Natural Capital Restoration and Corporate Philanthropy: Charity or Investment?

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The importance of natural capital restoration is growing in recent academic articles. Many of them deal with the chronological development of corporate philanthropy in opposition to international charity's funds. This paper contributes to the developing stream of research that focuses on the relationship between natural capital restoration and corporate philanthropy in developing countries. Contributions from the social issues in management field have argued that social responsiveness is a fundamentally multidimensional construct that embodies a large and varied range of corporate behaviour in relation to its resources, processes and outputs. In this paper, we do show that corporate philanthropy is not a charities activity, but an activity which is submitted to an economic efficiency constraint. We consider private–private partnerships (PPP), in which the Green Fund selects a project that is then developed and operated by a Corporate. We derive optimal private accounting rules when the official's choice among projects by the Fund's Principles.

Keyword: Natural capital restoration Funds, Corporate Philanthropy, Development Economics, Sustainability, Socially Responsible Investment (SRI)

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Introduction

For the last ten years, environmentalists and the trade policy community have engaged in a heated debate over the environmental consequences of liberalized trade. This solution is sensitive to assumptions about entry and market structure, when there are two or more domestic firms, part of the potential rents from exporting are dissipated as the two domestic firms compete with each other. The optimal policy to counter this competition is an export tax (or quota), which in our case is a tightening of environmental policy. Trade affects the environment via scale, composition, and technique effects, and these effects can all be expected to vary across countries. Some recent work has demonstrated how these effects can be isolated and estimated. Future work in this area should be attempting to refine, extend, and improve on these methods. In this case we have the asymmetric information of the corporate and national policy.

The subject of corporate responsibility is among the most hotly debated globalization topics Lenzen, M., D. C. and F. B. (2004). Each stakeholder group seems to have its own definition, each placing its preferred issue at the heart of its appeals to business. Developing commonly shared conceptual clarity on exactly what corporate responsibility means beyond legal compliance is therefore highly desirable. In this respect, the United Nations Environment Programme Finance Initiative (UNEPfi) works closely with 160 financial institutions worldwide; to develop and promote linkages between the environment, sustainability and financial report. The UNEPfi aimes at analysing the environmental, social and corporate governance issues that may be material for company performance. It contributes also to identify the potential impacts on company performance's evaluations.

In the academic literature, the corporate philanthropy issue becomes prominent (Brammer, S. and A. Millington, 2008). This body of studies stresses on the chronological development of corporate philanthropy in the United States or the United Kingdom and then examines the correlates of philanthropy (McGill, B. J., Brian J. Enquist, E. Weiher and M. Westoby (2006)). These developments in social beliefs and preferences are expected to condition the link between philanthropic expenditures and firm reputation. In particular, the link is more strongly positive if firm philanthropy programmes are consistent with these revealed preferences in those funds. In this communication, we are arguing that the corporate philanthropy is not Charity, which is defined as the aggregate contributions of individuals to social welfare or other organizations (Levy, F. K. and G. M. Shatto, 1978 ; Noble, G., J. Cantrell, E. Kyriazis and J. Algie, 2007). In recent years, the corresponding responsibility funds appear as substitutes for private contributions (charity) dedicated to non-profit organizations or government.

Our paper consists in using the model of Maskin, E. and J. Tirole (2008) to examine the relation between Natural capital restoration funds, local community and company management for the natural capital restoration' programmes. Natural capital restoration funds are in charge of choosing projects and it is a contractor who implements them. Formally, each project comprises three cycles. During the first cycle, the Local community decides (or not) to restore its natural capital. In the second cycle, the Corporate decides (or not) to assist the local community for the restoring of natural. In the third cycle, the management's Founds decides (or not) to allocate funds to the Corporate. Our model stresses on the charity-investment debate. In particular, we assume that:

(1) The corporate philanthropy cannot be only reduced to a charity act because the natural capital restoration funds require *outcomes* in the environmental project.
(2) natural capital restoration funds ensure the *efficiency* of the natural capital restoration project because they are evaluated by the environmental principles of this project.

