

# A Positive Theory of Moral Management, Social Pressure, and Corporate Social Performance

David P. Baron  
Stanford University

## I. Introduction

This paper presents a positive theory of corporate social responsibility and distinguishes it from corporate social performance (CSP), where the latter refers to social actions of firms and the former refers to social actions motivated by moral obligation. Corporate social responsibility is thus the result of moral management—the voluntary fulfillment of an identified moral duty. In the theory moral management is manifested by a voluntary response to an unaddressed externality associated with the operations of a firm or to a voluntary redistribution of profits. Morally-motivated performance constitutes CSP, but CSP also includes performance motivated by self-interest. For example, a self-interested firm could market a green product because it can charge a higher price and increase its profits, or it could respond to the externality or redistribute profits because of potentially harmful social pressure. Social pressure could come from public politics and government, but it could also come more directly from private politics.<sup>1</sup> The theory presented here does not incorporate government but instead focuses on private politics. Private politics is based on citizens' preferences, but it is plagued by free-rider and coordination problems. NGOs and activist organizations help overcome these problems, and in the theory social pressure is applied by an activist organization that is financed by contributions from citizens.

Citizens can reward firms for their CSP, but they also may distinguish between morally-motivated performance and performance motivated by social pressure or self-interest. From a normative perspective this distinction matters because a morally-managed firm can be expected to respond to new issues in the absence of social pressure or profit incentives, whereas a self-interested firm acts only when pressured or sufficiently rewarded.<sup>2</sup> From a positive perspective in the theory if citizens do not distinguish between moral management and CSP induced by social pressure, social pressure is more likely to be directed to morally-managed firms and the demands made on those firms are higher.

Moral management as considered here refers to a pattern of conduct that goes beyond normal business management and compliance with the law. Actions taken by a self-interested firm to

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<sup>1</sup> Baron (2001)(2003) provides an introduction to private politics.

<sup>2</sup> This perspective is presented in Baron (2006a) and in earlier editions of the book.

maximize its profits or market value represent normal business activity and constitute shareholder responsibility. Similarly, actions required by law or regulation would be taken by any firm. Normal business actions and compliance with the law may be viewed as CSP by some citizens, but they need not be morally motivated nor represent corporate social responsibility. Vogel (2005) views CSP as requiring actions beyond normal business activity and compliance with government requirements but does not distinguish between morally-motivated actions and actions motivated by social pressure. In the terminology used in this paper, he addresses CSP. Heal (2005) focuses on situations in which private and social costs diverge, and thus he views corporate social responsibility as “taking actions which reduce the extent of externalized costs or avoid distributional conflicts.” This definition also corresponds to CSP.

To evaluate and distinguish between moral management and CSP, a model must (1) trace their effects in the marketplace, (2) trace their effects of social pressure including the choice of a target firm by the activist, (3) price or value social pressure, and (4) price or value moral management and CSP. Behavior in the model is driven by citizens’ preferences. Citizens are consumers in the marketplace, donors in the market for social causes through personal giving and contributions to the activist and social pressure, and investors in the capital market by allocating wealth to savings and shares in morally-managed and self-interested firms. In contrast to Baron (2006b) this paper introduces competition in which firms differentiate their products through CSP and adds social pressure in the form of activism funded by citizens’ contributions.

Moral management or CSP that goes beyond normal business activity, or beyond what makes business sense, is costly, but the cost could be offset by certain benefits, five of which are incorporated in the model.<sup>3</sup> As a result of moral management or CSP a firm could benefit in the marketplace, first, if additional consumers are attracted or, second, if their willingness to pay is greater. Third, moral management and CSP could also benefit a firm if it directs social pressure away from the firm. Fourth, if moral management builds a favorable reputation among citizens, social pressure could be mitigated. For example, a boycott could be less effective or reputational damage could be mitigated if a firm has favorable reputational capital with citizens. Fifth, a firm could benefit if citizens obtain satisfaction from holding its shares. Unfortunately, little is known conclusively about whether such benefits accrue only to morally-managed firms or more broadly to firms that generate CSP.

The value of moral management and CSP depends on the preferences of citizens and how much

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<sup>3</sup> Other benefits of moral management and CSP could be improved employee morale, more successful recruiting, and improved relations with government.

they reward firms for their policies and actions. Citizens may have both altruistic and egoistic, or warm glow, preferences, using the terminology of Andreoni (1990). Altruistic preferences pertain to the societal benefits from responding to the externality and the good done by personal and corporate giving. Egoistic preferences pertain to the personal satisfaction from, or private good aspect of, social giving, including personal and corporate giving, moral management, and contributing to social pressure. If the model were to include government provision of social good financed by lump-sum taxes, personal giving motivated by altruistic preferences would be perfectly crowded out (Andreoni (1988)).<sup>4</sup> Consequently, government provision of social good is not included in the model.<sup>5</sup> Nevertheless, private giving can be crowded out by moral management and CSP.

In the theory citizens are assumed to receive a warm glow from, or have egoistic preferences for, moral management and possibly also from CSP more broadly.<sup>6</sup> Citizens, however, may distinguish between morally-motivated management and CSP motivated by social pressure. The theory provides a valuation for moral management and CSP based on both product and capital markets. In the product market moral management and CSP provide product differentiation and affect competition. Competition between firms producing otherwise identical products but where CSP provides product differentiation can strengthen incentives for CSP for some firms and weaken them for other firms. CSP thus may not make business sense for some firms. The valuation of moral management and CSP depends not only on the activities of the firms but also on the alternatives citizens have for fulfilling their social preferences. For example, the social impact of moral management on society may be offset if in response citizens give less personally to social causes or reduce their contributions to activist-led social pressure. The theory demonstrates that this crowding out results whenever citizens have warm-glow preferences.

In the theory CSP-based product differentiation allows the morally-managed firm to attract a consumer clientele that values CSP, and the firm sets a high price in response to its clientele's preferences. A self-interested firm prefers maximal product differentiation and hence does not provide CSP. The cost of moral management thus is mitigated both by the clientele its product

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<sup>4</sup> Nyborg and Rege (2003) survey alternative theories that give rise to crowding out.

