depending on characteristics of the NGO.

Corollary 1.1 *If the NGO crowds out public expenditure, a larger NGO budget exacerbates the effect, while aversion to poverty reduces the crowding out.*

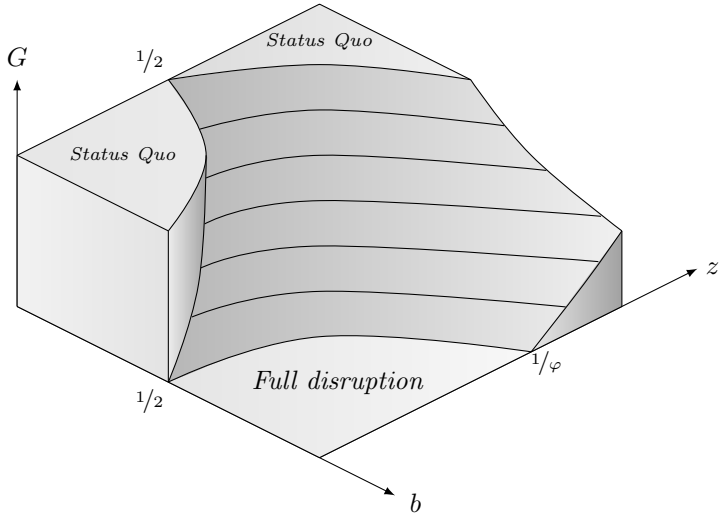

Figure 1.3: Levels of *ex-post* government expenditure for any z and b.

By targeting poorer agents, the NGO reduces the crowding out effect by two means: first, it reduces the size of the shift because the projects are smaller due to accessibility costs; secondly, beneficiaries are more likely to remain to the right of the *ex-ante* median voter if they are poorer. Targeting the middle class is therefore conductive of a larger shift. Next section analyses how this shift affects welfare at the individual and at the aggregate level.

1.5 Welfare Implications

In this section, we analyse the effect of the shift on welfare, both at the individual and at the aggregate level. We do so by comparing the ex-ante to the ex-post equilibria. I use the utilitarian welfare function, which simply aggregates payoff functions. An the ex-ante level, it writes

$$\int_i \left[(1-G)y_i + G - \frac{G^2}{2}\right] di = 1 + G - G^2 \tag{1.14}$$

since y_i follows a uniform distribution.[3]

The policy maximizing welfare is the equilibrium policy $G^* = 1/2$. This result obtains

[3]Given that incomes are uniformely distributed and ranked by i, one can write $y_i = {}^{i}/_{\alpha}$ in which $[0, \alpha]$ is

when the distribution is symmetrical around the mean, because mean and median coincide. The mean preferred policy maximizes welfare since it minimizes the sum of the distances between the individually preferred policies and the implemented outcome. Therefore, deviations from this equilibrium reduce welfare. The NGO brings the direct benefits from the project itself, while it creates the cost of deviating from the optimal government policy. We explore this trade-off in what follows.

1.5.1 Individual Welfare

Remark that at the ex-ante equilibrium $G^* = 1/2$. The payoff of voter i is by (1.14)

$$y_i/2 + 3/8. \tag{1.15}$$

If the project is to be beneficial to voter i, this payoff must be smaller than

$$(1 - \widehat{G}^*)y_i + \widehat{G}^* + ga - \frac{(\widehat{G}^* + ga)^2}{2}. \tag{1.16}$$

Proposition 1.2 *If a project is implemented and it crowds out public expenditure, then*

1. *non-beneficiaries poorer than the median are always made worse-off,*
2. *non-beneficiaries richer than the third quartile are always made better-off, and*
3. *beneficiaries are always made better-off.*

To see this, first consider the welfare of the non-beneficiaries by setting $a = 0$.

We can trace a set of points of indifference in which (1.15) equals (1.16) for any i. This yields the simple relation

$$y_i = \frac{3 - 2\widehat{G}}{4}.$$

Plotting this function in Figure 1.4 we define two sets: the set above the indifference line contains rich non-beneficiaries, for whom the project is a positive externality; the set below contains poor non-beneficiaries, for whom the project is a negative

---

the support of i. Then

$$\int_i y_i di = \int_{i=0}^{\alpha} \frac{i}{\alpha} di = \frac{\alpha}{2}$$

Since $\int_i y_i di = 1$, one obtains $\alpha = 2$. Therefore, $\int_i (constant)\ di = 2 \times constant$.

externality. When the vertical distance between y_i and the line increase, utility reduces. In the graph, the individual with income y_1 becomes closer to this line when there is a shift, while the distance of individual y_3 increases. Any individual richer than $y_i \geq 3/4$ is unambiguously made better off, and the converse is true for any agent poorer than $y \leq 1/2$. For an individual with income $1/2 < y_2 < 3/4$ the effect is ambiguous; while initially she prefers less public spending, if the project leads to a shift that is too large (as represented in Figure 1.4), she prefers the ex-ante equilibrium.

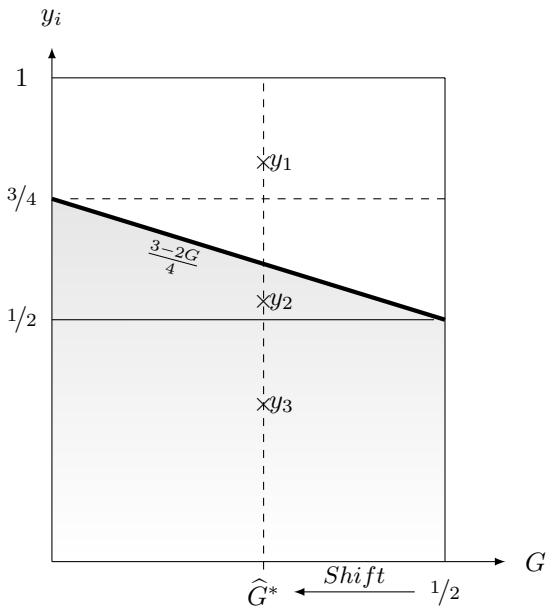

Figure 1.4: Welfare changes for non-beneficiaries.

The shift exacerbates inequalities amongst non-beneficiaries. By corollary 1.1, poor non-beneficiaries welfare decreases in the budget of the NGO, but the effect is mitigated when aversion to poverty increases.

Turn now to the beneficiaries of the project. When the NGO implement it, beneficiaries gain from the project but lose from the externality. To see that the net effect is positive, consider the poorest among all agents, $y_i = 0$, who suffers most from the externality. She is better off with the project when

$$\begin{aligned} & \widehat{G}^* + g - \tfrac{(\widehat{G}^*+g)^2}{2} && > G^* - \tfrac{G^{*2}}{2} \\ \Rightarrow \quad & \widehat{G}^* + g && > G^* \end{aligned} \tag{1.17}$$

since we are in the increasing part of the quadratic function. By (1.3), (1.5) and (1.13), this condition is rearranged as

$$B > \frac{1-2z}{(2-z)(1-z)}$$

which by (1.10) is respected when we are outside of the Satus Quo case. In the Status Quo case, (1.16) holds trivially. Hence, even for the poorest beneficiary, the negative exernality cost does not surpass the direct benefits from the project.

1.5.2 Aggregate Welfare

Dropping the asterisk of $\widehat{G}^*$ to alleviate notation, the sum of all payoff functions is

$$\begin{aligned} W &= \int_i \left[(1-\widehat{G})y_i + \widehat{G} + ga - \frac{(\widehat{G}+ga)^2}{2} \right] di \\ &= \underbrace{1-\widehat{G}}_{\substack{\text{After Tax} \\ \text{Income}}} + \underbrace{n\left[2(\widehat{G}+g) - (\widehat{G}+g)^2\right]}_{\substack{\text{Value of the public good} \\ \text{for Beneficiaries}}} + \underbrace{(1-n)\left[2\widehat{G} - \widehat{G}^2\right]}_{\substack{\text{Value of the public good} \\ \text{for Non-Beneficiaries}}}. \end{aligned} \tag{1.18}$$

The first term is aggregate disposable income after taxation, the second term is the utility of the combined public good for the beneficiaries, and the third term is the utility of the state-provided public good for non-beneficiaries. In the case of the partial shift, equations (1.5) and (1.13) give the values of $\widehat{G}$ and g depending on z and b. Therefore, we can write W as a function of parameters z and b,

$$W : (z, b) \to \mathbb{R}_+$$

The analytical form of this equation is unsuitable for interpretation.[4] Mathematical software allows us to plot three sets of interest in the $z \times b$ space:

$$\begin{aligned} A &= \{(z,b) : W(z,b) < 5/8\} \\ B &= \{(z,b) : W_b(z,b) < 0\} \\ C &= \{(z,b) : W_z(z,b) > 0\} \end{aligned} \tag{1.19}$$

The properties of these sets are: A determines values of (z, b) for which aggregate welfare is smaller than at the ex-ante equilibrium; B determines the region in which aggregate welfare decreases with the budget of the NGO; and C determines region for which aggregate welfare increases with aversion to poverty.

Figure 1.5 plots these three sets. Notice that $(A \cup B) \subseteq \{SatusQuo\}$, and are therefore empty, given that the partial shift defines $W(z, n)$. Set C is non-empty when

[4] $W(z,b) = \frac{1}{2} + \left[1 - \frac{1}{4}\left(1 + 2z - (1+z)(2-z)b\right)\right]\left[\frac{1+2z-(1+z)(2-z)b}{8} + \left((1-\frac{z}{2})b\right)^2\right] - \frac{1}{2}\left[(1-\frac{z}{2})b\right]^3$

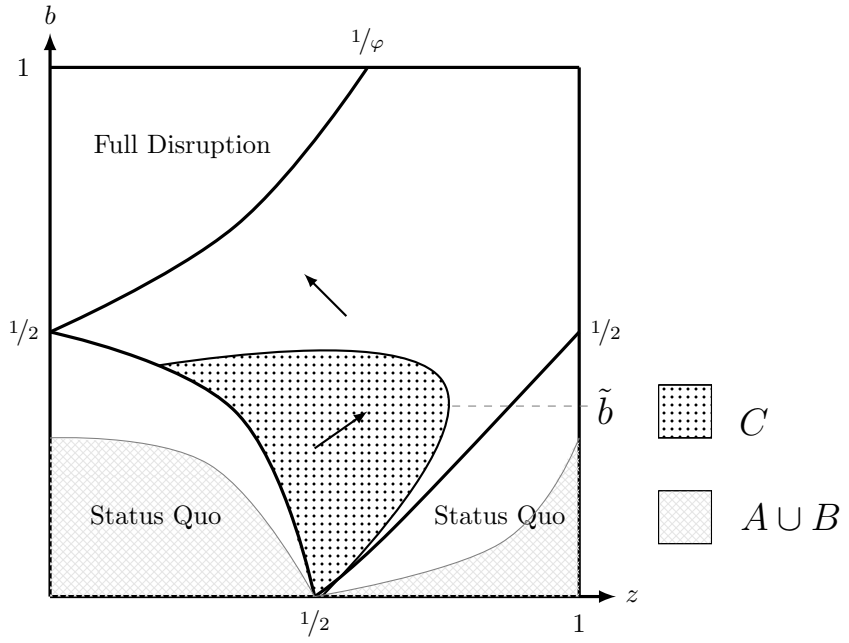

Figure 1.5: Effects of z and b on aggregate welfare.

b and z take "intermediary" values in the center of the graph. From any point in C, an increase of z increases welfare until it reaches the north-eastern boundary of C. This boundary defines the set of optimal z for any budget $b < 1/2$. When $b > 1/2$ then aggregate welfare decreases in the degree of aversion to poverty. The arrows in the graph indicate the directions in which welfare increases following a marginal change of vector (z, b). These observations allow for the following proposition:

Proposition 1.3 *If a project with characteristics (z, b) is implemented, then :*

1. *aggregate welfare is larger compared to the case in which there is no project (since A is empty);*
2. *aggregate welfare is monotonically increasing in b (since B is empty),*
3. *aggregate welfare increases in z for "intermediary" values of z up to the north-east boundary of C, and decreases afterwards.*

Figure 1.6 plots function $W(z, b)$ in the $[0, 1]^2 \times \mathbb{R}$ space, allowing to represent the magnitude of the effects. For low values of b, if there is a shift, then targeting the poorer

than the median (up to a point) is socially optimal even under an utilitarian welfare criterion. This is remarkable because, by assuming that targeting the poorest increases costs, one would expect that utilitarianism would recommend adopting the cheapest alternative, irrespective of who is the beneficiary. Instead, targeting those poorer than the median mitigates the externality which results from the deviation of the ex-ante equilibrium.

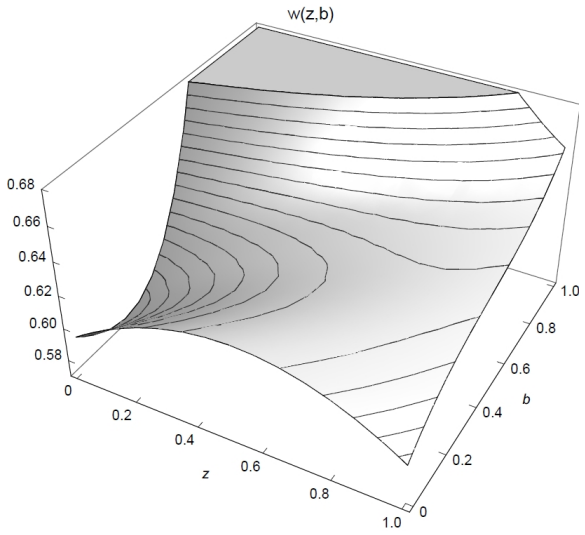

Figure 1.6: Welfare function $W(z, b)$

.

From this utilitarian perspective, an optimal targeting policy is, for a budget below threshold $\tilde{b} \approx 0.27$, to target increasingly poorer beneficiaries as aid money increases along the east boundary of C in Figure 1.5. This threshold is unlikely to be crossed, as it would represent more than half of national income $\int_i y_i d_i = 1/2$). However, if it is the case, as aid money increases, targeting obtains two optima along the north boundary of C, and quickly collapses to $z = 0$ when b is above set C. At this point the cost of targeting the poorest completely surpasses the benefits from mitigating the externality.After the threshold, objectives of efficiency and fairness are opposed: programs maximizing aggregate welfare will also create the largest externality, hurting poor non-beneficiaries the most.

1.6 Conclusion

This paper develops a model of vote over public finances interacted with the provision of public services by a foreign NGO. The NGO can reduce electoral support for state-provided public goods, because it delivers a project financed by external donors, while taxpayers finance the state-provided public good. The NGO can target particular sectors of the population, while the state is accountable to the entire population. It results that the crowding out of government expenditures translates into an externality for agents whom the NGO does not target. It follows that nongovernmental aid makes poor non-beneficiaries worse-off.

In the model, a representative NGO trades-off between the size of the project it finances and who benefits form it, as I assume that the NGO wishes to cater to the poor, but that this is costlier than satisfying the needs of the wealthy. While aversion to poverty results in higher costs, it mitigates the crowding out effect. The additional cost of targeting the poorest are worth enduring as they lessen inequalities even for non-beneficiaries and, to a degree, increase aggregated welfare by diminishing the size of the externality.

The model rests on deliberately simplifying assumptions to show that, even without institutional failures at the government level, non-governmental aid can harm the poor. It sheds light on the problem of lack of coordination between NGOs and government, and on the issues stemming from lack of ownership of aid by the recipient country. Recipient countries can overcome the crowding out problem if private aid is integrated in the electoral platform of the democratically elected government, so that there is no externality arising.

The optimistic view on the institutional arrangements make recommendations of this paper applicable to emerging democracies, which have an already consolidated voting system and free elections, although are still exposed to persistent poverty and inequalities. The model omits the advocacy role that NGOs often play, which affects attitudes of citizens beyond economic incentives only. This limitation highlights the importance of integrating the advocacy role of private foreign aid in the next generation of models on aid effectiveness.

1.7 Appendix

1.7.1 Appendix A

After log-linearisation of the objective function, the Lagrangian associated to this problem is

$$L(n, g, y_t, \lambda) = ln(n) + ln(g) - 2\left(\frac{1-z}{2-z}\right) ln(y_t) + \lambda\left[b - (n+g)\frac{1}{1+y_t}\right]$$

First order conditions are

$$\frac{1}{n} = \lambda\frac{1}{1+y_t} \tag{1.20}$$

$$\frac{1}{g} = \lambda\frac{1}{1+y_t} \tag{1.21}$$

$$-2\left(\frac{1-z}{2-z}\right)\frac{1}{y_t} = -\lambda(n+g)\frac{1}{(1+y_t)^2} \tag{1.22}$$

(1.20) and (1.21) yield $g = n$. Replacing λ in (1.22) from either (1.20) or (1.22) obtains

$$\frac{1-z}{2-z} = \frac{y_t}{1+y_t} \tag{1.23}$$

which states that $1 - z = y_t$. Replacing y_t in the budget constraint $b = (n+g)\frac{1}{1+y_t}$ and using $g = n$ yields the desired result.

1.7.2 Appendix B

By the assumption of uniformity, the ex-ante pdf is 1 on support $[0, 1]$. We can construct each piece of the *ex-post* CDF as follows:

$$J(G^*) = \begin{cases} \int_0^G 1 d\tilde{G} & \text{if} \quad 0 \leq G < \underline{G} - g \\ \int_{\underline{G}-g}^G 2 d\tilde{G} - \int_0^{\underline{G}-g} 1 d\tilde{G} & \text{if} \quad \underline{G} - g \leq G < \underline{G} \\ \int_{\underline{G}}^G 0 d\tilde{G} - \left[\int_{\underline{G}-g}^{\overline{G}} 2 d\tilde{G} - \int_0^{\underline{G}-g} 1 d\tilde{G} \right] & \text{if} \quad \underline{G} \leq G < \overline{G} \\ \int_{\overline{G}}^G 1 d\tilde{G} - \left[\int_{\underline{G}}^{\overline{G}} 0 d\tilde{G} - \left[\int_{\underline{G}-g}^{\overline{G}} 2 d\tilde{G} - \int_0^{\underline{G}-g} 1 d\tilde{G} \right] \right] & \text{if} \quad \overline{G} < G \end{cases} \tag{1.24}$$

Solving these integrals and replacing the values at the points at which the distribution changes slope yields the desired result.

Chapter 2
Advocacy NGOs

Joint work with Elena Serfilippi

Abstract

We develop a theoretical model in which NGOs financed by foreign donors engage in two types of activities in a developing country: service provision and advocacy. In the model, service provision relieves poverty, but these aid resources risk embezzlement by corrupt authorities. Advocacy can encourage the local population to demand more transparency to the authorities, reducing embezzlement at the cost of investing fewer efforts in direct poverty alleviation. We find that in general advocacy will be under-provided because its benefit, improved governance, has the characteristics of a public good. NGOs can remedy to this under-provision by coordinating their actions, but because this coordination threatens the rents of the local authorities, officials will respond to coordination attempts by cracking down on NGOs. Full coordination is therefore undesirable: crackdown of NGOs will be too strong, which reduces service provision and hurts beneficiaries.

Keywords: NGOs, Autocracy, Advocacy, Campaining, Aid Effectiveness, Coordination.

JEL Codes: L3, F3, F5, O19.

2.1 Introduction

In the last few years, the international community has multiplied efforts directed at improving foreign aid effectiveness. At the High Level Fora on Aid effectiveness (Paris, 2005; Accra, 2008; Busan 2011) , parts signing the agreements committed to transform the landscape of development assistance. Participant countries pledged to involve local

citizens into shaping development strategies, particularly through the explicit recognition of Nongovernmental Organisations as pillars of the implementation of effective aid. From being practically absent at the initial debates at the High Level Fora, NGOs became formally recognised as 'full and equal participants' to the negotiations at the Busan summit in 2011. Accompanying this formal recognition, donor countries have considerably increased their financial support to NGOs: roughly one-fifth of all official OECD aid money was delivered through NGOs in 2013, double of what it was just ten years ago (OECD, 2014). When private donations are added, Worthington and Pipa (2011) estimate that the amount of aid delivered by NGOs is roughly equal to that of aid delivered through official channels.