In the first section, we precise the origins of philanthropy economics applied in the field of restoration management projects. In the second section, we use a Markovian Perfect Equilibrium (MPE) model to examine the impacts of corporate philanthropy on the restoration project.

1 Natural capital, corporate philanthropy and Private–private partnerships

It is commonly recognised amongst the economists that natural and environmental resources endowment of a country appears as a critical economic asset, which can be called as natural capital. Into natural capital, we can include the pollution (outflow of the production process) and natural resources (inflow to production). Natural capital is the provider and absorber of flows, not the flows themselves. Environmental amenities are used without being consumed, but human action does interfere with ecosystems' ability to deliver them (Lawn, 2003). A few decades ago, Georgescu-Roegen (1971) called nature "the silent companion of man" to draw attention to the fact that nature works as a *fund* performing a diversity of functions such as the maintenance of soil fertility, climate control, or natural beauty. The spatial and temporal scales of ecosystem functioning vary greatly, and there is presently great uncertainty regarding the true extent of societal dependence on natural ecosystems (Comolli, 2005). As Odum. (1969) showed, modern agriculture and modern land occupation are, in general, highly disruptive of ecosystem function. Even though purely geographical space does not correspond to ecological space, we can conceptualise that natural capital is in fact composed of a fraction used for productive processes ("the biological slaves of mankind") and a fraction of "free" natural capital. More recently, England (2000) advanced the stimulating insight that ecological projects in the local community are only provided by the fraction of land not occupied by mankind.

With reference to this notion of ecological project, no one would contest today that the management of natural capital appears as a critical issue to the local community's ability to reach sustainable economic development (Barbier, 2006). Many ameliorative actions are available for restoring natural capital. They include the protection of remnant vegetation through reduction or removal of threats such as grazing stock and invasive species, ecological restoration in cleared areas using a diverse mix of indigenous species, conservation farming practices. Ecological restoration using indigenous species can restore ecosystems and provide additional habitat for native species, but it also restores soil and water resources through preventing soil wind erosion and rising groundwater, respectively (Hobbs et al., 1993 ; Salt et al., 2004 ; Pannell and Ewing, 2006). This activity is not only ecological *per se*, it also reveals a financial dimension.

The ecological projects were traditionally supported by private charity. However, this type of financing is not efficient with respect to the complexity of these projects. The private charity is viewed as traditional philanthropy. According to Sugden (1982, p.341), the theory of private philanthropy relies on three principal assumptions. Firstly, with reference to Samuelson (1954), "the charitable activity in question - say, the relief of poverty or the provision of health care - is a common argument in many individuals' utility functions, and so is a public good in the theoretical sense". Secondly, "each individual's decisions concerning his philanthropic activities are determined solely by the objective of maximising his utility". Thirdly, "each individual, when deciding how much (if anything) to contribute to a charitable activity, takes everyone else's contributions as given". In this communication, we argue that this theory of private philanthropy, which is based upon *public-ness*, *utility maximisation* and *Nash conjectures* is inconsistent with the observed forms of corporate philanthropy which are clearly subject to an *expert external control*. We do consider that the Socially Responsible Fund represents this expert external control agent. Given that these funds now represent a significant part of all investment funds, it is important to study whether or not SRF strategies achieve their goal of promoting social responsibility.

2 The model

Our model is constructed in the following way Private–Private Partnerships in a Markovian Perfect Equilibrium (Castro and Brandão, 2000): the *Local Community* (**L**) that is directly concerned by the restoring of natural capital, the *Corporate* (**C**) which restores the natural capital and the *Natural Fund* (**F**) who finances the Corporate. Each player (Local Community, Corporate and Funds) is part of a three-cycle of play. This means that, for instance, **L** at time $3k$, **C** at time $3k+1$ and **F** at time $3k+2$, for integer values of k. Since each player has an infinite number of moves and we assume the strategies are Markov, it does not matter who plays first. In fact, consider an external observer who looks at the game over a three-cycle. This cycle can be $(3k,\ 3k+1, 3k+2), (3k+1,\ 3k+2,\ 3(k+1))$ or $(3k+2,\ 3(k+1)$. Hence, the observer has no information about who was the decision of the Natural Fund (**F**).