<sup>5</sup> With distortionary taxation contributions motivated by altruistic preferences are imperfectly crowded out by government provision. This would reduce the cost of CSP without affecting the qualitative properties of the model.

<sup>6</sup> Becker (1974) and Andreoni (1989, 1990) consider social satisfaction and warm glow preferences. Videras and Owen (2006) analyze the World Values Survey and find evidence that personal contributions to environmental activities are positively correlated with satisfaction and happiness. They conclude that some portion of the correlation is causal; i.e., personal contributions increase satisfaction and happiness.

attracts and the credit arising from the preferences of citizens to hold shares in a morally-managed firm. The activist may find the morally-managed firm be an attractive target, however, because it has more to lose from a campaign than does the self-interested firm. If the morally-managed firm is protected against social pressure by a reputation for responsible conduct, the activist may find a self-interested firm to be the more attractive target. A self-interested firm has no incentive to act proactively to mitigate social pressure unless it receives sufficient reputational capital from doing so. Proactive measures, however, are encouraged by any credit given in the capital markets by citizens for those measures.

The next section introduces the model, and the following section considers competition in the product marketplace. Section IV considers private politics and social pressure led by an activist. Section V introduces a capital market and a citizen's allocation problem, which provides the valuation of moral management and CSP. Conclusions are offered in the final section.

## **II. The Model**

### **A. Moral Management**

The normative framework in the theory is utilitarianism, and the normative issues are an externality associated with the production of firms and corporate redistribution. The externality could be associated with climate change, hazardous waste, or a safety risk associated with a product, and corporate redistribution could include paying a living wage, improving working conditions in suppliers' plants in developing countries, and providing charitable gifts to the communities in which the firm has operations. The externality and the redistribution are not optimally addressed by the government, so there is a government failure and a social welfare improvement that can be made. A normative framework, however, requires not only identifying a social welfare improvement but also identifying which parties have the duty or responsibility to respond to it.

Coase (1960) noted that externalities are reciprocal, so there is more than one way to address an externality. If bargaining is costless, the assignment of duty or responsibility is a distributive issue rather than an efficiency issue. The situation considered here is one in which there are substantial transactions costs associated with any bargaining over the externality, as in the case of global warming. In such a situation, from a utilitarian perspective the duty should be assigned to the party that can most efficiently mitigate the externality. Calabresi and Melamed (1972) provide a test to determine which party should be assigned the duty, and here that test is assumed to assign the duty to firms. For example, firms may be best-placed to mitigate the externality, and hence the duty should be assigned to them. The morally-managed firm voluntarily accepts this

identified duty, whereas the self-interested firm only responds to social pressure.<sup>7</sup> In addition, the morally-managed firm may have an identified duty to redistribute a portion of its profits. The morally-managed firm is assumed to have a recognized pattern of conduct that is equivalent to committing *ex ante* to moral management. For example, it could make a public statement about its duty and fulfill that duty through its actions.

The maintained hypothesis is that moral management is not coincident with profit or value maximization because of the cost of addressing the externality. That is, citizens do not reward the firm sufficiently in the product market or the capital market to offset the cost of addressing the externality. Consequently, the socially-efficient response to the externality is assumed to be greater than the profit-maximizing response, which may be zero. Responding to the externality thus does not make business sense. If the response made business sense, every firm would take the socially-efficient response, and there would be nothing to explain.

## **B. Social Pressure**

Social pressure is a manifestation of the preferences of society for both financial returns and responsible conduct of firms. Assessing society's preferences is difficult at best, since preferences for responsible conduct may not be fully revealed through the actions of citizens. Responses to polls are cheap talk and are seldom put to the test of whether citizens would act in accord with their responses. In particular, poll questions about protecting the environment, improving human rights, and redistribution may not identify the costs associated with those actions, and if they do, the poll respondent does not face the actual test of paying that cost rather than allocating those funds to consumption or investment. In addition, individual actions motivated by altruistic preferences may face a collective action problem due to free-riding and may also be crowded out by government actions. The theory presented here is not based on altruistic preferences but instead views the satisfaction from responsible conduct by firms as a private good.<sup>8</sup>

The model grounds social pressure in the preferences of citizens by requiring citizens to back their preferences with financial contributions. Those contributions support NGOs that work for social causes and may also have their own preferences. The NGOs are then the instrument of society and serve to direct social pressure to economic agents, which in the model are firms. The

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<sup>7</sup> Bekke, Kverndokk, and Nyborg (2003) provide a theory in which individuals trade off a disutility for failing to fulfill a moral obligation against economic incentives. In the theory presented here, the morally-managed firm fulfills its moral obligation and once that obligation has been fulfilled it responds to economic incentives.

<sup>8</sup> See Andreoni (1990) for this perspective in the context of the private provision of public goods.

focus is on activist NGOs that engage in private politics. They select a target firm and campaign against it with a threat of harm if the target does not respond to their campaign demands.

The social pressure manifested through activists may induce change in the conduct of a firm, but for the pressure to be credible, it must be backed by the threat of harm. Harm could take many forms ranging from affecting product demand as in a boycott, reducing employee morale, deterring potential partners, and affecting the ability to hire or the wages that must be paid. The threat of harm could induce bargaining between the activist and its target.

Social pressure flows from citizen's preferences, and citizens could also reward firms for their conduct. In the model the reward flows from the social satisfaction or warm glow a citizen may experience from purchasing products of, or holding shares in, a firm whose conduct is in accord with their preferences. Although not incorporated in the model, the reward in the capital markets may be thought of as flowing through socially-responsible mutual funds that hold shares in firms whose conduct satisfies certain criteria.

### **C. Players**

The players are a continuum of citizens, two firms, and an activist. Citizens make investment and consumption decisions and also may personally give to social causes and finance social pressure by contributing to the activist. Citizens differ in their preferences for the firms' responses to the externality and to corporate redistribution.