2.1.1 The Challenge of Aid Harmonization

The increased reliance on the NGO sector raises the issue of coordination among organizations evolving in a fractioned sector. At the High Level Fora on aid effectiveness, the agreements stressed the importance of harmonizing aid among donors, without clearly stating how this harmonization can be achieved. Relying on a decentralized, atomistic, and heterogeneous multitude of NGOs, each of them driven by their own intrinsic objectives challenges the idea of harmonizing aid.The lack of coordination is one of the main criticisms addressed to the NGO sector, of which Haiti is the most poignant example. Likewise, relying on the NGO sector contradicts another engagement of the donor community: to concede the ownership of development strategies financed through foreign aid to beneficiary governments. NGOs often have objectives that are divergent, if not opposed, to those of host governments. Examples include human rights associations defying repressive authorities, NGOs that advocate gender equality in patriarchal societies, or environmental NGOs that oppose heavy infrastructure projects.

Recent years have seen a surge of tensions between high-handed rulers and the nongovernmental sector. Governments of countries such as Venezuela, Zimbabwe, Russia, Egypt, and several others have stringently audited, fined, intimidated, and ultimately expelled NGOs from their territories (The Economist, 2014). While rent-seeking authorities can take advantage of the presence of service-providing NGOs, directly through extortion or indirectly through the mismanagement of fungible public funds, they also risk being confronted to a sector that encourages beneficiaries into demanding greater accountability to the ruling elite. NGOs can allocate their resources between two activi-

ties: the provision of poverty-alleviating services, such as health and education, and the financing of advocacy activities. If effective, advocacy activities can motivate targeted beneficiaries into appropriating aid projects that are intended for them. However, if advocating for improved governance results in a crackdown on the aid sector, which cripples the amounts of aid provided, then one wonders if it is worth for NGOs to engage in advocacy at all.

In this paper, we contribute to the literature by explicitly modelling the trade-off between the provision of welfare-enhancing services and the engagement into governance-enhan- cing advocacy. Two main assumptions drive our model: first, we assume that the advocacy content of the activities of the NGO is not contractible *ex-ante* with the host government. Second, we assume that the benefit of advocacy, namely improved governance, has the characteristics of a public good, in that better governance is non-rival and non-excludable. In our model, three types of agents interact: the host government, NGOs, and the local population. In particular, we focus on the description of the numerous choices and constraints that NGOs face: in our set-up, NGOs interact with each other, with the local authorities, and with the local population. NGOs look for an optimal allocation of their efforts between service provision and advocacy, the latter of which brings upon the benefits of improved governance. We assume that NGOs are heterogeneous in their incomes and their preferences towards advocacy, and moreover, they can coordinate with each other.

Our results show that advocacy efforts will typically be under-provided because of the public good characteristics of better governance. While free riding inefficiencies undermine the provision of advocacy efforts, addressing this inefficiency through an increased focus on governance, or through intensified coordination efforts, makes the government strengthen its crackdown on NGOs. As a result, although some degree of advocacy is desirable, increasing it to the point of abolishing free riding inefficiencies is not optimal because corrupt authorities will react by shutting down too many NGOs compared to a second-best optimum. We prove the existence of such a second-best optimal degree of advocacy and we derive its properties, in particular its incompatibility with a state where there is no free riding in advocacy. A direct policy implication is that donors cannot – and should not – expect that all forms of free riding disappear, at least not through a bottom-up approach only.

2.1.2 Literature Review

Scholars in social sciences highlight the role of NGOs as promoters of good governance as frequently as they emphasise their role as service providers, but rarely do they expose the constraints faced by NGOs when they strive to empower people (Edwards and Hulme, 1996). The economic literature outlines the potential comparative advantages of nonprofits in the provision of public services relative to governments or for-profits (Hansmann, 1980; Hart and Moore, 1998; Besley and Ghatak, 2001a, 2005a). The literature dealing with the political economy of multilateral or bilateral foreign aid, can be traced back at least half a century (Fei and Paauw, 1965; Mosley, 1986; Boone, 1996; Acemoglu et al., 2003; Mekasha and Tarp, 2011). Studying the political economy of foreign aid when it is provided by private nonprofits is, however, a relatively recent endeavour (Fruttero and Gauri (2005); Barr and Fafchamps (2006); Fafchamps and Owens (2009); Aldashev and Verdier (2010); Brass (2012), Chapter 1).

The literature on aid efficiency typically models the problem of aid allocation as a principal–agent relationship between multilateral and bilateral donors (the principals) and recipient governments (the agents). In this context, the literature claims that aid conditionality and aid coordination are required to enhance the governance of recipient countries (Svensson, 2000; Azam and Laffont, 2003; Torsvik, 2005; Bourguignon and Platteau, 2012; Platteau et al., 2014). However, donors often lack credibility regarding their willingness to coordinate and enforce sanctions, which challenges the feasibility of this approach. Instead, many authors see in a bottom-up approach the most effective way towards improved governance (Easterly, 2007; Banerjee and Duflo, 2011b). Indeed, if donor countries cannot commit to demand governance improvements from the top, then they should design a way of increasing the bargaining power of the grassroots from the bottom. In order to do this, relying on the NGO sector appears as the most feasible alternative. In practical terms, the Busan Partnership legitimates NGOs as vital service providers and advocates of the poor, assigning them a double mission: to produce a tangible output that relieves poverty, and to advocate institutional change that grants new rights to the poor (Edwards and Hulme, 1996; Bebbington et al., 2008).

Our paper presents the first attempt at modelling NGOs when they carry out both advocacy efforts and service provision. In line with models of aid coordination, such as those of Platteau et al. (2014) and Torsvik (2005), we consider a setting with multiple donors and one government of a poor country. Their conclusion is that aid coordination

is always desirable for beneficiaries of aid, although it can be costly and even detrimental for donors. Focusing on the NGO sector brings about different conclusions. In our setting, too much coordination can be detrimental not only to donors, but also to beneficiaries. The main difference is that, unlike multilateral donors contracting with governments, NGOs operate in the field. This feature means that NGOs interact with the local population, must integrate local politics, and are constrained by the legislation of the host country.

The paper unfolds as follows. Section 3 sets and solves the basic model. Section 4 develops the model towards specifications in which NGOs are able to cooperate or have political preferences. Section 5 discuses the model in light of its policy implications. Section 6 concludes.

2.2 Basic Model

2.2.1 Set Up

Three types of players interact in this model. These are: the government of the host country (denoted G), the citizens it governs (C), and a set of N NGOs willing to operate in the country, indexed by $i = \{1, ..., n, .., N\}$. We assume that due to the atomistic nature of the NGO sector, N is arbitrarily high.

Actions of the players occur in the following sequence: the government chooses the number (n) of NGOs authorized to operate in the country ; once authorized, each NGO has to decide how much of its exogenous budget b_i it allocates between investing in providing services (s_i) and investing in advocacy (v_i); in the last step, citizens exposed to advocacy and aware of the existence of projects can engage in costly appropriation efforts (a), which allow them to obtain ownership over aid projects.

We define 'appropriation efforts' as any costly initiatives engaged by citizens, which allow them to discourage embezzlement by government officials. Appropriation efforts can take the form of protests, petitions, trials, votes for the opposition, or other similar endeavours. Citizens obtain ownership of a share $0 < \omega(a) \leq 1$ of aid projects s_i when they engage in a level of effort a. To make matters simple, specify ownership gain technology $\omega(a)$ as an isoelastic function up to a threshold $\tilde{a}$ such that

$$\begin{aligned} \omega(a) &= \kappa(1+a)^{\frac{1}{1+\rho}} \quad \text{if} \quad 0 < a < \tilde{a} \\ \omega(a) &= 1 \qquad\qquad\qquad\quad \text{if} \quad a \geq \tilde{a} \end{aligned}$$

with $\rho \geq 0$, $0 < \kappa \leq 1$ and $\tilde{a} = \kappa^{-(1+\rho)} - 1$. ρ measures the ability of the government to withstand appropriation efforts without having to make concessions. κ marks the baseline ownership level when there are no appropriation efforts. If at the baseline there is full ownership ($\kappa = 1$), then there is no room for appropriation gains. Ownership gains $\omega(a)$ are increasing and concave in a. The assumption of concavity guarantees that there is an interior solution for a, and reflects a process of gradual gain of ownership through more efficient appropriation efforts. A convex function would generate corner solutions (either $a = 0$ or $a = 1$), more suited to model civil conflict or government overthrows. In this paper, we maintain the focus on non-drastic changes.

The payoff function of the government writes

$$U^G = [1 - \omega(a)]\, s. \tag{2.1}$$

in which $s = \Sigma_i^N s_i$ is the aggregate amount of aid invested in development projects. The payoff of corrupt authorities increases with the amount of resources they can embezzle and reduces with level of appropriation efforts exerted by citizens. Appropriation efforts are costly, which we make explicit in the citizen's payoff function:

$$U^P = \omega(a)s - \frac{a}{v^\lambda} \tag{2.2}$$

in which $v = \Sigma_i v_i$ are the aggregate advocacy efforts provided by the NGO sector. Citizens benefit from the projects to the extent that they obtain actual ownership over them. They can increase their ownership through appropriation efforts, made cheaper by the NGO's advocacy input. Advocacy reduces the marginal cost of petitioning the government by providing informational, legal, political, or other types of intangible assistance. The intangible nature of these services makes them both simultaneously non-contractible and impossible to embezzle. The efficiency of advocacy efforts is variable and depends on how convincing the arguments of the NGO are, and on the degree to which beneficiaries are willing to listen. Parameter λ measures the ability of NGOs to mobilize appropriation efforts through advocacy, with low values denoting low responsiveness of citizens to campaigning.

The aforementioned payoff functions of both government and citizens are highly stylized in order to concentrate attention in the modelling of the NGO sector. In the benchmark case, the simplest payoff function for any NGO is

$$U_i^{NGO} = \omega(a)s_i \tag{2.3}$$

which it maximizes subject to the constraint $b_i = s_i + v_i$. In this simple case, an NGO cares about the size of its own project and on the degree of ownership of the project by its beneficiaries. While advocacy does not entail direct benefits, the NGO understands that it drives the appropriation efforts of the beneficiaries, which in turn makes the project more valuable. Through this section, we model NGOs as imperfectly altruistic: they only care about the well-being created by their own project, but not about the well-being created by the overall NGO sector. This assumption is relaxed in the extensions.

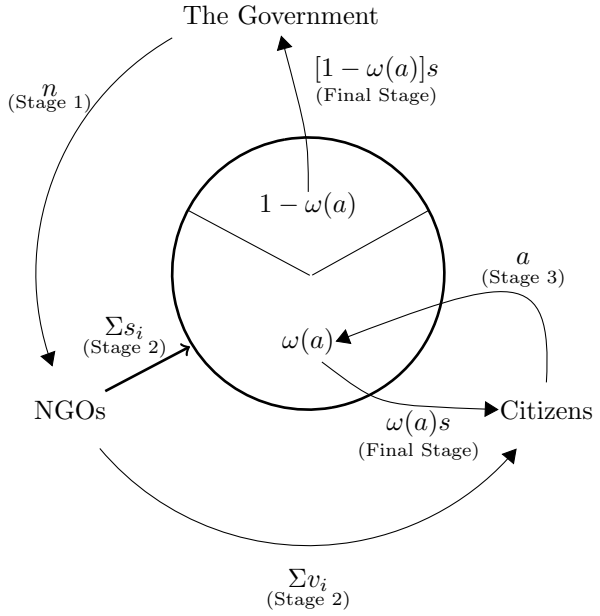

Figure 2.1: Timing of the model.

The timing of the game is simple; a three-stage, one-shot game is sufficient to derive our main results. In the first stage, the government knows the income distribution of all NGOs willing to enter the country and authorizes operations for n NGOs. In

the second stage, all authorized NGOs simultaneously allocate their budget between providing services (s_i) and investing in advocacy (v_i). At the last stage, citizens decide upon the effort they put into appropriating the projects (a). Finally, all players receive their payoff. This mechanism is schemed in Figure 2.1.

The choice of the number of players (NGOs) by the government or the continuous action space for NGOs makes the classic extensive-form representation of the game impractical to display, nonetheless we can easily solve it by backward induction and subgame perfect Nash equilibria.

2.2.2 Analysis

The model is solved by backward induction. At the last stage, $n \geq 1$ NGOs active in the country have invested $\Sigma_i b_i$ monetary units, of which $\Sigma_i s_i$ financed development projects, and $\Sigma_i v_i$ financed advocacy. Citizens choose the level of effort put into appropriating aid projects by solving the following program:

$$\underset{a}{\text{Max}} \quad \omega(a)\Sigma_i s_i - \frac{a}{(\Sigma_i v_i)^{\lambda}} \tag{2.4}$$

The first-order condition that optimizes this problem is $\omega_a(a^*)s = v^{-\lambda}$, in which $s = \Sigma_i s_i$, and $v = \Sigma_i v_i$. The isoelastic properties of $\omega(a)$ allow that

$$\omega_a(a) = \frac{\kappa}{1+\rho}\left[\frac{1}{1+a}\right]^{\frac{\rho}{1+\rho}} = \frac{\kappa^{1+\rho}}{1+\rho}\frac{1}{\omega^{\rho}}.$$

We can rewrite the citizens FOC as an equilibrium condition at the 3^{rd} stage

$$\omega(a) = max\left\{\kappa, \left[\frac{\kappa^{1+\rho}}{1+\rho}sv^{\lambda}\right]^{\frac{1}{\rho}}\right\}, \tag{2.5}$$

It is immediately obvious that ownership and appropriation efforts are increasing in both service provision and advocacy, with respective elasticities $1/\rho$ and λ/ρ.

At the second stage, each individual NGO solves the following maximization prob-

lem[1]:

$$\begin{cases} \underset{s_i,v_i}{\text{Max}} \quad \omega s_i & \\ s.t \quad b_i = s_i + v_i & \text{[Non-Distribution Constraint]}, \\ \omega = \left[\dfrac{\kappa^{1+\rho}}{1+\rho} s v^{\lambda}\right]^{\frac{1}{\rho}} & \text{[}3^{rd}\text{ stage equilibrium condition, (2.5)]}, \\ and \quad (s_j^*, v_j^*) \in \underset{s_j,v_j}{\text{argmax}}\, \omega s_j, \forall j \neq i & \text{[Best response of } n-1 \text{ NGOs]}. \end{cases}$$

where a^* and the case in which $a^* = 0$ are made implicit to alleviate notation. Solving the programme of the NGOs yields the following solution:

$$v^* = \frac{\lambda}{1+\lambda+n\rho} b \tag{2.6}$$

and

$$s^* = \frac{1+n\rho}{1+\lambda+n\rho} b. \tag{2.7}$$

in which $b = \Sigma_i b_i$ are the aggregated budgets.

Proposition 2.1 (Aggregate investments in service provision and advocacy) *If n NGOs are allowed to operate in the country, then*

1. *if advocacy and appropriation efforts have high returns, then NGOs invest a larger share of aid in advocacy;*
2. *if advocacy increases, then so do appropriation efforts;*
3. *if aid is fractioned, then NGOs free ride more on advocacy;*
4. *both advocacy and service provision monotonically increase with the number of NGOs.*

Proof The total derivative maximizing the objective function yields the following equilibrium condition:

[1] Akin to a budget constraint, the term non-distribution constraint is usually employed when referring to nonprofits since Hansmann (1980).

$$\frac{d\omega}{ds_i}s_i + \omega = 0 \Rightarrow \Sigma_{i=1}^{n}\left[\frac{d\omega}{ds_i}s_i + \omega\right] = 0 \Rightarrow \frac{d\omega}{ds}s + \omega n = 0$$

since $ds/ds_i = 1$. The logarithmic derivative of the 3^{rd} stage equilibrium condition (2.5) with respect to s yields

$$\rho\frac{d\omega}{ds}\frac{s}{\omega} = 1 + \frac{dv}{ds}\frac{s}{v} \tag{2.8}$$

By the non-distribution constraint, $dv/ds = -1$. Combing the two previous equations states the following second stage equilibrium condition:

$$\frac{v}{s} = \frac{\lambda}{1+n\rho} \tag{2.9}$$

Plugging this condition in the non-distribution constraint yields the desired solution. □

A fragmented aid sector makes advocacy prone to free riding because its benefit, improved governance, has the characteristics of a public good. Corrupt officials have thus an incentive to sow discord among NGOs, inducing them to free ride more on advocacy.

We can disaggregate the levels of advocacy and investment in projects at the individual level to display the second-stage subgame Nash equilibrium:

$$s_i^* = \frac{1+n\rho}{1+\lambda+n\rho}\bar{b}$$

and

$$v_i^* = b_i - \frac{1+n\rho}{1+\lambda+n\rho}\bar{b}$$

in which $\bar{b} = b/n$. Richer NGOs are willing to contribute more to advocacy, i.e. to the public good. As the average budget increases, so does the incentive to free ride on other contributors.

This result is standard in the theory of public goods, although not necessarily realistic in our context; in reality, politically motivated NGOs actively exert advocacy efforts, no matter how small they are. On the contrary, large NGOs can be timid militants. We address the question of political motivation in the next section.

Before looking at the optimization problem of the government, it is useful to show that free riding creates inefficiencies. Because we are concerned with the effectiveness of aid, our well-being criterion is the payoff function of the citizens only. We defend this choice with two arguments: (i) interests of NGOs should be aligned with those of their beneficiaries, so that the well-being of NGOs should be perfectly correlated with the well-being of citizens; and (ii) we care about ownership of aid. By adding the well-being of corrupt officials, we would care about absolute levels of aid, disregarding the issue of its distribution.

From the perspective of NGOs, the reaction function of the citizens, $\omega = s^{1/\rho} v^{\lambda/\rho}$, displays an inverse U-shaped relationship between advocacy and appropriation efforts, as shown in Figure 2.2. It reaches its maximum level when

$$v^{max} = \underset{v}{\text{argmax}}(\omega) = \frac{\lambda}{1+\lambda} b. \tag{2.10}$$

If the choices of NGOs result in corner solutions (all aid is invested in either projects or advocacy), there are no changes in appropriation efforts and ownership remains at a baseline $\omega(0)$. Intuitively, without advocacy efforts, there are no changes in appropriation efficiency, and without projects, there is no reason to change baseline appropriation efforts.

A low λ indicates that advocacy has little impact on the cost of appropriation efforts. This can happen because the message of the NGO is too weak or because beneficiaries are already highly organized and have little to gain from the NGO's input. Conversely, high returns of advocacy are most likely to occur when beneficiaries are disorganized and uninformed.

To compute the first-best level of advocacy, plug the FOC of the citizens back in to their payoff function. Evaluated at their optimized level, the utility of citizens is $U^C = \omega s \frac{\rho}{1+\rho}$.

Which yields the following optimal level of advocacy:

$$v^{op} = \frac{\lambda}{1+\lambda+\rho} b. \tag{2.11}$$

Proposition 2.2 (Free-ridding Inefficiency) *If the amount of aid that a country receives is fixed, then a single NGO should manage all of it.*

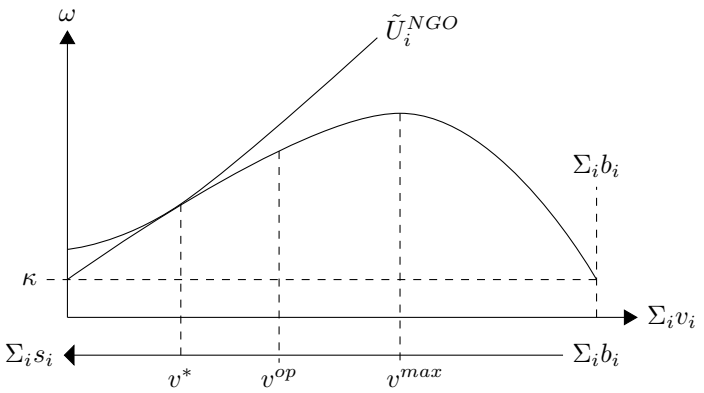

Figure 2.2: Levels of advocacy at the equilibrium, optimum, and maximum appropriation.