The payoffs for each player are:
- $\pi_L(x,\ y,\ f)$ for the Local community, representing its social benefit ($\pi_1(x,\ y,\ s) = \pi(x,\ y) + sx$ where π is the benefit in the absence of a fund);
- $\pi_C(x,\ y)$ for the Corporate, representing its profit; and
- $W(x,\ y)$ for the Natural **F**unds, representing the welfare given by $W(x,\ y) = \pi_L(x,\ y,\ f) - fx$ where x is the output of **L**, y the output of **C** and f the *fund* given to **C** by **F**.

The dynamic reaction function for each player is represented by

- $x = R_L(y,\ f)$ for **L**;
- $y = R_C(x)$ for **C**; and
- $f = R(x)$ for **F**.

Note that even though the reaction function of **L** is independent of the *fund*, it can reflect its influence through the output of **L**, which obviously depends on the *fund*. The same is valid for the dependence of the reaction function of the **F** with the output y of **L**. A set of reaction functions $(R_L,\ R_C, R)$ constitutes a MPE if any player's reaction function maximizes its present discounted profit given the other players' reaction functions. From dynamic programming we know that for $(R_L,\ R_C, R)$ to be a MPE it suffices that there exists valuation functions :

$\{v_L(y,\ s);\ w_L(x)\},\{v_C(x);\ w_C(y)\}$ and $\{v(x,y);\ w(s)\}$,

such that, if $\delta = e^{-rt}$ is the discount factor for interest rate r, we have

For the Local community (**L**) :

$$\begin{cases} v_L(y,g) = \max\limits_x \{\pi_L(x,y,f) + \delta^2 w_L(f)\} \\ R_C(x) \in \arg\max\limits_x \{\pi_L(x,y,f) + \delta^2 w_L(f)\} \\ f(x) = \pi_L(x, R_C(x)) + \delta^2 v_L(R_C(x), R(x)) \end{cases} \tag{1}$$

For the Corporate (**C**) :

$$\begin{cases} v_C(x) = \max\limits_y \{\pi_C(x,y) + \delta^2 w_C(f)\} \\ R_C(x) \in \arg\max\limits_y \{\pi_C(x,y) + \delta^2 w_C(f)\} \\ w_C(y) = \pi_C(y_L, R_L(x)) + \delta^2 v_L(R_2(y, R(x))) \end{cases} \tag{2}$$

For the Fund (**F**) :

$$\begin{cases} v(y,f) = \max\limits_x \{W(x,y) + \delta^2 w_L(f)\} \\ R(X) \in \arg\max\limits_x \{\pi_L(x,y) + \delta^2 w_L(f)\} \\ w(g) = W(R_L(y,f), R_C(R_L(y,f))) + \delta v(R_L(y,f), R_2(y,x)) \end{cases} \tag{3}$$

Starting with the first-order conditions to optimize the first of each set of equations we obtain:

$$\frac{\partial \pi_L}{\partial x}(R_L(y,f), y, f) + \delta^2 \frac{dw_L}{dx}(R_L(y,f)) = 0, \tag{4}$$

for the Fund and analogous equations for the other actors. These are all we need to prove the existence of a MPE in this game setting. The above three sets of equations are derived in the following way, using the arguments in Maskin, E. and J. Tirole (1987)

1. For the first set of equations, suppose the Local community plays at time $3k$, which is the present time. Then v_1 represents the present profit of **L** plus all the discounted profits in the future — these are given by $\delta^2 w_L(x)$, since the Fund's next decision will be at time $3k+2$. The function w_1 is then calculated using the reaction functions of the other two players for times between the present and $3k+2$. To include in w_1 all future profits we discount for time $3k+3$ using v_1 calculated at that instant.
2. The remaining two sets are obtained in a similar way, assuming the Corporate plays at time $3k+1$, which is the present when deriving the second set of equations, and the Found plays at $3k+2$, which is again taken to be the present for the third set of equations.