One firm is assumed to be morally motivated and the other is self-interested. The morally-motivated firm responds to the externality *ex ante* in a socially efficient manner and may also make a voluntary contribution from its profits to social causes. Once the morally-motivated firm has met its moral obligation, it maximizes its profits or market value. The self-interested firm may also respond *ex ante* to the externality but only if doing so increases its market value. If a firm is targeted by the activist, it may respond to the externality *ex post* because of the social pressure from private politics. The firms can build a reputation among citizens by responding to the externality, and that reputation may be stronger if the motivation is moral rather than a self-interested response to reduce the pressure from private politics. The case of interest is that in which moral management is costly, since otherwise firms would effortlessly act morally.

The activist selects a target firm and campaigns to pressure it to respond to the externality. The activist has preferences for the extent to which the externality is addressed, and those preferences are assumed to be extreme in the sense that it has distributive preferences that favor citizens over firms. The activist thus prefers a response to the externality stronger than the

morally-required response. The activist requires funding for its campaign, and the funding available to it comes from voluntary contributions by citizens. These contributions then determine the amount of social pressure or harm that can be imposed on the target. The social pressure on a firm thus comes from citizens, and the activist is their instrument.

#### **D. Timing**

In stage 1 firms decide whether to respond to the externality and redistribute profit. In stage 2 citizens allocate their endowments among savings, shares of the firms, personal giving to social causes, and a contribution to the activist. In stage 3 the activist chooses a target firm and launches a campaign against the target. The target decides whether to fight the activist's campaign or to bargain to end the campaign. In stage 4 the firms choose the prices for their products, and in stage 5 consumers allocate their financial returns from their stage 2 investments to consumption and purchases from the firms. The notation is introduced as each stage of the game is introduced and analyzed. Information is complete and perfect, and a subgame perfect Nash equilibrium is sought.

### **III. The Product Market**

The product market includes a morally-managed firm, denoted by  $m$ , and a self-interested firm, denoted by  $s$ . The appropriate model of competition in the product market depends on the products and the market structure. To focus on CSP, both firms are assumed to produce identical products, but their products can be vertically differentiated by their CSP.<sup>9</sup> That is, a component of brand equity comes from a firm's CSP. The morally-managed firm ex ante mitigates the externality and may also give a portion of its operating profit to social causes. The self-interested firm does not redistribute its profits and mitigates the externality only in response to social pressure.

Citizens' preferences for a firm's product may depend on its CSP, such as the conditions under which the product is made, its responses to global warming, and its redistribution.<sup>10</sup> To simplify the exposition, citizen consumers are assumed to view corporate redistribution and mitigating the externality as perfect substitutes. Consumers' preferences for CSP are manifested in a higher valuation of the product, and each consumer is assumed to have a demand for one unit of the product. Let preferences be indexed by  $\psi \in [0, \bar{\psi}]$  and represented by a consumer surplus function

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<sup>9</sup> Fisman, Heal, and Nair (2005) and Navarro (1988) consider CSP as advertising.

<sup>10</sup> Feddersen and Gilligan (2001) refer to such a product as a credence good.

$u(\psi)$  of the form<sup>11</sup>

$$u(\psi) = u^o + \psi B - p,$$

where  $u^o$  denotes the utility from consumption of the product,  $\psi$  is the value consumers receive from the perceived benefits  $B$  from the CSP of the firm from which they purchase, and  $p$  is price. The benefits  $B$  are assumed to be increasing in the response to the externality and the redistribution of profits to social causes. A consumer will purchase the product if  $u(\psi)$  is nonnegative.

A citizen chooses between the two products to maximize her surplus  $u(\psi, I)$  given by

$$u(\psi, I) = u^o + I(\psi B_s - p_s) + (1 - I)(\psi B_m - p_m), \quad (1)$$

where  $p_i$  denotes the price of the product of firm  $i$ ,  $i = s, m$ ,  $I \in \{0, 1\}$  is an indicator variable that identifies the choice of the consumer, and  $B_i$  is the consumer's benefits from buying the product of firm  $i$ .

Since moral management does not make business sense, the morally-managed firm has the higher CSP, so  $B_m > B_s$  and hence  $p_m > p_s$ . The consumer indifferent between the two products is denoted by  $\psi^*$  and is identified by

$$\psi^* = \frac{p_m - p_s}{B_m - B_s}.$$

Consumers with  $\psi > (<) \psi^*$  purchase from firm  $m$  ( $s$ ); i.e., the optimal choice  $I^*$  is  $I^* = 0$  if  $\psi \geq \psi^*$  and  $I^* = 1$  if  $\psi < \psi^*$ . Consumers with a high valuation  $\psi$  prefer the product of the firm with the greater CSP, and those with a low valuation prefer the product of the other firm.

The profits  $\pi_i$ ,  $i = s, m$ , of the two firms are given by

$$\pi_s = \int_0^{\psi^*} (p_s - c_s) dH(\psi)$$

and

$$\pi_m = \int_{\psi^*}^{\bar{\psi}} (p_m - c_m) dH(\psi),$$

where  $c_i$ ,  $i = m, s$ , is marginal cost and  $H(\psi)$  is the distribution function of consumer preferences for CSP, where the number of consumers is normalized to 1. The marginal cost  $c_m$  of the morally-managed firm could be greater than  $c_s$ , since moral management fulfills a duty beyond profit maximization.

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<sup>11</sup> See Tirole (1988, pp. 296-8) for a discussion of this model.

The firms choose prices to maximize their profits, and to obtain a closed-form characterization of the equilibrium, let  $H(\psi)$  be

$$H(\psi) = \delta + (1 - \delta) \frac{\psi}{\bar{\psi}}, \quad \psi \in [0, \bar{\psi}], \delta \in [0, 1].$$

This specification represents a mass  $\delta$  of consumers who do not value CSP and  $1 - \delta$  who value it to varying degrees. To simplify the characterization of the equilibrium, let  $u^o - \frac{1}{3}(2c_s + c_m + \bar{\psi}(B_m - B_s)) > 0$  to ensure that in equilibrium all consumers purchase from one of the firms.