Proof The total derivative of the citizens payoff relative to s is $\dfrac{d\omega}{ds}s + \omega = 0$ Plugging in (2.8) yields

$$\frac{v}{s} = \frac{\lambda}{1+\rho}$$

Combining this with the non-distribution constraint yields the desired solution. □

Figure 2.2 plots this optimum over the reaction function of the citizens. An indifference curve shows the optimal decentralized choice of an NGO when the sector is competitive.

The equilibrium choice of the NGO is the tangency point between its indifference curve and the reaction function of citizens. As fragmentation increases among NGOs, each will chose lower levels of advocacy, drifting away from the optimal monopolistic situation. Advocacy levels that maximize appropriation efforts are not optimal either, unless these efforts are efficient in achieving ownership (if ρ is low). Otherwise, when intents of gaining ownership have no real effect due to the tight grip of the authorities, encouraging appropriation is wasteful. Next, we close the model by solving the problem of rent-seeking officials.

Turn now to the first stage. To alleviate notation, we drop the asterisk from equilibrium values v^* and s^*. Likewise, and without loss of generality, we assume continuity of the number of NGOs, imposing the restriction that, if allowed to operate, there should be at least one (i.e. $n \in [1, \infty[$). If the government could contract the advocacy content of aid, it would fix it to zero. However, this contract is unenforceable, because

it is too demanding to monitor and to disentangle what part of aid is a service and which is nurturing political leadership. From the point of view of the authorities, the only observable variable is the presence or not of NGOs, given that they deliver the authorizations to operate. The program of the government is

$$\begin{cases} \underset{n}{\text{Max}} & (1-\omega)s \\ s.t & \bar{b}n = v + s, \qquad \text{[Aggregated Non-Distribution Constraints]}, \\ & \omega = \left[\dfrac{\kappa^{1+\rho}}{1+\rho} s v^{\lambda}\right]^{\frac{1}{\rho}} \qquad [3^{rd} \text{ stage equilibrium condition, (2.5)}], \\ and & \dfrac{v}{s} = \dfrac{\lambda}{1+n\rho} \qquad [2^{nd} \text{ stage equilibrium condition, (2.9)}]. \end{cases}$$

Because $s(n)$ is a bijective and monotonically increasing function of n, solving this problem is akin to choosing the optimal s for the government. The first order condition expressed in terms of the total derivative of the objective function with respect to s is

$$1 - \omega = \frac{d\omega}{ds} s. \tag{2.12}$$

This equilibrium condition states that the marginal benefit of allowing one additional unit of service provision (the captured share $1-\omega$ of that unit) must equal the marginal cost of having the beneficiaries' share improve. To obtain a more explicit expression of the right-hand side of this equation, take logarithmic derivative of the third stage equilibrium condition with respect to s:

$$\frac{d\omega}{ds}\frac{s}{\omega} = \frac{1}{\rho}\left[1 + \lambda \frac{dv}{ds}\frac{s}{v}\right] \tag{2.13}$$

The second term inside the square brackets is proportional to the elasticity of advocacy to services provision.

Lemma 2.1 *The elasticity of advocacy to services provision is*

$$\varepsilon = \frac{dv}{ds}\frac{s}{v} = \frac{1}{1 + \frac{1}{\frac{1}{\rho n} + \frac{\lambda}{1+\lambda+\rho n}}} \tag{2.14}$$

In which $\varepsilon \in [0, 1]$ *decreases in* n *and* ρ *and increases in* λ*, with* $\lim_{n\to 0} \varepsilon(n) = 1$ *and* $\lim_{n\to\infty} \varepsilon(n) = 0$.

The appendix proves this statement. To each percentage increase of service provision, there is an increase in advocacy, which is marginally declining as the free riding problem aggravates. Combining (2.12), (2.13) and (2.1) obtains the 1^{st} stage equilibrium condition:

$$1 - \omega = \frac{1 + \lambda\varepsilon}{1 + \rho + \lambda\varepsilon} \tag{2.15}$$

Denote the left-hand side $MB(n)$ for marginal benefit and the right-hand side $MC(n)$ for marginal cost. $MB(n)$ and $MC(n)$ are non-increasing, and as a result of continuity and their limit conditions, are single-crossing if the following condition holds:

$$\frac{\rho}{1 + \rho + \lambda} > \kappa \tag{2.16}$$

This condition states that the government will allow NGOs only if it can withstand appropriation efforts with ease, if the baseline ownership by beneficiaries is low, and if advocacy has sufficiently low returns. Figure 2.3 plots both functions and the equilibrium condition. Marginal costs are declining due to the free riding properties of our problem: allowing more NGOs increases ownership, but in a marginally declining manner.

Let $MU(n) = MB(n) - MC(n) = 0$ be the marginal payoff of n. Table 2.1 summarizes the sign of the partial derivatives of functions $MB(n)$ and $MC(n)$ for any n. The appendix details these computations. In line with proposition 1, the parameters that increase the share of total aid devoted to service provision increase the marginal benefits and reduce the marginal costs for the government.

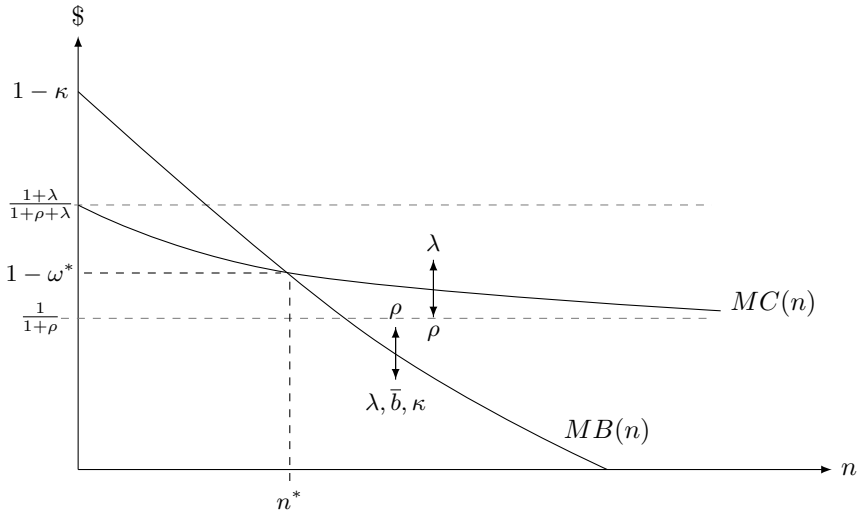

Figure 2.3: Marginal Benefits and Costs of allowing one additional unit NGO

	$\partial MB(n)$	$\partial MC(n)$	$\partial MU(n)$
$\partial\rho$	$+$	$-$	$+$
$\partial\lambda$	$-$	$+$	$-$
$\partial\overline{b}$	$-$	0	$-$
$\partial\kappa$	$-$	0	$-$

Table 2.1: Partial derivatives for $MB(n)$ and $MC(n)$ function.

Proposition 2.3 (Number of NGOs allowed by the Government) *If condition (2.16) holds, the authorities cannot observe each individual NGO's income, and cannot contract advocacy content, then they will deliver a unique number of permits n^*, which maps a unique level of services s^*. The number of NGOs allowed will increase if*

1. *NGOs' advocacy has low returns,*
2. *appropriation efforts have low returns,*
3. *agencies are poorer on average, and*
4. *baseline ownership is low.*

Proof Notice that at the crossing point $\partial MC(n^*)/\partial n > \partial MB(n^*)/\partial n$. By implicit derivation and using the partial derivatives stated above:

$$\frac{dn^*}{d\lambda} = -\frac{\partial MU(n^*)/\partial\lambda}{\partial MU(n^*)/\partial n^*} < 0 \; ; \quad \frac{dn^*}{d\rho} = -\frac{\partial MU(n^*)/\partial\rho}{\partial MU(n^*)/\partial n^*} > 0 \; ;$$

$$\text{and} \quad \frac{dn^*}{d\bar{b}} = -\frac{\partial MU(n^*)/\partial\bar{b}}{\partial MU(n^*)/\partial n^*} < 0. \qquad \square$$

The results provided in proposition 3 are quite intuitive. The government will be more tolerant of the NGO sector if it does not consider it a threat. The model predicts that areas under tight grip by corrupt authorities, or where NGOs have little influence, will host more NGOs, which will have high incentives to free ride on each other.

Corollary 2.1 *In a regime under which the government has a tight control on the access of NGOs, beneficiaries are better off when the government does not feel its rents threatened by the NGO sector.*

Figure 2.3 shows that parameters increasing the share of aid devoted to services shift the $MB(s)$ curve upwards, and shift the $MC(s)$ curve downwards. Because both curves are positively sloped and single crossing, it is easy to see that parameters making aid more service-intensive increase the equilibrium number of NGOs, and increase the level of ownership by beneficiaries. Disturbingly, beneficiaries are better off with a government untroubled by the actions of the NGO sector.

Corollary 2.2 *If the government has more information on NGOs, it will deliver more permits and extract larger rents. This slightly increases governance, and improves the overall well-being of beneficiaries.*

The model makes the simplistic assumption that the number of permits n is the only strategy available to the government. Other observable characteristics of NGOs can allow the government to expand its strategy set: incomes, activities in other countries, reputation, and so on, are signals correlated with political engagement. If the government knows the distribution of these correlated signals, it can set threshold values such that it will not authorize any NGO above them. If the threshold monotonically changes with n, then choosing it is equivalent to fixing a certain number of admissions. For instance, we saw that richer NGOs are more likely to be politically active. Then, the government will not admit any NGO richer than a threshold budget $\check{b}(n^*)$ in the

income distribution. The comparative statics from λ and ρ on the threshold are thus known. We have

$$\frac{d\check{b}(n^*)}{d\lambda} = \frac{d\check{b}(n^*)}{dn^*}\frac{dn^*}{d\lambda} < 0 \text{ and } \frac{d\check{b}(n^*)}{d\rho} = \frac{d\check{b}(n^*)}{dn^*}\frac{dn^*}{d\rho} < 0.$$

The government will allow richer NGOs in areas where they are less influential or where appropriation efforts are less effective. Notice that, by fixing such thresholds, allowed NGOs are poorer on average, which shifts the $MB(n)$ curve upwards, increasing the number of NGOs allowed, total service provision, and slightly improving ownership. If the authorities can perfectly observe the income of NGOs, this improves the situation of both beneficiaries and authorities.

2.3 Extensions of the Model

In the previous section, we assumed that NGOs take their decisions independently and selfishly. In reality, NGOs often try to coordinate through non-binding contractual arrangements, for example by signing the Istanbul Declaration (Istanbul Principles, 2011). By lacking any kind of enforcement, these documents usually remain vague agreements on common values[2]. In this section, we explore how changes in the objective functions of NGOs affect the wellbeing of target populations.

In order to do this, we apply our model to two different objective functions: first, NGOs give different weights to recipient's ownership relative to the size of their project; second, NGOs form partnerships among each other. We show that these objective functions do not improve the welfare of beneficiaries.

2.3.1 Focusing on Recipient's Ownership

First, consider the case where some NGOs decide to focus more citizen's ownership. In this case, NGOs give more weight to overall beneficiaries' appropriation relative to the focus put on the success of their own project. Each individual NGO has the following objective function:

[2]If these agreements where enforceable, then they should be studied through coalitional game theory. In our model, unilateral deviation is always profitable: NGOs find it always individually beneficial to free ride on other's advocacy. Under these circumstances, coalitional rationality is violated (Maschler et al., 2013).

$$\omega^{\frac{1}{\phi_i}} s_i$$

in which $1/\phi_i$ measures NGO i's focus on citizens' ownership. If $\phi_i = 1$, we are in the benchmark model. The NGO, quite pragmatically, cares about how much of the service provision it finances do beneficiaries actually own. When ϕ_i tends toward zero, on the contrary, the NGO focuses mainly in improving ownership, at the cost of pulling resources away from service provision. If, on the contrary, ϕ_i tends toward infinity, then the NGO is unconcerned with appropriation: what matters to it is to report large expenditures in service provision, whether end-line beneficiaries appropriate them or not.

Using the same resolution method than in the previous section, we obtain:

$$v^* = \frac{\lambda}{1 + \lambda + \rho n \overline{\phi}} b \tag{2.17}$$

and

$$s^* = \frac{1 + \rho n \overline{\phi}}{1 + \lambda + \rho n \overline{\phi}} b \tag{2.18}$$

where $\overline{\phi} = \frac{1}{n} \sum_{i=1}^{n} \phi_i$ is the average weight put on ownership. At the individual level, we have

$$s_i = \frac{\phi_i}{\overline{\phi}} \frac{\lambda}{1 + \lambda + \rho n \overline{\phi}} \overline{b}$$

and

$$v_i = b_i - \frac{\phi_i}{\overline{\phi}} \frac{\lambda}{1 + \lambda + \rho n \overline{\phi}} \overline{b}.$$

Results are as expected. NGOs more focused on ownership dedicate more time to advocacy. The description that we get of the NGO sector is now richer: the emphasis put on ownership by all other NGOs determines the relative effort devoted to advocacy for any single NGO. For example, if an NGO is pragmatic, in the sense that it cares only about the efficiency of its own project ($\phi_i = 1$) and if around it all other NGOs are unconcerned with ownership, then it will have to exert more effort in advocacy despite the fact that this action in not in its initial orientation.

Recall by proposition 2 that the free-ridding problem disappears when

$$v^{OP} = \frac{\lambda}{1+\lambda+\rho} b$$

In our framework, it is easy to find that NGOs can avoid the free riding problem if

$$\overline{\phi}^{*} = \frac{1}{n}. \tag{2.19}$$

Once n NGOs are allowed, NGOs willing to make aid more efficient should optimally increase the overall focus on ownership when the sector is more fractioned. Donors might frown upon NGOs focusing 'too much' on ownership, taking it as naive idealism. However, this naiveté can improve interim efficiency (after admission of n NGOs) to a certain extent because it allows counterbalancing free riding inefficiencies.

2.3.2 NGOs form partnerships

Assume now that NGOs decide to establish partnerships among each other. To make this simple, suppose that the objective function of any NGO becomes

$$\omega \left(s_i + \gamma \sum_{j \neq i} s_j \right)$$

in which γ denotes the weight that NGOs give to the projects all other NGOs. If $\gamma = 1$, an NGO gives as much importance to its own project as to the sum of all other projects. By proceeding by the same method used in the previous section, at equilibrium we obtain

$$\Leftrightarrow v^{*} = \frac{\lambda}{1+\lambda+\rho\frac{n}{1+\gamma(n-1)}} b \tag{2.20}$$

and

$$s^{*} = \frac{1+\rho\frac{n}{1+\gamma(n-1)}}{1+\lambda+\rho\frac{n}{1+\gamma(n-1)}} b. \tag{2.21}$$

The greater the weight attached to the projects of others, the more an NGO invests in advocacy. Free riding in advocacy is diminished by giving to service provision the characteristics of a public good as well: NGOs start free riding on service provision too. Because they are subject to a non-distribution constraint, the result is that the proportion spent in each activity evens out. The optimal level of campaigning provided

in (13) is reached when

$$\gamma^* = 1 \tag{2.22}$$

In words, if NGOs fully internalize the performance of all other NGOs, then the free riding problem disappears.

Both principles, focusing more on ownership and forming partnerships among NGOs, make the social optimum attainable at the second stage of the game. However, if the authorities anticipate that the adoption of these principles threatens their rents, then they will update their optimal level of delivered authorizations.

The appendix details how the $MB(n)$ and $MC(n)$ curves shift following changes of $\overline{\phi}$ and γ, summarized in table 2.2.

	$\partial MB(n)$	$\partial MC(n)$	$\partial MU(n)$
$\partial\gamma$	$-$	$+$	$-$
$\partial\overline{\phi}$	$+$	$-$	$+$

Table 2.2: Partial derivatives for $MB(n)$ and $MC(n)$ function.

Proposition 2.4 (Anticipation by the Government) *If a rent-seeking authorities anticipate that NGOs will adopt principles committing them to reduce free riding in advocacy, then they will reduce the number of NGOs authorized to operate in the country.*

Proof Identical to the proof of proposition 3, we obtain by implicit differentiation of $MU(n^*)$

$$\frac{dn^*}{d\overline{\phi}} = -\frac{\partial MU(n^*)/\partial\overline{\phi}}{\partial MU(n^*)/\partial n^*} > 0; \text{and} \quad \frac{dn^*}{d\gamma} = -\frac{\partial MU(n^*)/\partial\gamma}{\partial MU(n^*)/\partial n^*} < 0. \quad \square$$

Figure 2.4 displays how the marginal benefit-marginal cost curves change following attempts to reduce free riding inefficiencies[3]. Because both curves shift in opposite directions, and are downward-sloping and single-crossing, trying to reduce free riding (by either increasing γ or decreasing $\overline{\phi}$) shifts the equilibrium point to the north-west. The effect is such that even if appropriation efforts become cheaper, the reward of appropriation reduces; the net effect is that appropriation efforts become less valuable.

[3]Recall that s is a bijective increasing function of n.

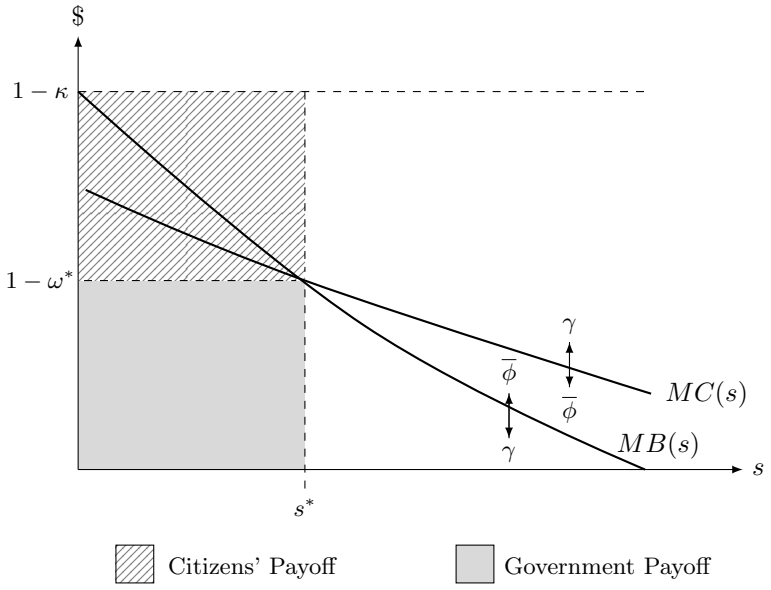

Figure 2.4: Attempts to reduce free-riding reduce the well-being of beneficiaries.

Corollary 2.3 *If corrupt authorities regulate the access of NGOs and anticipate efforts to reduce free riding inefficiencies, then the welfare of citizens diminishes when NGOs attempt to reduce free riding. The second-best optimum is obtained when the NGO sector is uncoordinated, and unconcerned with governance. This is*

$$\gamma^{**} = 0 \quad \textit{and} \quad \overline{\phi}^{**} = \infty$$

By (2.19) and (2.22), it is impossible to maximize the welfare of beneficiaries and to wipe out free riding in advocacy simultaneously.

This negative result depends on the fact that the authorities perfectly anticipate that NGOs will coordinate their efforts. Authorities optimize the number of permits depending on the expected value of ϕ. In the next subsection, we explore how results change when the authorities can perfectly observe the degree at which each NGO focuses on ownership.

2.3.3 Complete information

Suppose there exist two types of NGOs with parameters $\phi_h > \phi_l$ among the N NGOs willing to enter the country. Let $n_h + n_l = N$ define the size of each group, and as before denote $\overline{\phi}$ the average lack of interest in ownership. By definition of an average $\phi_h > \overline{\phi} > \phi_l$. If the authorities can perfectly observe the types, they first allow all high-type NGOs and optimize $n(\phi_h)$; if the optimal $n^*(\phi_h) \leq n_h$, then only high type NGOs are allowed. In this scenario, and by proposition 4, since allowed NGOs are less politicized, more of them are allowed and beneficiaries' ownership increases slightly.