We suppose that the Corporate captures enough of this restoring so that pre-evaluation is also privately worthwhile. With pre-evaluation, all contracts will be of the fixed-price variety, and social welfare becomes: Following both Fudenberg &. Tirole (1995) and Maskin & Tirole (2008), we use quadratic payoffs and linear reaction functions, ensuring thus that the second order conditions for maximization are satisfied. In what follows the payoff functions are, considering that the inverse demand function can be represented by $p=d-x-y$,

$$\pi_1(x,\ y,\ f) = x(d - x - y) - c_x + f_x - D,$$
$$\pi_2(x,\ y) = y(d - x - y) - c_y - G,$$
$$W(x,\ y) = x(d - x - y) - c_x - D$$

and the reaction functions

$$R_L(y, f) = a - b_L y + e_f,$$
$$R_C(x) = a - b_{2x},$$
$$R(x) = \beta x.$$

Note that there is no constant term in the reaction function for the government since, because the *fund* is given to the production, the government does not give a *fund* unless the output x of Fund is non-zero. All the constants are positive, except possibly β. This means that we allow for the *fund* to be, in fact, a *grant*. This also means that the reaction function for Corporate is downward sloping and that the reaction function for the Fund is downward sloping only for y. Next we state and prove our main result.

Theorem 1. *For any discount factor* δ *there exists at least one Markov perfect equilibrium.*

Proof. Because the reaction functions are linear and the payoffs quadratic, the valuation functions $\{v_L,\ w_L\},\{v_C,\ w_C\}\ \{v,\ w\}$ are quadratic. According to the Basic Model of Fudenberg and Tirole (1995), we know that if the objective functions defined by the first equations of ((1), (2) and (3)) are continuous at infinity then there exists a MPE. Furthermore, we know that concave functions are continuous at infinity and this is what we prove. We treat the objective functions as functions of one variable (x, y or f, respectively) only and use the first-order conditions written in Eq. (4) for Fund and their analogues for the two other players. The function in the left-hand side of (4) is a function of the two variables y and f. Calculating the partial derivative with respect to, for instance, y (the result is the same for the other variable) we obtain

$$\left(\pi_{L,xx}(R_L,\ y,\ f) + \delta^2 w_{L,xx}(R_L)\right) R_{L,y} + \pi_{L,xy}(R_L, y, f) = 0.$$

The notation used is $D_{*\beta}$ to represent the second-order derivative of D with respect to $*$ and, in this order, without distinguishing partial from total derivatives. With the payoff and reaction functions we have chosen, we have

$$R_{L,y} < 0 \ and \ \pi_{L,xy}(R_L,\ y,\ f) < 0,$$

hence, we must have

$$\pi_{1,xx}(R_1,\ y,\ f) + \delta^2 w_{1,xx}(R_1) < 0$$

Proving that, as a function of x the objective function is concave. Using the first-order conditions for Private we conclude that the objective function is concave by an entirely analogous process. Let us now consider the first-order conditions for the government, describing a function of x and y which we differentiate with respect to x to obtain

$$W_{ff}(x, y)+\delta^2 w_{ff}(R))R_x(x)+W_{xf}(R)=0$$

Since W does not depend explicitly on f, we have $W_f = 0$ which implies

$$\delta^2 w_{ff}(R)R_x(x)=0$$

and, because both δ and $R_x(x)$ are non-zero, $w_{ff}(R)=0$. This means we have

$$W_{ff}(x, y)+\delta^2 w_{ff}(R)=0.$$

If we calculate higher-order derivatives we conclude that all derivatives are zero and hence, the function is constant. It is trivial to conclude that then it is continuous at infinity.

Conclusion

The restoring of natural capital is not possible with the sole money (private charity), but with the ecological project (corporate philanthropy). The efficiency of the restoring of natural capital is obtained thanks to the control exerted by the expertise of the Socially Responsible Fund in a Markovian Perfect Equilibrium.

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