The equilibrium prices  $p_i^*, i = s, m$ , are

$$p_s^* = \frac{1}{3} [2c_s + c_m + \bar{\psi}(B_m - B_s)] \quad (2)$$

$$p_m^* = \frac{1}{3} [c_s + 2c_m + 2\bar{\psi}(B_m - B_s)], \quad (3)$$

so

$$\psi^* = \frac{1}{3} \left[ \bar{\psi} + \frac{c_m - c_s}{B_m - B_s} \right],$$

which is assumed to be positive. Both prices are increasing in  $B_m$  and decreasing in  $B_s$ .<sup>12</sup>

The difference in the prices is

$$\begin{aligned} p_m^* - p_s^* &= \frac{1}{3} [c_m - c_s + \bar{\psi}(B_m - B_s)] \\ &= p_s^* - c_s \geq 0, \end{aligned}$$

so the self-interested firm sets a lower price. That is, the morally-managed firm charges the higher price, and this is true even if it has lower marginal cost. The morally-managed firm thus takes advantage of consumers who value CSP by charging a higher price.

The operating profits  $\pi_i^*, i = s, m$ , of the firms are

$$\pi_s^* = \frac{\delta}{3} (c_m - c_s + \bar{\psi}(B_m - B_s)) + (1 - \delta) \frac{(c_m - c_s + \bar{\psi}(B_m - B_s))^2}{9\bar{\psi}(B_m - B_s)} \quad (4)$$

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<sup>12</sup> The market shares  $\Omega_s^*$  and  $\Omega_m^*$  of the two firms are

$$\Omega_s^* = \delta + (1 - \delta) \frac{1}{3} \left( 1 + \frac{c_m - c_s}{\bar{\psi}(B_m - B_s)} \right)$$

and

$$\Omega_m^* = \frac{(1 - \delta)}{3} \left( 2 - \frac{c_m - c_s}{\bar{\psi}(B_m - B_s)} \right).$$

The market share of the self-interested firm is greater than that of the morally-managed firm when  $c_s = c_m$  if  $\delta > \frac{1}{4}$ , and the market share of the self-interested firm is strictly increasing in  $c_m$ . The morally-managed firm thus could have only a market niche.

and

$$\pi_m^* = (1 - \delta) \frac{(c_s - c_m + 2\bar{\psi}(B_m - B_s))^2}{9\bar{\psi}(B_m - B_s)}. \quad (5)$$

The difference in the profits is

$$\pi_m^* - \pi_s^* = \frac{(1 - \delta)}{3} (2(c_s - c_m) + \bar{\psi}(B_m - B_s)) - \frac{\delta}{3} (c_m - c_s + \bar{\psi}(B_m - B_n)).$$

The profits of the morally-managed firm are the greater if and only if

$$\delta < \bar{\delta} \equiv \frac{2(c_s - c_m) + \bar{\psi}(B_m - B_s)}{c_s - c_m + 2\bar{\psi}(B_m - B_n)},$$

where  $\bar{\delta} = \frac{1}{2}$  if  $c_m = c_s$ . The morally-managed firm thus has higher profits than the self-interested firm when both have the same marginal cost only if a majority of consumers value moral management. If the morally-managed firm has higher marginal costs, a larger share of consumers must value moral management for the firm to have higher profits; i.e.,  $\bar{\delta}$  is strictly decreasing in  $c_m$ . Moral management, however, can increase  $B_m$ .

The profits in (4) and (5) are convex in their own perceived benefits  $B_i$ , respectively, and  $\pi_m^*$  is strictly increasing in  $B_m$  and  $\pi_s^*$  is strictly decreasing in  $B_s$  unless  $c_m - c_s$  is large.<sup>13</sup> Provided that the marginal cost of the morally-managed firm is not too great, the two firms have incentives to maximally differentiate on their CSP. That is, based on product market considerations the self-interested firm prefers  $B_s = 0$ , and  $B_m$  is at the level required by moral management. The self-interested firm may have  $B_s > 0$  if it mitigates the externality in response to social pressure, as considered in Section V.

The above characterization has been for firms that differentiate their CSP activities, which reflects the assumption that moral management requires mitigation of the externality beyond the point that maximizes profits or market value. If both firms had identical CSP activities, they would compete in price down to the higher of the two marginal costs. For example, if  $c_m \geq c_s$ , the equilibrium prices are  $p_i^* = c_m, i = s, m$ . CSP allows the firms to differentiate their products, and the morally-managed firm obtains a price premium for its product. The self-interested firm then can raise its price. CSP thus enables both firms to increase their profits.

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<sup>13</sup> The derivative is

$$\frac{d\pi_s^*}{dB_s} = -\frac{\delta\bar{\psi}}{3} + (1 - \delta) \frac{(c_m - c_s + \bar{\psi}(B_m - B_s))}{9\bar{\psi}(B_m - B_s)^2} [c_m - c_s - \bar{\psi}(B_m - B_s)],$$

which is negative for  $c_m < c_s + \bar{\psi}(B_m - B_s)$ .

The principal results of this section are summarized in the following proposition.

**Proposition 1:** If products are differentiated by CSP, the morally-managed firm serves a clientele of citizen consumers who have a high value for CSP and also charges a high price. The self-interested firm charges a low price and serves a clientele with a low value for CSP. The two firms have incentives to maximally differentiate their products, and both are more profitable than if their products were not differentiated.