If $n^*(\phi_h) \leq n_h$ does not hold, the authorities will deliver permits to all high-type NGOs and allow a few low-type NGOs in. The $MB(n)$ and $MC(n)$ curves will display a kink at n^h with the property that

$$\frac{\partial MB(n)}{\partial \phi_h} \geq \frac{\partial MB(n)}{\partial \overline{\phi}} \geq \frac{\partial MB(n)}{\partial \phi_l}$$

$$\frac{\partial MC(n)}{\partial \phi_h} \leq \frac{\partial MC(n)}{\partial \overline{\phi}} \leq \frac{\partial MC(n)}{\partial \phi_l}$$

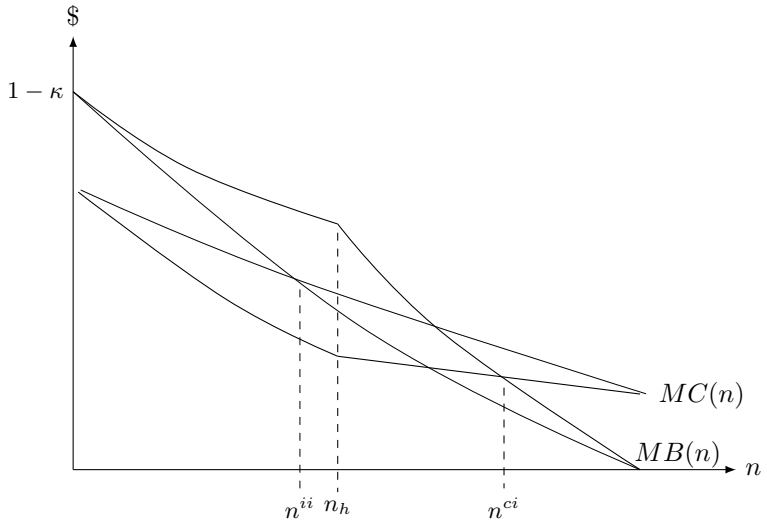

Figure 2.5: Complete versus incomplete information on the types of NGOs

Figure 2.5 plots the $MB(n)$–$MC(n)$ functions and the optimal number of permits delivered under complete and incomplete information. Under complete information,

initially marginal benefits are higher and and marginal costs are lower than in the incomplete information case because only high types are allowed in. If there are rents that can still be appropriated after all high types are allowed, authorities will allow a few low types, which rapidly decrease marginal benefits and increase marginal cost for the authorities. At limit conditions (if all N NGOs willing to enter are allowed or if there are no NGOs) complete and incomplete information yield the same costs and benefits.

Corollary 2.4 *The number of NGOs allowed under complete information (n^{ci}) is larger than the number of permits delivered under incomplete information (n^{ii}). Welfare of the beneficiaries improves when authorities have complete information.*

This result is in line with corollary 2. Denote $\underline{\phi}$ the average depoliticization under complete information. By choosing all high types, it follows that $\underline{\phi} n^{ci} \geq \overline{\phi} n^{ii}$. Comparing the advocacy to service provision ratio (v/s) in both regimes we obtain:

$$\frac{\lambda}{1+\underline{\phi} n^{ci}} < \frac{\lambda}{1+\rho n \overline{\phi}}$$

Asymmetries of information increase the advocacy content of aid, partially attenuating the free riding inefficiency. However, because this makes the authorities shrink the NGO sector too much, beneficiaries are overall better off when authorities have complete information despite the fact that free riding issues are exacerbated.

2.4 Discussion

The recent surge in the number of development NGOs justify our assumptions on the atomicity of the sector, substantiating our representation of NGOs as agents, and host governments as principals. Competition among NGOs reduces their bargaining power in front of host governments, akin to what occurs in markets. NGOs will deliver aid as long as their participation constraint is satisfied: although, in the model, we normalize the outside option to zero, in reality outside options are such that host governments do not have to worry about attracting NGOs. Additionally, many NGOs perceive providing inefficient aid as an improvement over not providing aid at all: NGOs will enter the country if host countries give them the opportunity. By the late 1990's, donors saw in the provision of services by NGOs an insufficient mean of promoting

development. Poverty-alleviating services were only treating the symptoms, not the causes, of structural poverty; NGOs agreed that institutional change was required to achieve effective long-run development (Mansuri and Rao, 2012). Institutional change meant advocating for new rights for the poor, and curtailing privileges of the ruling elite. This shift toward advocacy was easier said than done: it bore the risks of confronting the local authorities, of frightening donors concerned with diplomatic affairs, and required substantial coordination efforts among NGOs, in particular to agree upon a shared vision of institutional change. Even when NGOs overcome these institutional barriers, advocacy might not have the hoped influence on the local population. The message might be too weak, or too unconvincing, or outright wrong in the eyes of beneficiaries. For example, Boulding and Gibson (2009) finds that NGOs are conductive of political change in small and poor municipalities in Bolivia, which are politically disorganized, but not in larger, richer municipalities, in which trade unions and political parties out noise NGOs. The sensitivity to the message is captured in the model by parameter λ. Even if people are willing to listen, fear of repressive governments may deters civilians from demanding new rights. Among several examples, one could quote the assassination of 17 local workers of Action Contre la Faim (a French NGO) by the Sri Lankan military in 2006 (The Independent, 2006). The repressive capacity of the state is captured by parameter ρ.

Changing institutional arrangements injures the privileges of the established elite. In the model, the conflict of interests arising between the elite and intended beneficiaries over aid resources is very stylized. In it, the elite steal whatever beneficiaries do not appropriate. This exaggeration impersonates more subtle phenomena of embezzlement: nongovernmental aid reduces demands for accountability addressed to the state, redirecting public funds toward private interest; procedures in situ can impose that third part-contracts, for instance in construction, are procured by fraudulent enterprises; or corrupt officials might outright extort and blackmail NGO workers. A frequent practice is that local bureaucrats organize schemes to purchase alimentary aid at subsidized prices to resale it at market prices (Centre Français de Recherche sur le Renseignement, 2007). Another way in which authorities can extract rents from nongovernmental aid is by allowing them to operate only where they will be less effective. A collective of NGOs operating in Zambia denounced the adoption of a bill prohibiting NGOs from operating in certain domains and geographical regions (Freedom House, 2014). The model predicts

that governments will permit NGOs where they will be unable to promote institutional change, in line with what NGOs operating in Zambia fear. Similar stringent laws were adopted in Russia (The Economist, 2013), Venezuela (Human Rights Watch, 2013) and Egypt (The Guardian, 2010), among others. NGOs understand that coordination efforts can improve their prospects of achieving institutional change, by increasing their bargaining power. The intent of NGOs is to integrate in the debate at the High Level For a on aid effectiveness. In 2011, an Open Forum for Civil Society Organizations adopted the Istanbul Principles (2011), which is a list of eight commitments addressed at improving the efficiency of nongovernmental aid. In the model, we explore how the adoption of such principles would affect the wellbeing of target populations. We apply our model to two principles: first, NGOs are encouraged by the principles to 'focus on citizens' ownership' (parameter ϕ); second, NGOs are called to 'pursue partnerships with other NGOs' (parameter γ). We show that the strict adherence to these principles does not necessarily improve the welfare of beneficiaries, because full coordination will reduce the incentives of host governments to deliver permits to NGOs. Donor states have the political grit to ask from recipient countries adequate regulation of the NGO sector. German Chancellor Angela Merkel appealed Russian president Vladimir Putin to 'give NGOs a chance', following the crackdown of the sector in 2013; this appeal remains unheard (Al Jazeera, 2013).

2.5 Conclusion

In this paper, we develop a model of the political economy of nongovernmental organizations. We focus in the case in which NGOs deliver foreign aid in weakly institutionalized countries. In a game-theoretical framework, players are a large number of heterogeneous NGOs, the government of a developing country, and the people living in this country. NGOs can take two actions: they provide poverty-alleviating services, and they advocate the rights of the poor. Advocacy encourages beneficiaries to demand better accountability to their government. Because the benefits of advocacy have the characteristics of a public good, advocacy will be typically under-provided. NGOs can remedy the problems of free riding by increasing efforts in coordination. However, these efforts threaten the rents of corrupt officials, who will respond by cracking down on the operations of NGOs. The costs of this crackdown can outweigh the benefits from

investing in advocacy, turning a situation where no one free rides in advocacy into an undesirable outcome.

We strongly stylize the behaviour of the government and the local population to focus on the NGO sector. The assumption that all government officials are pure rent-seekers, or that the local population is a monolithic decision-taking unit are certainly unrealistic. However, by presenting a reduced-form optimization program for the local population and for the government, we are able to elaborate further on the constraints and strategies adopted by NGOs while maintaining analytical tractability.

Results of our model suggest that proponents of a bottom-up approach to development should not go too far in dismissing the role of multilateral and bilateral donors (Easterly, 2007; Banerjee and Duflo, 2011b). While merits of NGOs in the field can be plentiful, they require an enabling environment allows their initiatives to thrive, while their actions are legitimately and democratically monitored. Bilateral and multilateral donors have the diplomatic and economic power capable of demanding that such enabling environment is set in place.

2.6 Appendix

Proof of Lemma 2.1 Replace the value of n in (2.9) by its non-distribution constraint value $n = (s+v)/\overline{b}$. This yields

$$\lambda \frac{v}{s} = 1 + \rho(s+v)/\overline{b} \tag{2.23}$$

Implicit differentiation of v by s and multiplication by s/v obtains:

$$\varepsilon = \frac{dv}{ds}\frac{s}{v} = \frac{\lambda\frac{v}{s} - \frac{\rho}{\overline{b}}s}{\lambda\frac{v}{s} + \frac{\rho}{\overline{b}}v}$$

Plugging back in (2.23) gives

$$\varepsilon = \frac{1 + v\rho/\overline{b}}{1 + v\rho/\overline{b} + b\rho/\overline{b}}$$

which easily reduces to the desired equation using (2.6). □

Comparative statics of the $MB(n)$ and $MC(n)$ curves holding n constant.

We provide the comparative statics for the full model, i.e including parameters $\overline{\phi}$ and γ included in the extensions. This addition does not affect the comparative statics of the basic model and diminishes redundant computations. In the second stage Nash equilibrium we obtain:

$$s^* = \frac{1+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}{1+\lambda+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}\overline{b}n \text{ and } v^* = \frac{\lambda}{1+\lambda+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}\overline{b}n$$

2.6.1 Comparative statics for $MB(n) = 1-\omega$

Taking the logarithm of the third stage equilibrium condition (2.5) we obtain

$$ln(\omega) = \frac{(1+\rho)ln(\kappa) + ln(s) + \lambda ln(v) - \ln(1+\rho)}{\rho}$$

.

Partial derivatives yield

$$\nabla\omega(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \frac{1}{\rho}\left[\begin{pmatrix} \frac{ds}{d\rho}\frac{1}{s}+\lambda\frac{dv}{d\rho}\frac{1}{v} \\ \frac{ds}{d\lambda}\frac{1}{s}+\lambda\frac{dv}{d\lambda}\frac{1}{v} \\ \frac{ds}{d\overline{b}}\frac{1}{s}+\lambda\frac{dv}{d\kappa}\frac{1}{v} \\ \frac{ds}{d\kappa}\frac{1}{s}+\lambda\frac{dv}{d\overline{b}}\frac{1}{v} \\ \frac{ds}{d\gamma}\frac{1}{s}+\lambda\frac{dv}{d\gamma}\frac{1}{v} \\ \frac{ds}{d\overline{\phi}}\frac{1}{s}+\lambda\frac{dv}{d\overline{\phi}}\frac{1}{v} \end{pmatrix} + \begin{pmatrix} ln(\kappa)-\frac{1}{1+\rho}-ln(\omega) \\ ln(v) \\ 0 \\ (1+\rho)/\kappa \\ 0 \\ 0 \end{pmatrix}\right]$$

By $\overline{b}n = s+v$:

$$\nabla\omega(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \frac{1}{\rho}\left[\left(\frac{1}{s}-\lambda\frac{1}{v}\right)\begin{pmatrix} \frac{ds}{d\rho} \\ \frac{ds}{d\lambda} \\ \frac{ds}{d\overline{b}} \\ \frac{ds}{d\kappa} \\ \frac{ds}{d\gamma} \\ \frac{ds}{d\overline{\phi}} \end{pmatrix} + \begin{pmatrix} ln(\kappa)-\frac{1}{1+\rho}-ln(\omega) \\ ln(v) \\ 0 \\ (1+\rho)/\kappa \\ 0 \\ 0 \end{pmatrix}\right]$$

By $\dfrac{s}{v} = \dfrac{1+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}{\lambda}$

$$\nabla\omega(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \frac{1}{\rho}\left[-\frac{\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}{s}\begin{pmatrix}\frac{ds}{d\rho}\\ \frac{ds}{d\lambda}\\ \frac{ds}{d\overline{b}}\\ \frac{ds}{d\kappa}\\ \frac{ds}{d\gamma}\\ \frac{ds}{d\overline{\phi}}\end{pmatrix} + \begin{pmatrix} ln(\kappa) - \frac{1}{1+\rho} - ln(\omega)\\ ln(v)\\ 0\\ (1+\rho)/\kappa\\ 0\\ 0\end{pmatrix}\right]$$

By $\omega(a) = \kappa(1+a)^{\frac{1}{1+\rho}}$

$$\nabla\omega(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \frac{1}{\rho}\left[-\frac{\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}{s}\begin{pmatrix}\frac{ds}{d\rho}\\ \frac{ds}{d\lambda}\\ \frac{ds}{d\overline{b}}\\ \frac{ds}{d\kappa}\\ \frac{ds}{d\gamma}\\ \frac{ds}{d\overline{\phi}}\end{pmatrix} + \begin{pmatrix} -\frac{1}{1+\rho}(ln(1+a)+1)\\ ln(v)\\ 0\\ (1+\rho)/\kappa\\ 0\\ 0\end{pmatrix}\right]$$

By $s^* = \dfrac{1+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}{1+\lambda+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}\overline{b}n$

$$\nabla\omega(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \begin{bmatrix}<0\\ >0\\ >0\\ >0\\ >0\\ <0\end{bmatrix} \Rightarrow \nabla MB(\rho,\lambda,\overline{b},\kappa,\gamma,\overline{\phi}) = \begin{bmatrix}>0\\ <0\\ <0\\ <0\\ <0\\ >0\end{bmatrix}$$

□

2.6.2 Comparative statics for $MC(n) = \dfrac{1+\lambda\varepsilon}{1+\rho+\lambda\varepsilon}$

Proceeding like in the proof of lemma 2.1, we obtain the elasticity for the general case

$$\varepsilon = \frac{1}{1 + \frac{1}{\frac{1}{\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}} + \frac{\lambda}{1+\lambda+\rho\overline{\phi}\frac{n}{1+\gamma(n-1)}}}}$$

The denominator in the second term of the denominator decreases in ρ and $\overline{\phi}$, and increases in γ. ϵ moves in the same direction. It is easy to verify that:

$$\nabla MC(\rho, \lambda, \overline{b}, \kappa, \gamma, \overline{\phi}) = \begin{bmatrix} < 0 \\ > 0 \\ 0 \\ 0 \\ > 0 \\ < 0 \end{bmatrix}$$

□

Chapter 3

Encouraging Private Ownership of Public Goods: Theory and Evidence from Belgium

Joint work with Gani Aldashev, Franǫis Libois, and Astrid Similon.

Abstract

We study short-run and long-run effects of a government subsidy to private non-profit ownership of public good projects. In a simple model, we show that the subsidy increases the prices of project assets in the short run; however, the effect does not persist and prices decline in the long run. This happens because the subsidy temporarily relaxes the resource constraint of non-profit organizations, which allows them to engage in supply-expanding activities. We test this prediction using a unique dataset that we have constructed from Belgian notarial land-transaction records and exploiting a policy reform in public subsidies for land purchases by non-profits aiming at creating privately-owned natural reserves. Using the MS-estimation method (Maronna and Yohai, 2000) robust to outliers, we also provide a methodological contribution to the analysis of markets with quasi-donations.

Keywords: non-profit organizations; public goods; fundraising; land markets; protected areas; conservation.

JEL codes: L3, Q2, L22, H41, N5

3.1 Introduction

Non-profit organizations are key providers of public goods in modern economies. 67 per cent of in-patient hospitals in the United States are non-profits, and so are all orchestra and opera theatres in the United Kingdom and Japan (Bilodeau and Steinberg, 2006).

In the OECD countries, on average, 7.5 per cent of economically active population is employed in the non-profit sector, and for some countries (Belgium, Netherlands, Canada, U.K., Ireland) this share exceeds 10 per cent (Salamon, 2010). Non-profits provide public goods in such diverse sectors as education, health, environment, social protection, arts and culture, and human rights. The key issue is, therefore, whether non-profit provision (and ownership of key assets used in provision) of public goods is socially desirable. The seminal paper by Besley and Ghatak (2001b) provides the first answer to this question: they argue that the ownership of such assets should be given to the party (i.e. to the government or to the non-profit organization) that has the highest valuation of the public good, regardless whose investment increases more the value of the public-good project.

However, this general normative analysis does not provide guidance about *how* the transfer of ownership of public goods to non-profits (in case these have the highest valuation) should be organized. This is a fundamental policy question, given that governments dispose of a rich set of tools that can affect the incentives for the non-profit ownership of assets used for public good provision. These tools include, among others, subsidies for purchase of assets from private holders, direct grants to non-profits, tax exemptions to private sellers, etc. Designing an effective policy requires, first of all, understanding - theoretically and empirically - the effects of such policies on the behaviour of non-profits and the outcomes on the asset markets. Economists' current knowledge in this area is extremely limited, in particular, at the level of a market. Insights from standard microeconomic analysis of markets provide only limited answers, given that nonprofits possibly react to financial incentives in ways which are systematically different from those of their for-profit counterparts.

A crucial difference between for-profit and non-profit organizations is that nonprofits are legally barred from redistributing profits. This "non-distribution constraint" first formally introduced by Hansmann (1980), is at the heart of some of the main particularities of the non-profit sector. Non-profits are predominant in the provision of goods characterized by a high non-contractible quality content, such as health, the arts, or biodiversity (Kuan, 2001; Thornton et al., 2008). Asymmetries of information make most for-profits unreliable in the delivery of these goods characterized by unmeasurable quality. Thus, users prefer to rely on organizations whose members are motivated by something else than profit maximization. Non-profits have instead "missions", which

usually differ between organizations: each has a particular appraisal of the quality form and content that should be embedded in the public good they provide. Given this heterogeneity, missions can more or less accurately mirror the preferences of donors. Nonprofits can improve the matching of their mission with the donor's preferences by either adapting their mission, or by persuading donors of the soundness of it (Rose-Ackerman, 1982; Aldashev and Verdier, 2010).

In this paper, we evaluate the short-run and long-run effects of a government subsidy to non-profit ownership of assets used in public-good projects. We first develop a dynamic model of a market for assets populated by competing non-profits. The market is decentralized and finding each new potential asset requires some search (prospecting) efforts by the nonprofit. The nonprofit can persuade, at a cost, sellers into contributing to the mission by either donating or accepting a lower payment for the asset they sell. A good performance by a nonprofit at any given period attracts volunteer labour in subsequent periods. This creates a virtuous circle because new volunteers engage in new prospecting efforts, which expand supply. We show that the introduction of a subsidy starts such a virtuous circle. Initially, the subsidy increases units exchanged and prices paid. The increase in purchased quantities immediately after the shock attracts more volunteer labour, which in turn prospects to increase supply. At the steady state, a permanent subsidy permanently increases purchased quantities, while prices fall back to their pre-subsidy levels.

Next, we test these predictions using a unique dataset that we have constructed from notarial land-purchasing acts in the Walloon region of Belgium. This dataset includes all the land purchases by environmental conservation non-profits in Walloon region between 1950 and 1994. Importantly, our data allows us to study the effect of the policy reform undertaken in 1986, when the regional government introduced an ad valorem subsidy to land purchase by non-profits. The non-contractible quality cannot – by definition – be measured; however, other main predictions of the model are testable. We find that exchanged quantities increase substantially, while the effect on the asset price varies over time, in the way predicted by our model: the subsidy creates a sharp price increase in the short-run, followed by a gradual decline of the land prices. We argue that this occurs because the subsidy makes tradable goods (land) relatively cheaper than non-tradable assets (time), inducing non-profits to reallocate their time/human resources from quality-improving efforts into quantity-expanding activities, namely fundraising

and prospecting activities. Because the reallocation of internal resources takes some time, the subsidy initially creates a demand shock by increasing the purchasing power of the nonprofits, and over time prices gradually decrease due to the reallocation of non-tradable resources into searching and negotiating activities. This non-linear trend in prices is empirically identified thanks to the fact that the introduction of the subsidy was unexpected by market participants, and because comparable land unaffected by the reform did not exhibit any similar pattern regarding their prices. In addition, while we cannot directly observe quality, the data shows that nonprofits for which quantity-based objectives are emphasized in their mission statements capture a significantly more important share of the market, compared to nonprofits emphasizing quality-based objectives in their mission statements.

Our paper also makes a methodological contribution to the empirical analysis of markets for assets with a public-good component. A broad range of markets in which non-profits represent the buyer side fall into this category: the markets for works of art, labour markets for jobs in the non-profit sector, etc. In such markets, the motivation of actors on the supply side often consists of a mix of profit-oriented and altruistic elements, and thus such actors are often willing to sell the assets at a reduced or symbolic price or donate them. Data from such markets thus usually contain numerous observations that are considered as outliers. We show that by the use of an appropriate estimator robust to outliers (the MS-estimator, developed by Maronna and Yohai, 2000), one can estimate the trends in market outcomes much more accurately.

The structure of the rest of the paper is as follows. Section 2 presents our theoretical model of a market for assets and derives testable predictions. Section 3 describes the context from which our data is collected, provides a short history of natural reserves in the Walloon region and describes the dataset. Section 4 presents our identification strategy, the descriptive statistics and the results of the regression analysis. Section 5 discusses the interpretation of our empirical results and the methodological contribution. Section 6 highlights the broader implications of our findings and concludes.

3.2 Model

During each period t, there is a unit size continuum of size k potential sellers, each endowed with one unit of an asset required for the production of a public good. A

set of $i \in N$ non-profit Organizations (NPOs) are potentially interested in purchasing such assets. The market is decentralized, and NPOs have to exert a time-consuming effort n_t^i to find, bargain and match with potential sellers. For simplicity, suppose that that k is sufficiently large, or prospecting sufficiently inefficient, for the probability of a seller being discovered by more than one NPO is negligible. Define n_t^i as the *prospecting effort* exerted by each NPO, expressed in units of time. This effort has two effects: first, it allows the NPO to discover n_t^i potential sellers, and secondly, it persuades discovered sellers to accept a lower price for their asset. This second effect arises through bargaining and persuasion. Conditional on being discovered, a seller trades if the price p_t^{ik} proposed by the NPO is above her reservation price γ^k.

Suppose that γ^k follows a uniform distribution defined as follows:

$$\gamma^k \backsim U\left[0, \frac{1}{n_t^i}.\right]$$

While NPOs do not know the exact willingness to pay of the sellers, prospection efforts narrow their distribution. Conditionally on discovering a seller, trade occurs with probability $n_t^i p_t^{ik}$. Given that the NPO discovers n_t^i potential sellers, the supply that i faces is

$$q_t^i = \int_k {n_t^i}^2 p_t^{ik} dk = {n_t^i}^2 p_t^i$$

in which q_t^i are the units of asset supplied at t, and p_t^i denotes the average price paid by NPO i. Note that the square exponent of prospection efforts captures the double dividend of discovering sellers, and reducing expected reservation prices. The inverse supply function writes

$$p_t^i = \frac{q_t^i}{{n_t^i}^2}. \tag{3.1}$$

The mission of each non-profit is the provision of a public good which has a quantity and a quality dimension. The public good uses q_i^t assets as an input. Let us denote the quantity and the quality of the public good provided by non-profit i, respectively, with q_i and x_i. Each non-profit manager has v_t^i units of volunteer labour time that she allocates between improving the quality of the public good (x_t^i), conducting fundraising activities (f_t^i), and searching/prospecting for the assets necessary to the production

of the public good (n_t^i). Given the legal non-profit status, the organizations cannot distribute earnings amongst its members. The optimization problem of non-profit i at period t is:

$$\begin{aligned} \max_{\{q_t^i, x_t^i, n_t^i, f_t^i\}} \quad & q_t^i {x_t^i}^{\omega^i} && \text{[Objective function]} \\ \text{s.t} \quad & v_t^i \geq x_t^i + f_t^i + n_t^i, && \text{[Time constraint]} \\ & (1-\sigma) p_t^i q_t^i \leq \mu f_t^i, && \text{[Non-distribution constraint]} \end{aligned}$$

with $p_t^i = q_t^i / {n_t^i}^2$. Each NPO pursues the double objective of increasing the quantity and quality of the public good it produces, weighted by ω^i in the Cobb-Douglas objective function. ω^i increases with the intrinsic preference for the quality dimension. Notice that we implicitly assume that time devoted to improve quality during period t applies only to assets purchased during this period; stocks of assets purchased in previous periods have already benefited from quality improvements and remain unchanged in subsequent periods. A simple way of justifying this assumption is by stating that available volunteer hours v_t^i are net of time resources sunk in the management of previously purchased lands. The Cobb-Douglas objective function prevents that changes in the price of assets directly modify the allocation of volunteer time: this choice is made to prevent our results from being explained by simple substitution effects. The first inequality in the optimization programme displays the time resource constraint of the organization in terms of volunteer hours available at period t. The non-distribution constraint states that all the funds available to the non-profit have to equal its expenditures for public good provision (i.e. the organization cannot distribute profits to its owners/members). The only expenditure item is assets purchased. Government provides the ad valorem subsidy $\sigma \in [0, 1]$ for asset purchase over the paid price p_t^i. On the revenue side, the available funds are obtained through donations (collected thanks to fundraising activities with the simple linear technology μf_t^i).

3.2.1 Static Equilibrium

The Lagrangian associated to the problem of the NPO is :

$$\mathcal{L}(q_t^i, x_t^i, n_t^i, f_t^i, \lambda_t^i, \nu_t^i) = q_t^i x_t^{i\omega^i} - \lambda_t^i \left[(1-\sigma) \left(\frac{q_t^i}{n_t^i} \right)^2 - \mu f_t^i \right] + \nu_t^i (v_t^i - x_t^i - f_t^i - n_t^i)$$

in which λ_t^i and ν_t^i are the Lagrange multipliers. Solving this problem characterizes the static equilibrium (details are provided in the appendix). In terms of the allocation of available volunteer time we obtain

$$\begin{aligned} x_t^{i*} &= \frac{2\omega^i}{3+2\omega^i} v_t^i \quad \text{[Time devoted to improving quality]} \\ n_t^{i*} &= \frac{2}{3+2\omega^i} v_t^i \quad \text{[Time devoted to prospecting for assets]} \\ f_t^{i*} &= \frac{1}{3+2\omega^i} v_t^i \quad \text{[Time devoted to fundraising]} \end{aligned}$$

The specification of the objective function makes the allocation of time invariant in changes of the relative price of the assets. As one could expect, when the NPO weights more quality relative to quantity (when ω^i increases), time devoted to improve quality increases, to the detriment of prospecting and fundraising activities. More available volunteer hours increase the time devoted to all three activities by a fixed proportion.

Concerning quantities purchased, the optimization program obtains:

$$q_t^{i*} = 2 \left(\frac{v_t^i}{3+2\omega^i} \right)^{3/2} \left(\frac{\mu}{1-\sigma} \right)^{1/2} \tag{3.2}$$

Improvements in the fundraising technology (μ), and increases in the subsidy (σ) relax the non-distribution constraint of the NPO, allowing it to purchase more assets. More volunteer hours allow the NPO to devote more time to prospecting activities, finding more potential sellers and persuading them of selling more assets. As noted above, an increased focus on the quality dimension reduces time devoted to prospecting, driving down quantities purchased.

Finally, the equilibrium price paid by i is:

$$p_t^{i*} = \sqrt{\frac{3+2\omega^i}{v_t^i} \cdot \frac{\mu}{1-\sigma}} \tag{3.3}$$

As fundraising technology improves, prices increase because the NPO has more disposable income, shifting the demand curve upwards. An increased focus on quality increases prices as well, because less time is devoted to prospecting, which results in worse deals for the NPO. On the contrary, more available volunteer time increases prospecting. Finally, an increase in the subsidy shifts the demand curve up, increasing prices, as in any typical market. Next, we explore how this equilibrium changes dynamically.

3.2.2 Dynamics

Assume that the number of volunteers willing to adhere to a certain NPO depends on its performance in the previous period. Namely, volunteers adhere to the organization if it has performed well in the quantity and in the quality dimension. Because quality is by assumption non-observable, volunteers infer the quality improvements by observing how much time has been devoted to (observable) fund raising and prospection. The more time the NPO devotes to these activities, the less volunteers are willing to adhere, as they feel that it does not invest sufficient resources in the desirable output. In other words, the NPO appears to less driven by the mission, and more by a budget-maximizing strategy. Assume that

$$v_{t+1}^i = \frac{q_t^i}{f_t^i + n_t^i}. \tag{3.4}$$

Substituting by the static equilibria values of q_t^i ,f_t^i, and n_t^i at any period t, this rewrites as a law of motion of volunteer time:

$$v_{t+1}^i = \frac{2}{3}\left[\frac{\mu}{1-\sigma}\frac{v_t^i}{3+2\omega^i}\right]^{\frac{1}{2}}.$$

This particular law of motion is a calibration adapted to emulate the results obtained in the empirical section of this paper. It ensures a closed-form solution and a convergent time series; other laws of motion, if convergent, would produce qualitatively similar results to those obtained here. The 1/2 exponent on v_t^i guarantees that this series is convergent.

From any initial arbitrary volunteer time v_0^i, the law of motion obtains

$$v_t^i = \left[\frac{2}{3}\left[\frac{1}{3+2\omega^i}\cdot\frac{\mu}{1-\sigma}\right]^{\frac{1}{2}}\right]^{2-2^{1-t}} {v_0^i}^{2^{-t}} \tag{3.5}$$

which is the value of v_t^i at any period t depending in the initial stock of volunteer time. The Appendix proves this statement. Note that there is some path dependence, as the initial stock of volunteer hours determines the subsequent trajectory. As t increases, volunteer time converges to its steady state value

$$v_{SS}^i = \frac{4}{9}\left[\frac{1}{3+2\omega^i}\cdot\frac{\mu}{1-\sigma}\right]. \tag{3.6}$$

Remark that the steady state is independent from the initial volunteer labour time. Relaxing the non-distribution constraint increases quantities purchased, attracting more volunteers in the long run. Finally, quality-oriented NPOs will attract less volunteers in the long run. The quadratic supply function indicates that the returns of prospecting are surpass those of investing in quality; each unit of labour devoted to prospecting increases purchases more than it would have improved quality, therefore quantity-oriented NPOs will attract relatively more volunteers.

Plugging v_{SS}^i in equations (3.2) and (3.3) one obtains the steady state quantities and prices:

$$\begin{aligned} q_{SS}^i &= \frac{16}{27}\left(\frac{1}{3+2\omega^i}\right)^3\left(\frac{\mu}{1-\sigma}\right)^2 \\ p_{SS}^i &= \frac{3}{2}(3+2\omega^i) \end{aligned}$$

Proposition 3.1 (Steady state prices and quantities) *Under the law of motion of volunteer labour defined in (3.4), the steady state for each NPO in this decentralized market is such that:*

1. *if fundraising technology improves or if the government introduces subsidies, then the amount of assets purchased increases at the steady state;*
2. *if the NPO weights more quality than quantity, then at the steady state prices paid are higher and quantities purchased are smaller;*

3. the subsidy has no effect on the steady state price.

It is immediate that:

$$\frac{d^2 q^i_{SS}}{d\sigma d\omega^i} < 0$$

Corollary 3.1 (Effect of the subsidy across NPOs) *NPOs more concerned with the quality dimension will buy proportionately less assets when the subsidy is introduced. It follows that the subsidy will decrease the market share of those more concerned with the quality dimension.*

Let us study now the effect of the introduction of the subsidy in the short run by examining the transition from the pre-subsidy steady state to the steady state in which the government finances the permanent subsidy. Denote $t = 0$ the period at which the subsidy is introduced. The moment at which the unexpected subsidy is introduced, the number of volunteers remains at the pre-subsidy steady state until new recruitments occur. By (3.6),

$$v^{i,ea}_{SS} = \frac{4}{9}\left[\frac{\mu}{3+2\omega^i}\right]$$

in which $v^{i,ea}_{SS}$ denotes the *ex-ante* steady state. The moment the subsidy is introduced, using (3.3) and (3.2) we how that prices and quantities jump to:

$$p^i_{t=0} = \frac{1}{\sqrt{1-\sigma}}\frac{3}{2}(3+2\omega^i)$$

$$q^i_{t=0} = \frac{1}{\sqrt{1-\sigma}}\frac{16}{27}\left(\frac{1}{3+2\omega^i}\right)^3 \mu^2$$

Immediately after the introduction of the subsidy, prices and quantities are multiplied by scalar $(\sqrt{1-\sigma})^{-1}$ larger than one. By substituting the *ex-ante* steady state volunteer time as an initial condition in (3.5), the number of volunteers at each t after the shock is

$$v^i_t = \left(\frac{1}{1-\sigma}\right)^{1-2^{-t}} \frac{4}{9}\left[\frac{\mu}{3+2\omega^i}.\right] \tag{3.7}$$

From it, we obtain the motion of quantities and prices following the introduction of the

subsidy:

$$q_t^{i*} = \frac{16}{27}\left(\frac{1}{3+2\omega^i}\right)^3 \mu^2 \left(\frac{1}{1-\sigma}\right)^{2-3\cdot 2^{-t-1}}$$

$$p_t^{i*} = \frac{3}{2}(3+2\omega^i)\left(\frac{1}{1-\sigma}\right)^{2^{-t-1}}$$

Proposition 3.2 (Motion of prices and quantities) *Under the law of motion of volunteer labour defined in (3.4), the introduction of an unexpected permanent subsidy is such that:*

1. *immediately after the introduction of the subsidy, there is a hike of demand, which increases prices,*
2. *the price of the assets progressively declines while purchases progressively increase*
3. *at the new steady state, the price converges to the pre-subsidy situation, while the increase in purchases is permanent.*

We test this proposition in the empirical section of the paper. Figure 3.1 plots quantities and prices for four NPOs, which vary in their degree of concern for the quality of the public good. We fix $\mu = 1$ and $\sigma = 0.5$ which corresponds to a 50% ad-valorem subsidy. Initial available voluntary hours are arbitrarily fixed. Before the permanent subsidy unexpectedly introduced at $t = 0$, prices and quantities converge to the *ex-ante* steady state. At the moment of the shock, both prices and quantities hike, then prices progressively return to their pre-subsidy levels, while quantities continue rising until reaching a new, higher, steady state.

3.3 Institutional context and data

3.3.1 Natural reserves worldwide and in the Walloon Region

The first American national park, the Yellowstone, was established by the U.S. Congress already in 1872. In Europe, the formal institutions for the conservation of nature started somewhat later and were much more grassroot-driven. The United Kingdom and France saw the birth of private conservation charities in 1895 and 1901, respectively. These societies had the mission of protecting countryside landscapes, scenic beauty, and major

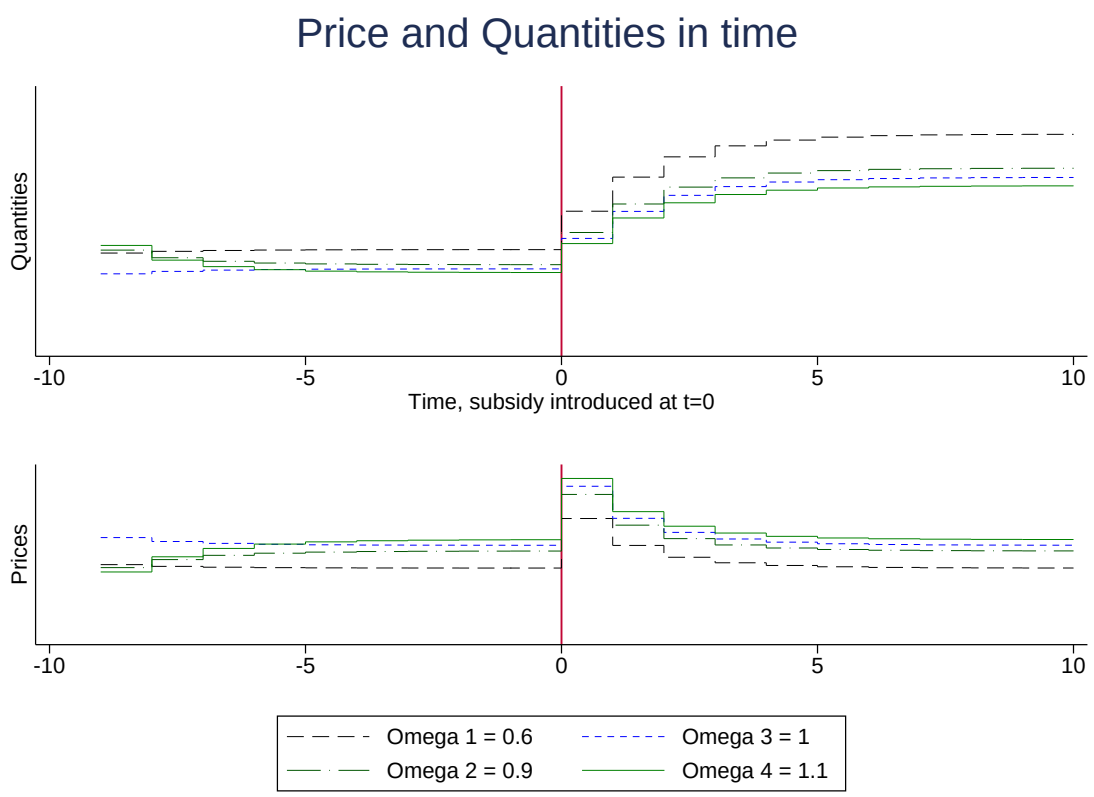

Figure 3.1: Motion of Prices and Quantities after the introduction of the Subsidy.

natural sites (Lansley, 1996; Lepart and Marty, 2006). In the UK, the National Trust almost immediately started to buy land plots and buildings from private owners. It created several natural reserves and progressively became the main private actor of environmental policy in the UK. Thanks to its two million members, the National Trust has relieved the UK government from a substantial part of its tasks in the environmental conservation domain; in exchange, the government granted the charity with considerable fiscal advantages. In France, the *"Société pour la Protection des Paysages et de l'Ésthétique de la France"*, the oldest French environmental non-profit association chose instead a strategy focused on lobbying the government on various environmental policies. France passed its first environmental-protection laws in the beginning of the 19th century, while its first national park was established in 1913.

Currently, throughout the world, private foundations aimed at creation and pro-

tection of natural reserves play an important role both in public-good provision and advocacy. The prominent example is The Nature Conservancy, a U.S.-based global-operations environmental charity. With more than one million members, Nature Conservancy manages over 8000 kilometers of rivers and 50 million hectares of land (a surface exceeding that of California) in more than thirty countries (www.nature.org).

Belgium (and especially the Walloon Region, the Southern half of the country) exhibits a system of environmental conservation that combines certain aspects of the French mostly public sector-oriented approach with some characteristics of the British charity-based approach. In 1943, *Ardenne et Gaume*, an environmental non-profit, created the first natural park in the Walloon Region. In subsequent thirty years, the environmental non-profits kept playing the major role of environmental public good providers, by either contracting long-term leases or purchasing and managing new plots of land. Initially, the budgets of non-profit consisted mainly of private contributions and donations, complemented by small-scale commercial activities.