Given their preferences, consumers are better off because of CSP. The consumer surplus  $u(\psi) = u(\psi, I^*)$ , where  $I^*$  indicates the optimal choice, of a citizen is

$$u(\psi) = \begin{cases} u^o + \psi B_s - \frac{1}{3} [2c_s + c_m + \bar{\psi}(B_m - B_s)] & \text{if } \psi \in [0, \psi^*) \\ u^o + \psi B_m - \frac{1}{3} [c_s + 2c_m + 2\bar{\psi}(B_m - B_s)] & \text{if } \psi \in [\psi^*, \bar{\psi}]. \end{cases} \quad (6)$$

If there is maximal differentiation so that  $B_s = 0$ , the surplus of consumers who purchase from the self-interested firm is constant in  $\psi$ , whereas the surplus of consumers who purchase from the CSP firm is linear and increasing in  $\psi$ . The surplus  $u(\psi)$  is thus an increasing and continuous function of  $\psi$ , so consumers with a high preference for CSP have the larger surplus. The surplus of all consumers has been assumed to be positive so that both firms are in the market.

## IV. Private Politics and Social Pressure

### A. The Activist and Its Target

Social pressure is assumed to come not from government but from citizens, and their instrument for applying pressure is an activist organization. The activist confronts a firm with the threat of harm and demands that it mitigate the externality. This confrontation represents private politics (Baron 2001, 2003); i.e., attempts by private parties to affect the behavior of other private parties.

The activist is assumed to have preferences for mitigating the externality, and those preferences may be extreme in the sense of preferring to mitigate the externality beyond the utilitarian optimum. Extreme preferences may correspond to a desire to punish the firm, compensate others for any remaining harm associated with the externality, or redistribute from the firm's owners to citizens; e.g., to compensate citizens for the firm's failure to respond to the externality in the past. The activist's preferences are represented by a utility function  $U_A = x$ , where  $x$  is the response by the target to the externality. The activist is rational, however, and takes what it can get, which depends on the strength of its threat and the actions of the target.

In stage 3 the activist first chooses a campaign to which it is assumed to be able to commit credibly. A campaign is composed of a target firm, a demand  $x^d$ , and a credible promise of harm  $\xi(A)$ , where  $A$  denotes the funds available to the activist to execute the campaign. These funds are contributed by citizens and thus do not represent a cost to the activist. The harm is assumed to be increasing in  $A$  with  $\xi(0) = 0$  and may be interpreted as reputation damage or a loss of profits as a result of the tactics implemented by the activist. The harm, for example, could come from a boycott organized by the activist. The demand is to be interpreted as an additional response to the externality, so if a firm took ex ante measures  $\hat{x}$  and it concedes to the activist's demand, its response to the externality is  $\hat{x} + x^d$ .

Given the announced campaign, the target can fight, concede, or bargain with the activist. If the target fights, the campaign is assumed to succeed with probability  $q \in [0, 1)$ . Fighting costs the target a fixed amount  $y$  and yields a probability  $1 - q$  of defeating the campaign.<sup>14</sup> The probability  $q$  thus can be interpreted as the “quality” of the activist, so a higher quality activist is more likely to have a successful campaign.

If the campaign is defeated, the target incurs no harm; i.e., the harm is neutralized or does not materialize. If the campaign succeeds, the target can either concede to the activist's demand  $x^d$  or bear the harm. A successful campaign imposes harm  $\mu\xi(A)$  on the target, where  $\mu \in [0, 1]$  reflects the protection provided by citizens' attitudes toward the firm. The parameter  $\mu$  could depend on the reputation of the target for moral management or CSP, where that reputation is earned by the stage 1 mitigation of the externality. A lower  $\mu$  represents a stronger reputation; i.e., a reputation that is more difficult for the activist to harm. More specifically,  $\mu = \mu(\hat{x})$ , where  $\hat{x}$  is the target's ex ante response to the externality. The function  $\mu(\cdot)$  is assumed to be strictly decreasing with  $\mu(0) = 1$ . That is, a target with no reputation for CSP bears the full brunt of the campaign, whereas a target that addresses the externality ex ante ( $\hat{x} > 0$ ) may bear less of the brunt, since citizen-consumers have a more favorable view of it.

Instead of fighting, the target can bargain with the activist over a response to the externality. There is no institution to structure the bargaining, so the bargaining outcome will be represented by the Nash bargaining solution. That solution maximizes the product of the differences between the utility of the outcome and the autarky utility, which corresponds to no bargain.

If the target fights, loses, and concedes to a successful campaign or bargains with the activist,

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<sup>14</sup> Baron and Diermeier (2006) present a model in which the probability of winning is endogenous to the expenditure of the activist on the campaign and the target's expenditure to counter the campaign.

citizen-consumers may give the target credit in the marketplace for its ex post CSP. To represent this effect, let  $\kappa \in [0, 1]$  denote the fraction of the credit citizen-consumers give to the target for its ex post response to the externality relative to its ex ante response  $\hat{x}$ . The perceived benefits in the marketplace from CSP are assumed to depend only on the mitigation of the externality, so for the morally-managed firm the benefits are  $B_m(\hat{x} + \kappa z_m)$  and for the self-interested firm are  $B_s(\kappa z_s)$ , where  $z_i, i = m, s$ , denotes the ex post response to the externality.

The activist is assumed to expend  $A$  at the time it announces the campaign and makes its demand on the firm. The activist must hire personnel to manage the campaign, take out advertisements to announce the campaign, coordinate the delivery of pressure, create an Internet site, and so on. It is the expenditure of  $A$  that makes the campaign credible. This means that  $A$  is sunk when the firm makes its response to the demand of the activist.<sup>15</sup> The activist is assumed to have a limited capacity to conduct a campaign and thus can target only one of the two firms.