The national government showed interest in the natural park creation and management around 1957 and made its first acquisition of land in 1972. Political decentralization of Belgium implied that the conservation of nature fell under regional jurisdiction in 1980, and the government of the Walloon Region created a new strategy, which included a set of policies towards environmental non-profits. Most importantly, in 1986 the regional government passed a reform (with retroactive effect to January 1, 1985) introducing large subsidies to environmental non-profits. This reform essentially consisted of two sets of subsidies. The first (and by far the most important) is a subsidy for land acquisition, consisting of paying (reimbursing) 50 per cent of the price of land plots that a legally registered non-profit purchased from a private owner (with the scope of creating a natural reserve) on any date after Jan. 1, 1985. The second is a subsidy for management expenses of natural reserves, which consists of covering 50 per cent of effective ordinary management expenses (or an annual lump-sum of around 100 Euros per hectar of certified natural-reserve surface) and of fully covering the extraordinary (emergency) expenses. To qualify for these subsidies, the land plot acquired by a non-profit should obtain the status of "*Réserve Naturelle Agrée*" (RNA hereafter) from the Department of Nature and Forests of the Walloon regional government, following the decision of a council of experts. This council (composed of scientists, non-profit representatives, and public servants) is the only administrative structure that has the right

to decide on the RNA status. Its main task that of verifying whether the proposed land area has a sufficiently high environmental value. This council also plays a similar role in the creation of the public counterpart of RNAs, called "*Réserves Naturelles Domaniales*" (RNDs), that are publicly owned and managed.

Given the substantial expertise of the council members, virtually all the existing natural reserves are created on the land areas with a relatively high environmental potential. Such land typically has few alternative production uses (such as intensive agriculture) but, if properly managed, can yield considerable positive externalities (protection of natural habitats and endangered species, environmental tourism, etc.). Thus, the main actors in the Walloon region on the buyer side of the market for this type of land are the legally recognized environmental non-profits (there are ten such organizations in the region) and, to some extent, the regional government. The seller side consists of a multitude of small landowners (many of whom are heirs of individuals that bought these land plots in the past mostly for extensive pastoralism or to diversify their wealth portfolios).

3.3.2 Data

The data that we collected comes from the archives of the branch of the Walloon regional administration that is in charge of the conservation of nature[1]. This branch is in charge of administering payments of subsidies to environmental non-profits both for land acquisition and for the management of the natural reserves. We construct our data using the certified copies of notary deeds of land acquisitions by non-profits from private owners, that the legally registered environmental non-profits have to provided to the DGO3 in case they receive any subsidy. Importantly, even though the policy was introduced in 1986, subsidies for ordinary management expenses are paid for natural reserves regardless of their date of creation. Provided that the land plot has a sufficiently high environmental value, conditions to fulfil in order to qualify for the ordinary-management subsidy are quite loose. This implies that for the year range 1943 to 2010, we have data on virtually all the land transactions related to creation of private natural reserves. In this paper, we restrict our analysis to the period between January 1950 and March 1994 for two main reasons: (1) there is no price deflator available for the observations before 1950, and (2) starting April 1994, the European Union started

[1]Direction Générale Opérationelle 3 (DGO3)

to provide additional subsidies for environmental non-profit land purchases through the program (with somewhat different eligibility conditions), which we plan to investigate in future work.

From each notary deed, we extracted (and quantified, wherever needed) information about the transaction, i.e. the date and the price at which land was purchased, identities of both parties, and precise information about land plots (geographic characteristics, cadastral number, size of the plot, and the exact location). Importantly, given that our sources are the notary deeds, we can disregard the problems related to misreporting, which usually have to be addressed in survey-based data.

3.4 Empirical Analysis

3.4.1 Identification strategy

Our identification strategy relies on the discrete change in policy towards non-profits introduced in 1986 by the Walloon regional government, as described above. This policy change deeply modified the incentives faced by non-profits. We want to analyze the behavioral response of non-profits to this policy change, both in the short- and the long run, as compared to the behavior and outcomes before the policy reform.

We argue that this identification strategy is valid because the policy reform was unanticipated and not simultaneous with any other major change in environmental policies. The reform was carried out by a coalition government consisting of Christian-Democrats and Liberals, shortly after this government was formed. Given that the Walloon region is traditionally a stronghold of the Socialist Party, this particular government is (so far) the only regional government in the history of the Walloon region where Socialists were not in power, and for the first time, the minister of environment was a Liberal and not a Socialist. Given the Belgian political context, prior to the elections that led to formation of this government, it was thus extremely difficult to foresee the exact composition of this government and the identity of ministers' cabinet members. Moreover, the reform was not widely discussed, neither at the regional parliament, nor in the media, essentially because in that particular period, tensions between the French-speaking and the Flemish-speaking communities in Belgium occupied most of the public debates, and the environmental conservation was definitely not considered

a key issue[2].

The timing of elections and of the implementation of reform also limited potential anticipation effects. The regional government was in place from December 1985 onwards, following the regional election in October 1985. The reform was then passed, in a relatively short period of time. Transactions on the land market, instead, require substantial amount of time to be concluded[3]. Thus, this timing leaves little space for the reform to have retroactive effects on transaction prices before July 1986. For robustness, we provide additional evidence below that our findings are not driven by purchases between 1985 and July 1986. If anything, our estimates provide a lower bound, if some of the land transactions finalized after July 1986 had not yet been influenced by the reform.

Our identification relies on the policy break and on comparing the land plots with similar characteristics transacted before and after the reform. However, one key concern is that other (unobservable) changes in the environment of the market for land might have occurred around the same time. This would jeopardize our identification. To allay this concern, we collected the data on the aggregate market prices for comparable types of land (woodland and farm land/pastures). We use these series to show that there are no similar changes in the prices for these types of land (that do not qualify for the subsidy), in the several years before and after the policy reform.

3.4.2 Descriptive statistics

The dataset that we use for this paper consists of 938 land plots acquired by environmental non-profits between 1950 and 1994. This represents virtually the universe of such land purchases within this time period[4]. Transactions at the beginning of this period are few, given that systematic land purchase by non-profits started in the 1970s, followed by a boom in both the quantity and the size of transactions in the 1990s, as can be seen in Figure 3.2. 148 plots were purchased before the reform and 790 were bought after it. Twenty-one plots were purchased between January 1, 1985 (the date of retroactive effect of the reform) and the official announcement of the reform.

The land surface purchased increased substantially: it rose from 134 hectares before

[2]Reading through the major regional newspapers in the period 1985-87, we could not find any article discussing this reform.

[3]Typically, once the buyer and the seller agree on the transaction details, they sign a provisional sale agreement in front of a notary; a procedural delay of two to four months usually follows, before the final bill

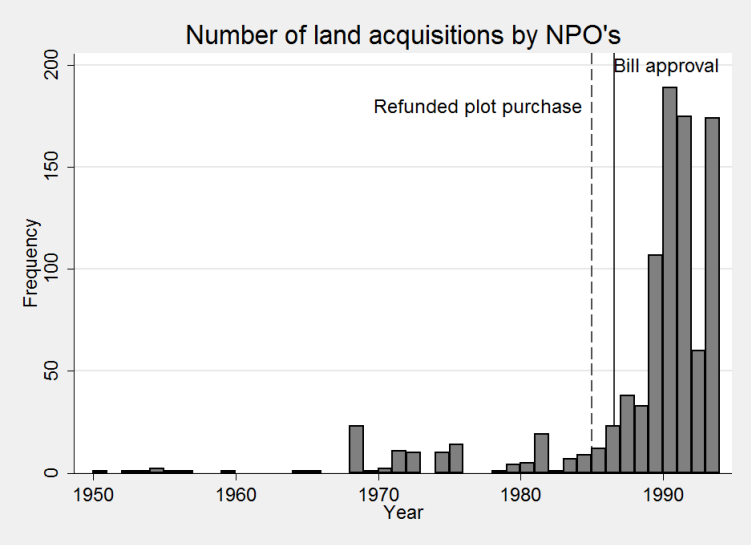

Figure 3.2: Number of land transactions with non-profits as buyers

the reform to 728 hectares after it. The number of environmental non-profits buying land increased as well: three non-profits were buying land before 1986, whereas after the reform this number doubled. However, the market structure became much more concentrated. Before the reform, two non-profits had relatively large market shares (71 and 27 per cent, respectively), leaving a residual market share to the third actor. After the introduction of subsidies, the largest buyer increased its market share even further (up to 93 per cent of the market), becoming a de facto monopolist (as depicted in Figure 3.3).

Table 3.1 presents descriptive statistics of our main variables before and after the reform of July 1986. In addition, we also look at a sub-sample of observations which are potentially strongly affected by the reform and are less affected by potential unobservable variables. This restriction allows us to exclude the surge in the number of plots purchased in the early 1990s, where other time-varying factors might be driving this dynamics. In this sub-sample, we thus focus on 75 observations after the reform and compare them to 75 observations just before it (we also compare the post-reform observations to 75 acquisitions before January, 1 1985, the earliest purchase date to

of sale is signed in the notary's office.

[4]We lose 11 observations because of missing information on the transaction price.

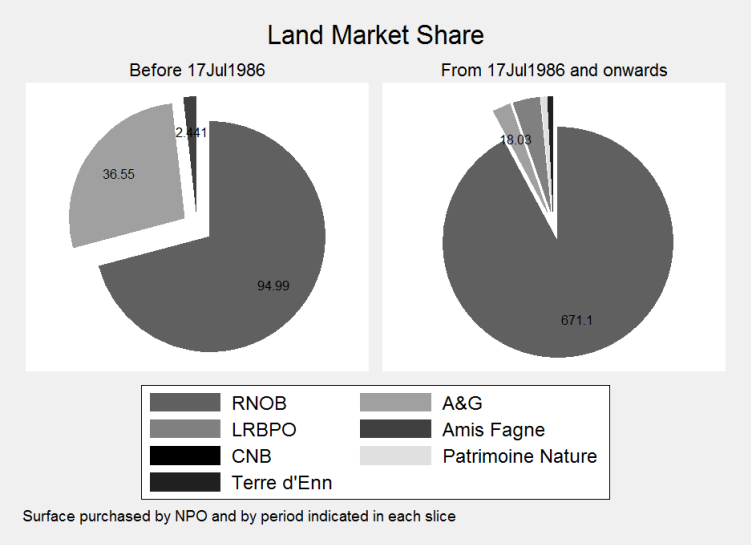

Figure 3.3: Land market share, by non-profit, before and after the reform

qualify for the subsidy).

In all comparisons, prices after the reform are higher than those before the reform. The difference is statistically significant only when we restrict the comparison to observations shortly before and shortly after the reform; however, notice that the variance in prices also increases considerably. Average plot size remains relatively stable (slightly below one hectare). Around half of the plots were owned by multiple sellers (these typically are multiple heirs of the landowning farmer). This share falls to less than 40 per cent after the reform. In addition, there are two large changes in the portfolio of plots purchased by the non-profits. First, there is a change in land occupation pattern of purchased plots. After the reform, non-profits seem to buy more woodlands, wetlands and pasture lands, and fewer wastelands. However, the change in the quality of land is small when we restrict our comparison to the 150-observation window (dropping the observations in the "grey" area between early 1985 and July 1986). The differences in land quality are not statistically significant in this restricted window (because point estimates are smaller and not because difference-in-means tests are less accurate in smaller sample). Finally, as shown in Figure 3.4, non-profits increase the geographic spread of their purchasing activity after the reform. They remain highly active at their core area in the Eastern part of the Walloon region, but start to buy plots in other

provinces where land prices are, on average, higher. This might indicate that after the reform non-profits increase their search and prospecting efforts.

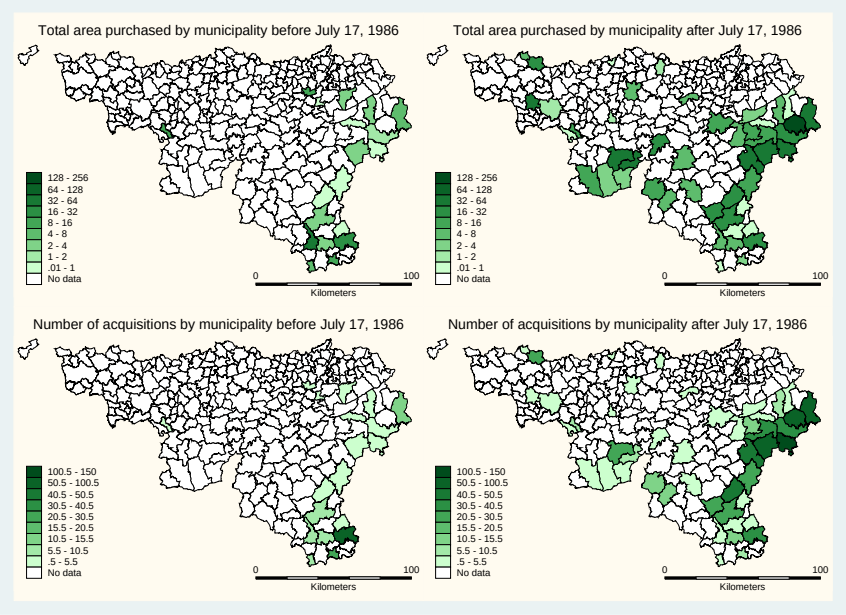

Figure 3.4: Location of acquisitions in the Walloon region before and after the reform

Table 3.1: Descriptive statistics

	Before 17Jul86		After 17Jul86	Before 17Jul86		Before 01Jan85		After 17Jul86
	mean/sd		mean/sd	mean/sd		mean/sd		mean/sd
Price	2814.95		3470.30	2654.69		2144.45	**	4188.67
	(9342.50)		(13007.01)	(4920.10)		(4581.21)		(7394.07)
Surface	0.91		0.92	0.90		0.80		0.99
	(2.72)		(3.54)	(1.79)		(1.75)		(1.39)
Price per hectare	3642.00		5111.39	4062.82		3802.83		4859.73
	(2923.65)		(19306.64)	(3763.14)		(3559.86)		(7775.41)
Number of co-owners	1.90		1.78	1.91	***	2.03	***	1.44
	(1.50)		(1.46)	(1.43)		(1.61)		(0.87)
=1 if co-owned	0.47		0.38	0.49	***	0.48	**	0.28
	(0.50)	**	(0.49)	(0.50)		(0.50)		(0.45)
=1 if waste land	0.30		0.06	0.17		0.21		0.16
	(0.46)	***	(0.24)	(0.38)		(0.41)		(0.37)
=1 if woodland	0.03		0.16	0.07		0.01	***	0.12
	(0.18)	***	(0.37)	(0.25)		(0.12)		(0.33)
=1 if wetland	0.01		0.05	0.03		0.03		0.00
	(0.12)	**	(0.22)	(0.16)		(0.16)		(0.00)
=1 if pasture land	0.55		0.67	0.67		0.64		0.56
	(0.50)	***	(0.47)	(0.47)		(0.48)		(0.50)
=1 if pond	0.00		0.02	0.00		0.00	**	0.05
	(0.00)		(0.13)	(0.00)	*	(0.00)		(0.23)
=1 if cult. land	0.11		0.12	0.09		0.09		0.13
	(0.32)		(0.33)	(0.29)		(0.29)		(0.34)
=1 if out of core area	0.01		0.15	0.03		0.01		0.12
	(0.12)	***	(0.36)	(0.16)	**	(0.12)	***	(0.33)
Observations	148	vs. after	790	75	vs. after	75	vs. after	75

*, **, *** denote significant differences between values before and after, respectively at 10%, 5% and 1%

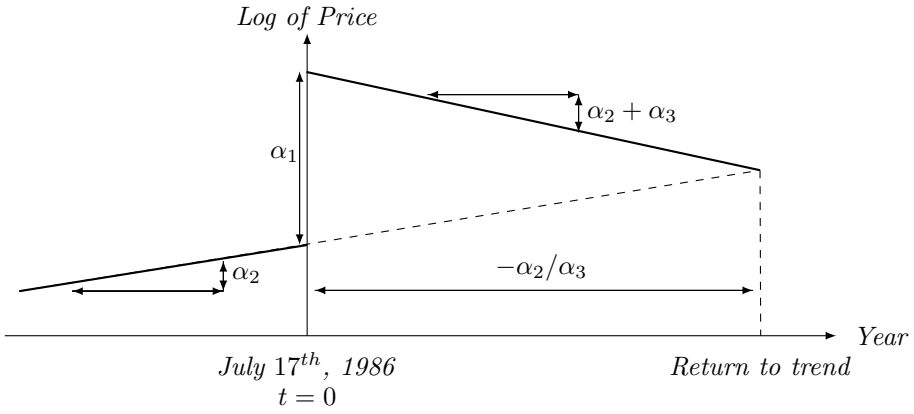

Figure 3.5: Interpretation of regression coefficients

3.4.3 Regression analysis

As explained above, our econometric analysis relies on the discontinuity around the policy reform date. We thus estimate the relationship:

$$Lnprice_i = \alpha_0 + \alpha_1 Policy_i + \alpha_2 Year_i + \alpha_3 Policy_i * Year_i + \mathbf{X}_i\beta + \varepsilon_i. \tag{3.8}$$

Here, $Lnprice_i$ is log of the (deflated) purchase price of plot i, $Policy_i$ is an indicator variable that takes value 1 if the plot was purchased under the subsidy regime, and zero otherwise, $Year_i$ denotes the year of transaction, $\mathbf{X}_i$ is a vector of control variables (size of the plot, number of sellers, geographic characteristics, identity of the buyer, etc.), and ε an idiosyncratic component. Figure 3.5 presents the interpretation of the main coefficients. α_1 denotes the average short-term change in prices of land plots driven by the policy change (i.e. with the year of the policy change is referenced as $Year = 0$). Since our dependent variable is expressed in logs and $Policy_i$ is a binary variable, the exact predicted average change between the prices of subsidized and non-subsidized land purchases equals $e^{\alpha_1} - 1$. α_2 controls for the overall time trend in prices, whereas α_3 allows to capture the difference in time trends between the period before the reform and the one after the reform. In a linear specification, the time necessary to revert to the pre-reform trend after the policy reform is given by the ratio between α_1 and α_3, provided that these two coefficients have opposite signs. Table 3.2 reports the results of estimating of equation (3.8) by ordinary least squares. Point estimates of

α_1 are systematically positive, relatively large but very imprecise (standard errors are clustered at municipality level); therefore, the coefficient is never significantly different from zero in any of our specifications. However, it is worth noting that estimates of both α_1 and α_3 are relatively stable when we add controls for the number of sellers, land quality (geographic characteristics), and whether the plot is located in a province where there were no purchases before 1986. Specification (5) adds controls for the identity of the buyer (i.e. non-profit fixed effects). Taking into account that only two non-profits engaged in land purchase transactions both before and after 1986, these controls purge our estimated coefficients from a potentially different market behaviour of new buyers. The estimated coefficient α_1 increases substantially, which suggests that new entrants buy, on average, at lower prices than the two incumbents. Observing the two main coefficients of interest jointly, we find some evidence in favour of an increase in prices after the introduction of subsidies; however, this increase looks temporary as suggested by a negative sign of α_3 (the coefficient of the interaction term between the time trend and the policy dummy).

The methodology used for these estimations is unsatisfactory, as clearly indicated by the coefficients of the plot area. In general, land market prices are almost perfectly proportional to the plot size; our discussions with several notaries involved in such transactions indicate that in most transactions, the purchase price is roughly calculated as the price per-hectare multiplied by the plot surface (after taking into account the land quality). Therefore, we should observe that a one percent increase of plot area should be accompanied by an increase in price by roughly one percent. Our OLS estimations suggest, instead, that the price only increases by 0.8% or less (moreover, the coefficient is somewhat unstable across specifications).

A potential explanation for this under-estimation is the public-good nature of assets that are traded on this market. The land market for natural reserves is a market where assets acquired by non-profits are used to produce public goods. Like in any other land market, buyers exchange money for land plots, and, overall, prices are determined by demand and supply. However, unlike in the usual land markets, buyers also invest substantial effort in convincing sellers to accept a lower price in the interest of the public good (or in prospecting for sellers that are more public-spirited). During our work on data, we collected anecdotal evidence concerning several landowners who were happy to sell their land for a symbolic price, provided that the buyer maintains the landscape and

protects endangered animals living in the area. These benefits are non-rival and non-excludable, which means that the seller is sure to enjoy those environmental services without paying a management cost. On the other hand, non-profits are sometimes inclined to pay a relatively high price for a small plot because that plot would allow the extension of a green mesh between sites. Both types of transactions constitute outliers, and failing to take them into account biases the estimates obtained above.

More precisely, from the econometrics point of view, these transactions constitute vertical outliers for small plots with high prices and bad leverage points for large plots sold at symbolic prices. The presence of both types of outliers biases regression coefficients downwards and increases standard errors. In specification (6) of Table 3.2, we estimate our model including a dummy variable flagging seven most obvious quasi-donations, i.e. land plots sold for a clearly symbolic price. Four of these transactions occurred before July 1986 and the remaining occurred after. The price-surface elasticity is jumps from 0.75 to 0.82 and the t-statistic doubles. The coefficient on the policy dummy drops by about 15 per cent, whereas the R^2 reaches 0.72. This implies that correcting for less than one percent of observations has a major influence on our results. Proceeding in such a way would not be problematic if we could easily flag all the transactions with exceptionally low and high prices; however, this is quite cumbersome (given the size of our dataset) and might also involve some arbitrariness in borderline cases.

A better way of attacking this problem is to use an estimator robust to outliers. We opt for the MS-estimator proposed by Maronna and Yohai (2000) and developed by Verardi and Croux (2009). It allows for a robust and efficient estimation in the presence of outliers in a multidimensional setting, deals with dummy variables in the set of explanatory variables, and properly handles asymmetric distribution of residuals in the presence of outliers. The loss function of this estimator is a Tukey-Biweight function where the marginal change of the residuals' weight tends to 0 as residuals become large. It means that all observations have some weight in the regression but that this weight does not explode when the observation lies far away from the regression line (or, more precisely, far away from the core group of observations in a multivariate sense).

Table 3.2: OLS regression results

	(1) log of price	(2) log of price	(3) log of price	(4) log of price	(5) log of price	(6) log of price
Bought after the reform	0.0143	0.0238	0.0239	0.0194	0.0884	0.0735
	[0.261]	[0.262]	[0.261]	[0.256]	[0.266]	[0.144]
Year * reform	-0.0252	-0.0262	-0.0265	-0.0320	-0.0389	-0.0113
	[0.0351]	[0.0349]	[0.0356]	[0.0339]	[0.0326]	[0.0226]
Year, 17jul1986=0	0.0188	0.0186	0.0194	0.0184	0.0144	-0.00431
	[0.0225]	[0.0225]	[0.0224]	[0.0221]	[0.0212]	[0.00884]
Log of surface	0.814***	0.812***	0.778***	0.747***	0.750***	0.819***
	[0.0783]	[0.0789]	[0.0817]	[0.0790]	[0.0794]	[0.0483]
Number of co-owners		0.0210	0.0146	0.0145	0.0180	0.0000953
		[0.0212]	[0.0207]	[0.0205]	[0.0209]	[0.0173]
Out of core area				0.431***	0.326**	0.381***
				[0.132]	[0.160]	[0.123]
Sold at symbolic price						-7.905***
						[0.869]
CONTROLS						
Land quality	N	N	Y	Y	Y	Y
Buyers identity	N	N	N	N	Y	Y
Observations	938	938	938	938	938	938
Adjusted R^2	0.432	0.432	0.438	0.449	0.459	0.726

Standard errors in brackets, clustered at the municipality level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.3: MS regression results

	(1) log of price	(2) log of price	(3) log of price	(4) log of price	(5) log of price	(6) log of price
Bought after the reform	0.494*	0.409***	0.570***	0.575***	0.396	0.396
	[0.272]	[0.153]	[0.127]	[0.158]	[0.261]	[0.277]
Year * reform	-0.0748***	-0.0841***	-0.0341**	-0.0354*	-0.0464*	-0.0458*
	[0.0221]	[0.0152]	[0.0164]	[0.0189]	[0.0241]	[0.0250]
Year, 17jul1986=0	-0.00535	0.000452	-0.0158**	-0.0159	-0.00296	-0.00305
	[0.0195]	[0.00966]	[0.00768]	[0.00981]	[0.0167]	[0.0179]
Log of surface	1.081***	1.067***	1.034***	1.029***	1.041***	1.041***
	[0.0235]	[0.0310]	[0.0212]	[0.0235]	[0.0255]	[0.0259]
Number of co-owners		-0.0390	0.00801	0.00877	0.00353	0.00355
		[0.0290]	[0.00831]	[0.00941]	[0.0101]	[0.00988]
Out of core area				0.0510	0.0396	0.0396
				[0.0388]	[0.0450]	[0.0456]
Sold at symbolic price						-8.211***
						[0.220]
CONTROLS						
Land quality	N	N	Y	Y	Y	Y
Buyers identity	N	N	N	N	Y	Y
Hausman's Chi-squared	20.66	25.51	37.75	59.89	82.85	220.9
Observations	938	938	938	938	938	938

Robust standard errors in brackets
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3.3 reports estimates of the same specifications than those in Table 3.2, with estimations performed using the MS-method. Robust estimation does not affect the signs of coefficients. The elasticity of prices to land surface is now very close to one and is highly stable across specifications. The introduction of the subsidy has an estimated positive effect on prices of an order between 41 and 57 per cent. Therefore, for a plot valued €100, the introduction of the subsidy pushes the price up to €150 (of which €75 are paid by the non-profit recipient of the subsidy). Thus, in the short run the subsidy represents a €25 saving for the non-profit. Over time, the price steadily declines until it reaches the pre-subsidy price around nine years after the introduction of the subsidy. Given that our sample is limited to the eight years following the reform, we cannot know if the trend would have continued until subsidized prices become actually lower than non-subsidized prices or whether it would have stabilized around the trend.

The introduction of the dummy variable indicating quasi-donations in the last specification leaves our estimates virtually unchanged, contrarily to the instability of OLS estimates noted above. The regression coefficient on this dummy is unsurprisingly large, predicting a drop in the price for these plots by more than 99 per cent; however, all other coefficients remain unaffected. This stability is a clear indication that our methodology is justified and that robust estimates adequately depict regular market conditions without being much affected by other mechanisms that drive the outliers. We also report in this table a generalized Hausman test proposed by Dehon et al. (2011). For all estimations, the ordinary least squares method (an efficient but potentially inconsistent estimation technique) systematically provides estimators which are significantly different from robust ones. Despite a somewhat lower efficiency of the MS-methodology (28.4 per cent loss in efficiency), it seems reasonable to prefer the consistent robust estimation technique.

In the Appendix, we provide two further tables with robustness checks. Table A.1 reports estimates based on the outlier-free subsample of the first five specifications of Table 3.2. Point estimates of the main coefficients of interest are slightly lower in absolute value than robust estimates on the full sample; however, all the results go in the same direction. Estimates of price-surface elasticity are remarkably stable. Table 3.3 introduces several variations in the model specification. The first column corresponds to the baseline specification estimated by the MS-estimator. The second column allows for a more flexible relationship between the price and the time trend by introducing

quadratic terms in the trend. The estimated effect of the policy reform is smaller and less precisely estimated but remains economically significant. The third column reports estimates on a subsample generated by eliminating all land purchases made between January 1985 and July 1986 (i.e. transactions potentially affected by anticipating the reform). Point estimates of the coefficient on the reform dummy increases a little bit; which could indicate some (minor) anticipation of the reform. Specification (4) introduces another modification to check that the anticipation effect does not seriously affect our estimations. In this specification, we set the timing of the policy reform on January 1, 1985: this eliminates the distinction between the starting date of the retroactive effect of the reform and the date of the reform itself. Estimates remain similar in terms of the signs and sizes of coefficients, and inference is not affected much. Finally, in the specification in the last column, we impose an extremely conservative restriction on our sample: we consider only the 75 transactions preceding January 1, 1985 and the 75 transactions immediately following the policy reform. We comfortingly find effects similar to those found for the full sample, with slightly larger standard errors (despite the relatively low statistical power caused by our sample restriction), consistently with our previous findings.

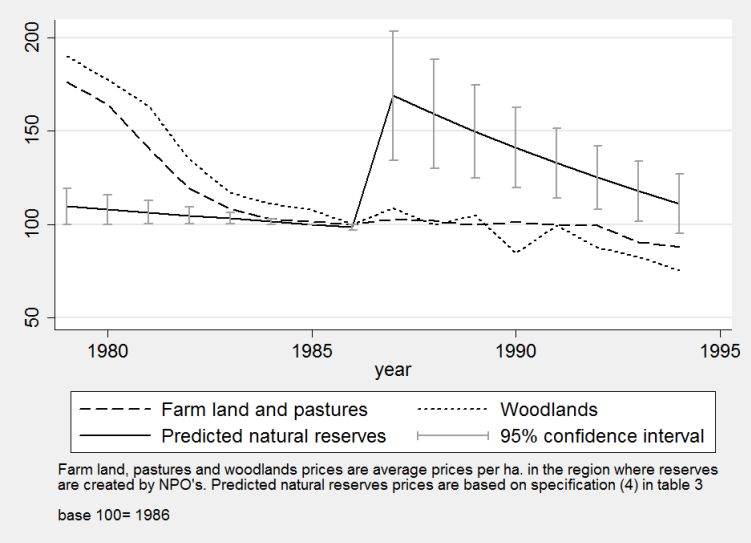

Figure 3.6: Evolution of prices for different land types

Our identification is based on the policy break in 1986 and on comparing the land

plots with similar characteristics acquired by the non-profits before and after the reform. However, it is possible that other changes in the environment of the market for land might have occurred around the same time. For instance, if other policy changes that concerned all the agricultural land in the region were introduced shortly before or after the subsidy, one would observe a pattern similar to the one that we find, but it would be driven (at least in part) by these other policy changes. In that case, our findings would be a poor test of the theory presented above.

To allay this concern, we have collected the data on the aggregate land market prices for two major types of land: woodland and farm land/pastures. The markets for these types of land are of an order of magnitude larger as compared to the market for the land that non-profits acquire. Crucially, a very small proportion of these types of land could qualify for the 1986 subsidy. The time series of prices comes from the Belgian National Statistics Agency (INS, 1994), and represents average prices per hectare (from all land transactions, by type, which are officially registered).

Figure 3.6 plots the evolution of land prices in the Walloon region, from 1979 until 1994. It depicts three series: the average price per hectare of woodlands, the average price per hectare of farmland and pastures, and the predicted price per hectare of land acquired by non-profits (constructed on the basis of our notary-deeds data). For clarity, we have normalized the prices, with 1986 (the year of the reform) being the baseline. One clearly sees that there is not a break around 1986 in prices of woodlands and farm lands, at least not of a magnitude comparable to the predicted natural reserve land prices. Following the pattern that we have documented above, we see that prices of land prices purchased by non-profits first jumps, and then converges in the long-term to the initial level).

3.5 Discussion

3.5.1 Interpretation of empirical results

Our theoretical model has generated two testable propositions. Proposition 3.2 predicts a the differential effect of the subsidy over time: we should observe that prices of assets bought by non-profits strongly increase in the short-run and then decrease in the long-run as compared to this short-run peak; the quantity of assets bought should increase unambiguously over time. Above, we have tested this prediction using data on land

acquisitions by environmental non-profits in the Walloon region of Belgium. Properly taking into account the presence of outliers in the data (both vertical ones and bad leverage points) by using the MS-estimator, we show that the empirical results are in line with this first prediction of our theoretical framework. All the parts of Proposition 3.2 are confirmed: we observe a spike in prices just after the introduction of the subsidy (i.e. $\alpha_1 > 0$), followed by a progressive decline towards the initial price ($\alpha_3 < 0$). Even if the effect of the subsidy on the market price vanishes over time, the number of transactions largely increases by the end of the sample period, as shown in Figure 3. This is fully consistent with a positive demand shock followed with a long-run expansion of the supply curve.

Corollary 3.1 predicts a differential effect of the subsidy across non-profit types. In particular, one should observe a relatively stronger increase in land purchases by non-profits that give a relatively higher weight to the quantity than to the quality of public goods provided (captured by the parameter α_i in our model). In our data, the two main non-profits have different preferences in the quantity versus quality trade-off; these differences are made clear when one looks at their mission statements. The mission statement of the first organization (*Ardenne & Gaume*) reads:

> "[The association] has the objective of creating (and participating to the creation) and managing (and participating to the management of) natural reserves [...] and more generally of any structure, private or public, regardless of its form, that contributes to preserving nature."

For the second organization (*R.N.O.B.*), one reads:

> "[The association] is devoted to preserving and managing threatened natural habitats. To this end, the association develops a strategy of purchasing or renting land with considerable biological interest, mainly in the Walloon and Brussels regions."

The first non-profit seems to be more open to partnerships and its mission statement mostly emphasizes natural reserve management efforts. Contrarily, the second statement makes clear that the organization's priority is on purchasing land. As displayed in Figure 3.3, we can see that the second non-profit (*R.N.O.B.*) is purchasing the largest number of land plots (in terms of total surface) after the reform. The market share of each of the two non-profits changes following the introduction of the subsidy in the

direction predicted by our model. Consequently, the subsidy makes the quantity-driven non-profit capture virtually all the new land purchases.

This change in the market structure is consistent with corollary 3.1. In a market with relatively few actors, one should observe that the subsidy has a relatively small effect on the long-run price and a relatively large effect on the quantity purchased, at the expense of less effort devoted to quality enhancement. Given that our empirical analysis focuses on only one market, we cannot compare its outcomes to those of a less concentrated market. However, combined with information about the context that we have discussed above, it is clear that the de facto monopsony position of the R.N.O.B., driven by its quantity-oriented mission, induced it to engage massively in supply-expanding prospecting activities, avoiding the free-riding that would plague a market with multiple small prospecting non-profits. Under these conditions, the long-run impact of the ad valorem subsidy in such a concentrated market had a huge impact on quantities of land purchased, as we have shown previously.

Policy-wise, the relatively limited effect on prices and the long-run convergence towards the pre-reform trend, combined with the large expansion in quantity purchased might seem a positive result, given that large amounts of land were traded without a massive price pass-through effect of taxpayers' money to private sellers. However, a caveat should be mentioned. As we have argued above, the less aggressive quality-oriented buyers are driven out of the market and the market is dominated by organizations that consider quantity purchased to be the priority. A negative effect of the subsidy is that quality-enhancing management effort per unit of land is predicted to decrease. Therefore, the ad valorem subsidy encouraging private ownership of public goods is an efficient policy tool only if the quantity of the public good (and not its quality) is the policy objective.

3.5.2 Econometric methodology

In our empirical investigation we implicitly assume that (at least) two different data-generating processes (DGPs) generated our sample. This assumption is supported by the anecdotal evidence collected during our data construction. A part of transactions on the land market for natural reserves does not fit the classical supply-and-demand framework. Some transactions are non-standard in the sense that public-good considerations, warm-glow and persuasion play a key role in shaping the prices. Our data

are thus "contaminated" by these observations with potentially abnormally low prices. It is, however, impossible to disentangle the DGP of each observation *a priori*. Identification of other DGPs requires additional information (not observed, and, in some cases, unobservable). This lack of information can be overcome by using robust estimation techniques that allow to consistently estimate the main DGP. We opt for the MS-estimator for four reasons: (1) it is robust to good and bad leverage points; (2) it allows for asymmetries in outliers distribution; (3) it allows to handle categorical variables; and (4) it has a very low break-down point of 50 per cent (i.e. the estimated coefficients are consistent even when almost half of the sample is contaminated by outliers).

Once the coefficients behind the main DGP are estimated, one can consistently identify the outliers in the data as shown for instance in Figure 3.7. Importantly, the identification process relies on an objective statistical procedure rather than on the *a priori* of the researcher, and in case one is interested in understanding the origin of the outliers in one's data, this procedure offers a systematic basis for the case-study analysis of outliers.

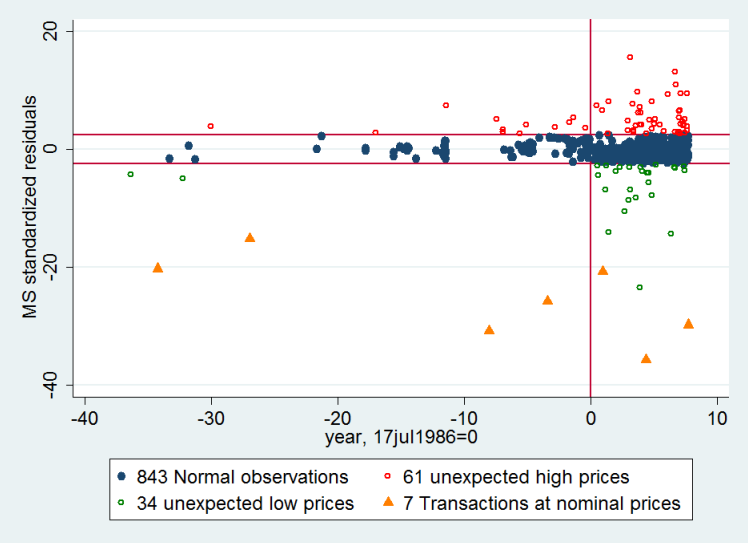

Figure 3.7: Outliers in specification 4 of table 3.3

More generally, this methodology might be useful in settings where different DGPs might coexist and where other tools to grasp their co-existence are missing (provided

that one DGP generates at least half of the data points). We believe that our method has numerous potential applications in the empirical analyses of non-profit sector, given that the theoretical literature agrees that the behaviour of various actors in this sector (donors, managers, volunteer workers, etc.) is driven by a mix of classic extrinsic high-powered incentives and intrinsic motivation (see, e.g., Benabou and Tirole (2003, 2006); Besley and Ghatak (2005b)). Standard estimation techniques might miss this co-existence of DGPs and lead to inconsistent estimates.

3.6 Conclusion

What are the broader implications of our model and empirical findings? The framework of analysis that we have developed above applies to a large set of contexts where the provision of a public good is delegated to a non-profit organization. These are the contexts in which a certain asset or input potentially can generate substantial externalities or has a fundamental public-good nature, but is initially held by a private party that value insufficiently these externalities. At the same time, there exist agents (or organizations founded by such agents) that are intrinsically motivated and would like to internalize these externalities or release the public-good potential of the asset. Usually, however, these agents are credit-constrained (or, more generally, cannot easily monetize their intrinsic motivation; so their willingness-to-pay does not fully reflect their motivation). Thus, they can either raise funds through solicitations from other agents, or the government can assist in transferring the ownership of the asset to these motivated agents. Moreover, locating such assets implies a positive search cost.

One example of such a setting (beyond environmental conservation discussed above) is the market for art. Most private non-profit organizations devoted to artistic or cultural heritage conservation face the problem similar to the one discussed in our paper: works of art are often held by individuals that do not fully value their public-good nature, and such objects are traded in a competitive market. Government can subsidize the acquisition by non-profit museums of these works of art, but finding the art pieces that best suit the collection of the non-profit museum requires effort.

Another example is the non-profit organizations whose mission is to combat environmental pollution by, for example, recycling polluting second-hand appliances. There exists (relatively thin) markets for these objects. Some appliances are more polluting

than others (e.g. they contain highly environmentally-hazardous substances); however, given the absence of monetary incentives, some owners are unlikely to be willing to pay the cost of bringing them to the recycling points. Thus, the non-profits often conduct the door-to-door campaigns of searching for such appliances, which requires substantial effort. From the policy perspective, it is important to investigate the desirability of government subsidies for the purchase of such appliances by non-profits.