## B. The Campaign

To characterize the equilibrium campaign, suppose the activist has targeted firm  $i$ , the target fought, and the campaign succeeded. The target will then agree to the activist's demand if and only if

$$\pi_i^*(\hat{x} + \kappa x^d) - \tau x^d - \tau \hat{x} - y \geq \pi_i^*(\hat{x}) - \mu_i \xi(A) - \tau \hat{x} - y, \quad i = s, m, \quad (7)$$

where  $\tau$  is the marginal cost of addressing the externality,  $\mu_s$  and  $\mu_m$  are the reputation effects, and  $\pi_i^*(\cdot)$  is the operating profit in (4) or (5) represented as a function of the arguments of  $B_i(\hat{x} + \kappa x^d)$ , where  $\hat{x} = 0$  for the strategic firm. Both the cost  $\tau \hat{x}$  of the ex ante response and the cost  $y$  of fighting are sunk. The activist prefers that the target concede, since otherwise the externality is not addressed. Hence, the maximum demand  $x^d$  the activist can make satisfies (7) as an equality.

Letting  $x_i^d$  denote the demand that would be made by the activist if it targeted firm  $i, i = m, s$ , the maximum demands are given by

$$\pi_s^*(0) - (\pi_s^*(\kappa x_s^d) - \tau x_s^d) \equiv \mu_s \xi(A) \quad (8)$$

and

$$\pi_m^*(x^*) - \tau x^* - (\pi_m^*(x^* + \kappa x_m^d) - \tau(x^* + x_m^d)) \equiv \mu_m \xi(A), \quad (9)$$

where the proactive measures of the two firms are  $\hat{x} = 0$  for firm  $s$  and  $\hat{x} = x^*$  for firm  $m$ .

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<sup>15</sup> The alternative assumption is that some portion of  $A$  is expended only if the target decides to fight the campaign. This leaves the issue of what the activist does with the funds if the firm concedes to the activist's demand or bargains to avoid a campaign.

As an example, consider the case in which the marginal costs  $c_m = c_s$  are equal and  $B_i(x) = \beta x$ . The demands in (8) and (9) then are

$$x_s^d = \frac{\mu_s \xi(A)}{\tau + (1 + 2\delta) \frac{\bar{\psi}}{9} \beta \kappa} \quad (10)$$

and

$$x_m^d = \frac{\mu_m \xi(A)}{\tau - (1 - \delta) \frac{4\bar{\psi}}{9} \beta \kappa}. \quad (11)$$

The demand  $x_s^d$  in (8) and (10) is strictly decreasing in  $\kappa$ , and  $x_m^d$  in (9) and (11) is strictly increasing, reflecting the product differentiation effects.

Reflecting the incentives for maximal product differentiation in the marketplace, the demand  $x_s^d$  on the self-interested firm is strictly decreasing and the demand  $x_m^d$  on the morally-managed firm is strictly increasing in the marginal product differentiation effect  $\beta\kappa$ . Both demands are strictly decreasing in the marginal cost  $\tau$  of responding to the externality and strictly increasing in the harm the activist can cause. The demand  $x_i^d$  is strictly increasing in  $\mu_i$ , so a stronger reputation from moral management results in a lower demand. The demands are strictly decreasing in  $\delta$ , reflecting lower citizen-consumer demand for CSP.

The difference in the demands for the example is

$$x_m^d - x_s^d = \frac{\xi(A)}{(\tau - (1 - \delta) \frac{4\bar{\psi}}{9} \beta \kappa)(\tau + (1 + 2\delta) \frac{\bar{\psi}}{9} \beta \kappa)} [\mu_m (\tau + (1 + 2\delta) \frac{\bar{\psi}}{9} \beta \kappa) - \mu_s (\tau - (1 - \delta) \frac{4\bar{\psi}}{9} \beta \kappa)].$$

Consequently, even if citizen-consumers give it credit for its ex ante response  $x^*$ , the morally-managed firm can be the more attractive target. This results because the morally-managed firm has the greater stake  $\pi_m^*(x^*) - \pi_m^*(x^* + x_m^d)$  in the outcome of a campaign.

The self-interested firm will fight rather than concede immediately if

$$y \leq y_s \equiv (1 - q)(\pi_s^*(0) - \pi_s^*(\kappa x_s^d) + \tau x_s^d) \quad (12)$$

and for the morally-managed firm if

$$y \leq y_m \equiv (1 - q)(\pi_m^*(x^*) - \pi_m^*(x^* + \kappa x_m^d) + \tau x_m^d), \quad (13)$$

and these conditions are assumed to be satisfied. The willingness of the morally-managed and the self-interested firms to fight the activist depends on their stakes, and the difference  $y_m - y_s$  is given by

$$y_m - y_s = (1 - q)((\mu_m - \mu_s)\xi(A) + \tau(x_m^d - x_s^d)).$$

Consequently, if  $\mu_m \geq \mu_s$ , the morally-managed firm is willing to spend more, and this is also true for some  $\mu_m < \mu_s$ . This results from the greater stake of the morally-managed firm in the outcome of a campaign.

### C. Bargaining

The activist and its target have incentives to bargain rather than fight, so consider first the case in which the activist targets the self-interested firm. The Nash product  $\mathcal{N}_s$  is

$$\mathcal{N}_s = (\pi_s^*(z_s) - \tau z_s - q(\pi_s^*(\kappa x_s^d) - \tau x_s^d) - (1 - q)\pi_s^*(0) + y) \cdot (z_s - qx_s^d),$$

where  $z_s$  is the bargain and the autarky utilities are those with fighting. The necessary condition for the bargaining solution  $z_s^*$  is

$$-2\tau z_s^* + y + 2\tau qx_s^d + \kappa \frac{d\pi_s^*}{dz_n(z_s^*)}(z_s^* - qx_s^d) + q(\pi_s^*(\kappa z_s^*) - \pi_s^*(\kappa x_s^d)) + (1 - q)(\pi_s^*(\kappa z_s^*) - \pi_s^*(0)) = 0.$$

For the example with equal marginal costs  $c_m = c_s$  and  $B(x) = \beta x$  the Nash bargain is

$$z_s^* = qx_s^d + \frac{y}{2(\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9})}.$$

Substituting for  $x_s^d$  from (10) yields

$$z_s^* = \frac{2\mu_s q \xi(A) + y}{2(\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9})}. \quad (14)$$

The bargain is increasing in the harm  $\xi(A)$ , the cost  $y$  of fighting, the probability  $q$  the campaign succeeds, and the weakness  $\mu_s$  of the reputation. The bargain is strictly decreasing in the strength  $\bar{\psi}$  of the market, the consumers' valuation  $\beta$  of CSP, the credit  $\kappa$  given for ex post CSP, the marginal cost  $\tau$  of responding to the externality, and the proportion  $\delta$  of consumers who do not value CSP.