In addition, our empirical analysis has an important methodological implication. In applied problems of evaluating the effects of government subsidies on the market outcomes in this kind of settings, a non-negligible fraction of data points exhibit very low prices. This occurs because some of the initial owners of the assets can also be intrinsically motivated, and these owners would sell these assets to non-profits for a price that does not correctly reflect the market value of the assets (i.e. a symbolic price). In that case, failing to treat such outliers properly might induce the researcher to underestimate the effect of the subsidy on the market price and to overestimate the effect on the quantity. Our analysis above highlights such pitfalls and illustrates the appropriate robust methodology for treating these outliers.

3.7 Appendix

3.7.1 Resolution of the Lagrangian

$$\mathcal{L}(q_t^i, x_t^i, n_t^i, f_t^i, \lambda_t^i, \nu_t^i) = q_t^i {x_t^i}^{\omega^i} - \lambda_t^i \left[(1-\sigma) \left(\frac{q_t^i}{n_t^i} \right)^2 - \mu f_t^i \right] - \nu_t^i (v_t^i - x_t^i - f_t^i - n_t^i)$$

First order conditions:

wrt q_t^i **:**

$$ {x_t^i}^{\omega^i} = \lambda_t^i \, (1-\sigma) 2 \frac{q_t^i}{{n_t^i}^2} \tag{3.9}$$

wrt x_t^i **:**

$$\omega^i q_t^i {x_t^i}^{\omega^i - 1} = \nu_t^i \tag{3.10}$$

wrt n_t^i **:**

$$\lambda_t^i (1-\sigma) 2 \frac{{q_t^i}^2}{{n_t^i}^3} = \nu_t^i \tag{3.11}$$

wrt f_t^i **:**

$$\lambda_t^i \mu = \nu_t^i \tag{3.12}$$

wrt λ_t^i **:**

$$(1-\sigma)\left(\frac{q_t^i}{n_t^i}\right)^2 = \mu f_t^i \tag{3.13}$$

wrt μ_t^i **:**

$$v_t^i = x_t^i + f_t^i + n_t^i \tag{3.14}$$

Use (3.12) to replace all ν_i^t by $\lambda_t^i \mu$. The ratio (3.9)/(3.10) yields

$$x_t^i = \omega^i 2\frac{1-\sigma}{\mu}\left(\frac{q_t^i}{n_t^i}\right)^2 \tag{3.15}$$

(3.11) can be rearranged to :

$$n_t^i = 2\frac{1-\sigma}{\mu}\left(\frac{q_t^i}{n_t^i}\right)^2 \tag{3.16}$$

(3.13) can be rearranged to :

$$f_t^i = \frac{1-\sigma}{\mu}\left(\frac{q_t^i}{n_t^i}\right)^2 \tag{3.17}$$

Plugging back the three previous equations in (3.14) obtains :

$$v_t^i = (3+2\omega^i)\frac{1-\sigma}{\mu}\left(\frac{q_t^i}{n_t^i}\right)^2 \tag{3.18}$$

Combining (3.15) and (3.18) we obtain

$$x_t^{i*} = \frac{2\omega^i}{3+2\omega^i} v_t^i$$

Combining (3.16) and (3.18) we obtain

$$n_t^{i*} = \frac{2}{3+2\omega^i} v_t^i \tag{3.19}$$

Combining (3.17) and (3.18) we obtain

$$f_t^{i*} = \frac{1}{3+2\omega^i} v_t^i$$

Using (3.18) and (3.19) one obtains :

$$q_t^{i*} = 2\left(\frac{v_t^i}{3+2\omega^i}\right)^{3/2}\left(\frac{\mu}{1-\sigma}\right)^{1/2} \tag{3.20}$$

Finally, by using (3.1) the equilibrium price paid by i is:

$$p_t^{i*} = \sqrt{\frac{(3+2\omega^i)\mu}{(1-\sigma)v_t^i}} \tag{3.21}$$

3.7.2 Details on the motion of volunteer hours

From any initial state v_0^i we obtain

$$\begin{aligned} v_1^i &= \frac{2}{3}\left[\frac{\mu}{(3+2\omega^i)(1-\sigma)}v_0^i\right]^{\frac{1}{2}} \\ v_2^i &= \left[\frac{2}{3}\left[\frac{\mu}{(3+2\omega^i)(1-\sigma)}\right]^{\frac{1}{2}}\right]^{\frac{1}{2}} {v_0^i}^{\frac{1}{2^2}} \\ &\dots \\ v_t^i &= \left[\frac{2}{3}\left[\frac{\mu}{(3+2\omega^i)(1-\sigma)}\right]^{\frac{1}{2}}\right]^{\Sigma_{\tau=0}^{\tau=t-1}\frac{1}{2^t}} {v_0^i}^{\frac{1}{2^t}} \end{aligned} \tag{3.22}$$

Because $\Sigma_{\tau=0}^{\tau=t-1}\frac{1}{2^t} = \dfrac{1-\frac{1}{2^t}}{1-\frac{1}{2}} = 2-2^{1-t}$, we obtain

$$v_t^i = \left[\frac{2}{3}\left[\frac{\mu}{(3+2\omega^i)(1-\sigma)}\right]^{\frac{1}{2}}\right]^{2-2^{1-t}} {v_0^i}^{2^{-t}}$$

3.7.3 Appended tables

Table A.1: OLS regression results, without outliers

	(1) log of price	(2) log of price	(3) log of price	(4) log of price	(5) log of price
Bought after the reform	0.266*	0.240*	0.271**	0.267**	0.250*
	[0.135]	[0.135]	[0.116]	[0.118]	[0.129]
Year * reform	-0.0432***	-0.0463***	-0.0344**	-0.0361***	-0.0425***
	[0.0138]	[0.0140]	[0.0139]	[0.0134]	[0.0135]
Year, 17jul1986=0	-0.00358	-0.00183	-0.00575	-0.00624	-0.00365
	[0.00726]	[0.00724]	[0.00634]	[0.00637]	[0.00768]
Log of surface	1.064***	1.063***	1.047***	1.030***	1.035***
	[0.0177]	[0.0182]	[0.0174]	[0.0140]	[0.0129]
Number of co-owners		-0.0180**	-0.0126	-0.0130	-0.0141
		[0.00738]	[0.00850]	[0.00867]	[0.00876]
Out of core area				0.218**	0.163*
				[0.0903]	[0.0885]
CONTROLS					
Land quality	N	N	Y	Y	Y
Buyers identity	N	N	N	N	Y
Observations	844	846	843	843	843
Adjusted R^2	0.923	0.922	0.923	0.926	0.931

Standard errors in brackets, clustered at the municipality level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.2: Alternative specifications in MS-regressions

	(1) log of price	(2) log of price	(3) log of price	(4) log of price	(5) log of price
Bought after the	0.575***	0.251	0.636***		0.404***
reform (Jul. 1986)	[0.158]	[0.201]	[0.0934]		[0.121]
Year * order	-0.0354*	-0.0302	-0.0290**		-0.0590
	[0.0189]	[0.0549]	[0.0139]		[0.0372]
Year, 17jul1986=0	-0.0159	0.0219	-0.0198***		0.00373
	[0.00981]	[0.0257]	[0.00524]		[0.0135]
Year squared		0.00122			
		[0.000762]			
Year squared* reform		-0.00736			
		[0.00803]			
Bought after the				0.632***	
reform (Jan. 1985)				[0.0919]	
Year * reform				-0.0211*	
				[0.0114]	
Year, 1jan1985=0				-0.0197***	
				[0.00541]	
Log of surface	1.029***	1.035***	1.023***	1.020***	0.918***
	[0.0235]	[0.0234]	[0.0188]	[0.0184]	[0.0455]
Number of co-owners	0.00877	0.00589	0.00945	0.00884	-0.0242
	[0.00941]	[0.0149]	[0.00780]	[0.00859]	[0.0162]
Out of core area	0.0510	0.0657	0.0547	0.0565	1.015***
	[0.0388]	[0.0425]	[0.0370]	[0.0363]	[0.165]
CONTROLS					
Land quality	Y	Y	Y	Y	Y
Buyers identity	N	N	N	N	N
Hausman's Chi-squared	59.89	56.41	55.52	58.26	45.74
Observations	938	938	917	938	150
Sample	Full	Full	Full$\setminus [1985; 17Jul86]$	Full	$[-75; +75] \setminus [1985; 17Jul86]$
Timing of the break	17Jul1986	17Jul1986	01Jan1985	17Jul1986	17Jul1986

Robust standard errors in brackets

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Bibliography

Accra Agenda for Action (2008). Adopted at the Third High Level Forum on Aid Effectiveness, Accra, Ghana.

Acemoglu, D., Robinson, J. A., and Verdier, T. (2003). Kleptocracy and divide-and-rule: A model of personal rule. Working Paper 10136, National Bureau of Economic Research.

Al Jazeera (April 8, 2013). Merkel asks Putin to give 'NGOs a chance'. `www.aljazeera.com`.

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

Andreoni, J. and Payne, A. A. (2001). Government Grants to Private Charities: Do They Crowd-Out Giving or Fundraising? Public Economics 0111001, EconWPA.

Arellano-López, S. and Petras, J. F. (1994). Non-governmental organizations and poverty alleviation in Bolivia. *Development and Change*, 25:555–568.

Azam, J.-P. and Laffont, J.-J. (2003). Contracting for aid. *Journal of Development Economics*, 70(1):25–58.

Banerjee, A. and Duflo, E. (2011a). *Poor economics: A radical rethinking of the way to fight global poverty.* PublicAffairs.

Banerjee, A. and Duflo, E. (2011b). *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty.* PublicAffairs.

Barr, A. and Fafchamps, M. (2006). A client-community assessment of the NGO sector in Uganda. *Journal of Development Studies*, 42(4):611–639.

Bebbington, A., Hickey, S., and Mitlin, D. C. E. (2008). *Can NGOs Make a Difference?* Zed Books.

Benabou, R. and Tirole, J. (2003). Intrinsic and extrinsic motivation. *Review of Economic Studies*, 70(3):489–520.

Benabou, R. and Tirole, J. (2006). Incentives and prosocial behavior. *American Economic Review*, 96(5):1652–1678.

Besley, T. and Ghatak, M. (2001a). Government Versus Private Ownership Of Public Goods. *The Quarterly Journal of Economics*, 116(4):1343–1372.

Besley, T. and Ghatak, M. (2001b). Government versus private ownership of public goods. *Quarterly Journal of Economics*, 116(4):1343–1372.

Besley, T. and Ghatak, M. (2005a). Competition and incentives with motivated agents. *American Economic Review*, 95(3):616–636.

Besley, T. and Ghatak, M. (2005b). Competition and incentives with motivated agents. *American Economic Review*, 95(3):616–636.

Bilodeau, M. and Steinberg, R. (2006). Donative nonprofit organizations. In Kolm, S. and Ythier, J. M., editors, *Handbook on the Economics of Giving, Reciprocity and Altruism*, volume 1, chapter 19, pages 1271–1333. Elsevier.

Bjørnskov, C. (2010). Do elites benefit from democracy and foreign aid in developing countries ? *Journal of Development Economics*, 92(2):115–124.

Boone, P. (1996). Politics and the effectiveness of foreign aid. *European Economic Review*, 40(2):289–329.

Boulding, C. and Gibson, C. (2009). Supporters or challengers? the effects of Non-governmental Organizations on local politics in Bolivia. *Comparative Political Studies*, 42(4):479–500.

Bourguignon, F. and Platteau, J.-P. (2012). Does aid availability affect effectiveness in reducing poverty? *World Institute for Development Economic Research (UNU-WIDER), Working Paper*.

Brass, J. N. (2012). Why Do NGOs Go Where They Go? Evidence from Kenya. *World Development*, 40(2):387–401.

Burnside, C. and Dollar, D. (2000). Aid, policies, and growth. *American Economic Review*, 90(4):847–868.

Busan Partnership (2011). Adopted at the Fourth High Level Forum on Aid Effectiveness, Busan, South Korea.

Centre Français de Recherche sur le Renseignement (April 17, 2007). Le détournement des fonds destinés au développement et les menances contre l'action humanitaire. `www.cf2r.org`.

Collier, P. and Dollar, D. (2004). Development effectiveness: what have we learnt? *Economic Journal*, 114(496):F244–F271.

Deaton, A. S. (2009). Instruments of development: Randomization in the tropics, and the search for the elusive keys to economic development. Working Paper 14690, National Bureau of Economic Research.

Dehon, C., Gassner, M., and Verardi, V. (2011). Extending the Hausman test to check for the presence of outliers. ECARES Working Papers 2011-036, ULB – Universite libre de Bruxelles.

Djankov, S., Montalvo, J., and Reynal-Querol, M. (2008). The curse of aid. *Journal of Economic Growth*, 13(3):169–194.

Downs, A. (1957). *An economic theory of democracy*. Harper and Row, New York.

Dreher, A., Mölders, F., and Nunnenkamp, P. (2007). Are NGOs the better donors? a case study of aid allocation for Sweden. KOF Working papers 07-180, KOF Swiss Economic Institute, ETH Zurich.

Easterly, W. (2007). *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill And So Little Good*. Number 9780199226115 in OUP Catalogue. Oxford University Press.

Edwards, M. and Hulme, D. (1996). Too close for comfort? the impact of official aid on non-governmental organizations. *World Development*, 24(6):961–973.

Fafchamps, M. and Owens, T. (2009). The determinants of funding to Ugandan non-governmental organizations. *The World Bank Economic Review*.

Fei, J. C. and Paauw, D. S. (1965). Foreign assistance and self-help: A reappraisal of development finance. *The Review of Economics and Statistics*, 47(3):251–267.

Freedom House (February 5, 2014). Zambia's Government Should Halt Enforcement of NGO Law. `www.freedomhouse.org`.

Fruttero, A. and Gauri, V. (2005). The strategic choices of NGOs: Location decisions in rural Bangladesh. *The Journal of Development Studies*, 41(5):759–787.

Hansmann, H. (1980). The role of nonprofit enterprise. *The Yale Law Journal*, 89(5).

Hart, O. and Moore, J. (1998). Cooperatives vs. Outside Ownership. NBER Working Papers 6421, National Bureau of Economic Research, Inc.

Herzer, D. and Nunnenkamp, P. (2012). The effect of foreign aid on income inequality: Evidence from panel cointegration. Kiel working papers, Kiel Institute for the World Economy.

Human Rights Watch (June 11, 2013). Why egypt's new law regulating ngos is still criminal. `www.hrw.org`.

INS, I. N. d. S. (1994). Annuaire de statistiques regionales. Technical report, Ministere des affaires economiques.

Istanbul Principles (2011). First Global Assembly of the Open Forum for CSO Development Effectiveness, Istambul, Turkey.

Kharas, H. (2007). The new reality of aid. Technical report, Wolfensohn Center for Development at Brookings.

Koch, D.-J. (2007). Blind spots on the map of aid allocations: Concentration and complementarity of international NGO aid. Technical report.

Koch, D.-J., Dreher, A., Nunnenkamp, P., and Thiele, R. (2009). Keeping a low profile: What determines the allocation of aid by non-governmental organizations? *World Development*, 37(5):902–918.

Kuan, J. (2001). The Phantom Profits of the Opera: Nonprofit Ownership in the Arts as a Make-Buy Decision. *Journal of Law, Economics and Organization*, 17(2):507–20.

Lansley, J. (1996). Membership participation and ideology in large voluntary organisations: The case of the National Trust. *Voluntas*, 7:3:221–240.

Layton, T. and Fuller, J. (2008). Aiding inequality: A pooled time-series analysis of the effect of foreign aid on income inequality. Technical report, Interamerican Development Bank Working Paper No. 455.

Lepart, J. and Marty, P. (2006). From natural reservations to the biodiversity territories. the case of France. *Annales de Géographie*, 651:485–507.

Lorgen, C. C. (1998). Dancing with the state: the role of NGOs in health care and health policy. *Journal of International Development*, 10(3):323–339.

Mansuri, G. and Rao, V. (2012). *Localizing Development: Does Participation Work?* Policy Research Reports. World Bank Publications, 1rd edition.

Maronna, R. and Yohai, V. (2000). Robust regression with both continuous and categorical predictors. *Journal of Statistical Planning and Inference*, 89(1):197–214.

Maschler, M., Solan, E., and Zamir, S. (2013). *Game Theory*. Cambridge University Press.

Mekasha, T. J. and Tarp, F. (2011). Aid and growth what meta-analysis reveals. Technical report.

Mercer, C. (2002). NGOs, civil society and democratization: a critical review of the literature. 2(1):5–22.

Mosley, P. (1986). Aid-effectiveness: The micro-macro paradox. *IDS Bulletin*, 17(2):22–27.

Navarra, C. (2013). Economics of development NGOs: a survey of existing datasets. *CRED Working Papers*, 1305.

OCDE (2011). How DAC members work with civil society organisations: An overview 2011. Technical report.

OECD (October 2014). StatExtracts, Retrieved from http://stats.oecd.org/ .

Paris Declaration (2005). Adopted at the Second High Level Forum on Aid Effectiveness, Paris, France.

Persson, T. and Tabellini, G. (2002). *Political Economics: Explaining Economic Policy*, volume 1 of *MIT Press Books*. The MIT Press.

Petras, J. (1997). Imperialism and NGOs in Latin America. *Monthly Review*, 49(07).

Platteau, J.-P., Somville, V., and Wahhaj, Z. (2011). Elite capture through information distortion: A theoretical essay. Working Papers 1103, University of Namur, Department of Economics.

Platteau, J.-P., Somville, V., and Wahhaj, Z. (2014). Elite capture through information distortion: A theoretical essay. *Journal of Development Economics*, 106(C):250–263.

Rajan, R. and Subramanian, A. (2007). Does aid affect governance? *American Economic Review*, 97(2):322–327.

Rajan, R. G. and Subramanian, A. (2008). Aid and growth: What does the cross-country evidence really show? *The Review of Economics and Statistics*, 90(4):643–665.

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

Rose-Ackerman, S. (1986). Do government grants to charity reduce private donations? In Rose-Ackerman, S., editor, *The Economics of Nonprofit Institutions*. Oxford University Press, Oxford.

Roy, A. (2004). Help that hinders. *Le Monde Diplomatique*.

Salamon, L. M. (2010). Putting the civil society sector on the economic map of the world. *Annals of Public and Cooperative Economics*, 81(2):167–210.

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

Svensson, J. (2000). Foreign aid and rent-seeking. *Journal of International Economics*, 51(2):437–461.

The Economist (Mars 28, 2013). Will Russia play tough with its "foreign agent" law? `www.economist.com`.

The Economist (September 13, 2014). Foreign Funding of NGOs: Donors, Keep Out. `www.economist.com`.

The Guardian (December 22, 2010). Venezuelan national assembly bars foreign funding for NGOs. `www.theguardian.com`.

The Independent (September 31, 2006). Europe accuses Sri Lankan army of assassinating aid workers. `www.independent.co.uk`.

Thornton, J., Castaneda, M., and Garen, J. (2008). Competition, Contractibility, and the Market for Donors to Nonprofits. *Journal of Law, Economics and Organization*, 24(1):215–246.

Torsvik, G. (2005). Foreign economic aid; should donors cooperate? *Journal of Development Economics*, 77(2):503–515.

Verardi, V. and Croux, C. (2009). Robust regression in Stata. *Stata Journal*, 9(3):439–453.

Weisbrod, B. (1986). Toward a theory of the voluntary nonprofit sector in a three-sector economy. In Rose-Ackerman, S., editor, *The Economics of Nonprofit Institutions*. Oxford University Press, Oxford.

Worthington, S. and Pipa, T. (2011). Private development assistance: the essentail role of INGOs and foundations in a 21st century aid architecture. In Kharas, H., Koji, M., and Woojin, J., editors, *Catalizing Development: A New Vision for Aid*. Brookings Institution Press.

Yontcheva, B. and Masud, N. (2005). Does foreign aid reduce poverty? empirical evidence from nongovernmental and bilateral aid. IMF Working Papers 05/100, International Monetary Fund.

Yontcheva, B. and Nancy, G. (2006). Does NGO aid go to the poor? empirical evidence from europe. IMF Working Papers 06/39, International Monetary Fund.