In a similar manner, using (11) the Nash bargain  $z_m^*$  when the activist targets the morally-managed firm is

$$\begin{aligned} z_m^* &= qx_m^d + \frac{y}{2(\tau - (1 - \delta)\frac{4\bar{\psi}\beta\kappa}{9})} \\ &= \frac{2\mu_m q \xi(A) + y}{2(\tau - (1 - \delta)\frac{4\bar{\psi}\beta\kappa}{9})}. \end{aligned} \quad (15)$$

The bargain  $z_m^*$  is strictly increasing in  $q$ ,  $\mu_m$ ,  $\xi(A)$ , and  $y$  and strictly decreasing in  $\tau$  as is  $z_s^*$ , but it is strictly increasing in  $\bar{\psi}$ ,  $\beta$ , and  $\kappa$  reflecting the greater product differentiation. The bargain  $z_m^*$  is strictly decreasing in the proportion  $\delta$  of consumers who do not value CSP in the marketplace.

#### D. Target Selection

For a given budget  $A$  the activist prefers to target the firm that will agree to the most favorable bargain. The difference in the Nash bargaining outcomes for the examples with  $c_s = c_m$  is

$$z_m^* - z_s^* = \frac{2q\xi(A)(\mu_m(\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9}) - \mu_s(\tau - (1 - \delta)\frac{4\bar{\psi}}{9}\beta\kappa) + \frac{(5-2\delta)}{9}\bar{\psi}\beta\kappa y)}{2(\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9})(\tau - (1 - \delta)\frac{4\bar{\psi}\beta\kappa}{9})}.$$

The activist targets the self-interested firm rather than the morally-managed firm if and only if

$$\mu_m \leq \hat{\mu}_m \equiv \frac{\mu_s(\tau - (1 - \delta)\frac{4\bar{\psi}}{9}\beta\kappa)}{\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9}} - \frac{\frac{(5-2\delta)}{18}\bar{\psi}\beta\kappa y}{q\xi(A)(\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9})}. \quad (16)$$

The cutpoint  $\hat{\mu}_m$  is strictly increasing in  $\mu_s$  and  $\tau$  and strictly decreasing in  $\beta$ ,  $\kappa$ ,  $\bar{\psi}$ ,  $y$ ,  $q$ , and  $\xi(A)$ . If the reputation advantage of moral management is small so that  $\mu_m$  is high, the activist prefers to target the morally-managed firm. If the reputation effect is large, the activist prefers to target the self-interested firm. The morally-managed firm is thus selected as the target unless citizens accord it a strong reputation that mitigates the harm from an activist campaign.

The cutpoint  $\hat{\mu}_m$  is decreasing in the profitability of the morally-managed firm, since profits are increasing in  $\beta$ ,  $\kappa$ , and  $\bar{\psi}$ . A more profitable firm thus is a more attractive target because it has more to lose in the marketplace as the result of the harm from a campaign. Such a firm could be viewed as soft, since it is willing to concede more to the activist; i.e.,  $z_m^* > z_s^*$ . This suggests that morally-managed firms could be attractive targets for activists and hence bear the social pressure. Argenti (2004) explains the decision by the activist organization Global Exchange to target Starbucks to sell Fair trade Coffee: “truly socially responsible companies are actually more likely to be attacked by activist NGOs than those that are not, ... Our interviews with Global Exchange suggested that Starbucks was a better target for the fair trade issue because of its emphasis on social responsibility, as opposed to a larger company without a socially responsible bent.”

The selection of a target depends importantly on whether citizen-consumers give credit in the product marketplace for activist-induced CSP. That is, to what extent do citizen-consumers distinguish between moral management and CSP? Suppose that citizen-consumers distinguish and give credit only for (ex ante) moral management. Then, for  $\kappa = 0$ , (16) reduces to  $\mu_m \leq \mu_s$ . Consequently, if citizen-consumers distinguish in the product marketplace between activist-induced CSP and moral management, the self-interested firm is targeted if and only if it has a weaker reputation. The bound  $\hat{\mu}_m$  is decreasing in  $\kappa$ , so the more credit citizen-consumers give for an ex

post response to an activist campaign, the more likely is the morally-managed firm to be targeted. Consequently, the morally-managed firm is the more attractive target if its reputation is weak or consumers give credit for CSP induced by social pressure. Both the social pressure and the reputation depend on the preferences of citizens.

The targeting choice by the activist affects not only the target but the other firm as well if consumers reward the firm in the marketplace for responses to social pressure. In that case targeting the morally-managed firm increases the profit of the self-interested firm because product differentiation increases, which from (2) and (3) increases the prices charged by both firms. Targeting the self-interested firm decreases the profit of the morally-managed firm because product differentiation decreases.

Responding to the externality could affect the marginal cost  $c_i$  of production. Suppose that the marginal cost increases from  $c_i^o$  to  $c_i^o + \Delta c_i$ ,  $\Delta c_i > 0$ . Differentiating (8) and (9) indicates that the demand  $x_i^d$ ,  $i = m, s$ , decreases. Consequently, social pressure results in lower demands and in lower bargaining outcomes when costs increase as a result of the response to the externality. If the morally-managed firm responds to the externality ex ante whereas the self-interested firm does not, the morally-managed firm has lower profits and is a less-attractive target than if costs did not increase.

The principal results of this section are summarized in the following proposition.

**Proposition 2:** The social pressure and the demand made in an activist campaign are strictly increasing in the resources  $A$  available to the activist, and hence the harm, and are strictly decreasing in the reputation of the firm. The social pressure on the morally-managed firm can be greater than that on the self-interested firm even if the reputation of the morally-managed firm is stronger than that of the self-interested firm because the former's stake is greater than the latter's stake. This property is reflected in the Nash bargaining outcome. The activist targets the morally-managed firm unless it has a strong reputation with citizens, and the more credit citizens give for CSP undertaken in response to an activist campaign, the more likely is the morally-managed firm to be targeted.

## V. Citizens' Allocations and the Capital Market

### A. Valuing Moral Management

This section introduces a capital market in which citizens' social preferences can be priced as in Graff Zivin and Small (2005). This establishes a value for moral management and CSP. Even

though firm responses to the externality and corporate redistribution or giving to social causes are untraded goods, they can be priced in the capital markets. That is, the financial and social returns from a firm are spanned by a portfolio of savings and personal giving to social causes. Personal giving represents financial gifts to charities and providers of social services, direct redistribution, volunteering, expenditures of costly effort for social causes, etc. In a similar manner, social pressure yields both a response to the externality and an effect on the profit of the firm. These social and financial effects are also spanned and hence can be priced in the capital markets.

In the second stage of the model a citizen allocates her endowment between savings which has a return of 1, a share  $\eta_m$  of the morally managed firm, a share  $\eta_s$  of the self-interested firm, personal giving  $g$  to social causes, and a contribution  $a$  to the activist. Although only two firms are included in the model, they are to be understood as representing many firms, each of which is small relative to the capital market. The citizen's budget constraint is

$$\eta_s \rho_s + \eta_m \rho_m + g + a \leq w + \eta_s^o \rho_s + \eta_m^o \rho_m, \quad (17)$$

where  $\rho_m$  is the market value of the morally-managed firm,  $\rho_s$  is the market value of the self-interested firm,  $w$  is initial wealth,  $(\eta_s^o, \eta_m^o)$  are the initial shares held by the citizen, and savings is the difference between the right and left sides of (17).<sup>16</sup>

The morally-managed firm is assumed to contribute a portion  $h$  of its operating profits to social causes and to make an ex ante response  $x^*$  to the externality. One firm is targeted by the activist, and let  $J = 1$  denote that the morally-managed firm is targeted and  $J = 0$  denote that the self-interested firm is targeted. The financial return  $R$  of a citizen is thus

$$R = \eta_s(\pi_s - \tau(1 - J)z_s^* - \rho_s) + \eta_m(\pi_m(1 - h) - \tau(x^* + Jz_m^*) - \rho_m) - g - a + w - \eta_s^o \rho_s - \eta_m^o \rho_m.$$

In the final stage a citizen receives her financial return  $R$  and allocates it to a composite numeraire good  $k$  and one unit of the product produced by one of the two firms. That product yields net utility given in (6). Consumption  $k$  in the final round thus is  $R$  minus the price  $p_s^*$  or  $p_m^*$  from (2) and (3), respectively.

Since the theory emphasizes private politics rather than public politics, and hence government is not considered, citizens will be assumed not to have altruistic preferences so as to simplify the notation. Egoistic preferences pertain to the private good aspect of social giving and mitigating the externality. Citizens are assumed to receive a warm glow from personal giving to social causes,

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<sup>16</sup> Baron (2006b) considers firms established by entrepreneurs, who hold the initial shares.

holding a share in the morally-managed firm, and contributing to the activist. For example, Becker (1974, p. 1083) notes that “apparent ‘charitable’ behavior can also be motivated by a desire to avoid scorn of others or to receive social acclaim.” The social satisfaction from holding shares in the morally-managed firm may be reflected in the growth of socially-responsible mutual funds.

Citizens can differ in their valuation of the warm glow, and let  $\theta \in [0, 1]$  represent the warm glow the citizen receives from its shareholdings in the morally-managed firm and from contributing to the activist relative to the warm glow from personal giving. If  $\theta = 1$ , for example, shareholdings are a perfect substitute for personal giving, and if  $\theta = 0$ , there is no warm glow from shareholding. The distribution function of  $\theta$  is denoted by  $F(\theta)$ . The warm glow from contributing  $a$  to the activist is  $\frac{a}{A^*}\tau z$ , where  $A^*$  is the aggregate giving to the activist and  $z \in \{z_s^*, z_m^*\}$  is the bargain with the activist’s target. Initially, citizens are assumed not to receive a warm glow from the actions of the self-interested firm, since its actions are motivated solely by profits or pressure from the activist. The warm glow or social satisfaction  $S$  thus is<sup>17</sup>

$$S = g + \theta \left( \eta_m (\pi_m^* h + \tau x^*) + \frac{a}{A^*} \tau z \right), \quad (18)$$

where  $\pi_m^* h + \tau x^*$  is the CSP of the morally-managed firm and  $z \in \{z_s^*, z_m^*\}$  depending on which firm is targeted. Note that in this specification the citizen is assumed to view corporate social responsibility and the accomplishments of the activist as imperfect ( $\theta < 1$ ) substitutes for personal giving because they are less personal. That is, another party, a firm or the activist, acts as an intermediary, and hence the effect of the citizen is indirect.

## B. The Capital Market Equilibrium

The preferences of a citizen are represented by a quasi-linear utility function

$$u = k + u(\psi(\theta)) + \gamma S^\alpha,$$

where  $\alpha \in (0, 1)$ ,  $\gamma > 0$ , and  $u(\psi(\theta))$  is the net utility in (6) and  $\psi(\theta)$  relates citizens’ product marketplace preferences  $\psi$  to their type  $\theta$ . Substituting for  $k$  and  $R$  yields

$$\begin{aligned} u = & \eta_s (\pi_s^* - \tau(1 - J)z_s^* - \rho_s) + \eta_m (\pi_m^* (1 - h) - \tau(x^* + Jz_m^*) - \rho_m) \\ & + w + \eta_s^o \rho_s + \eta_m^o \rho_m - g - a + u(\psi(\theta)) + \gamma S^\alpha. \end{aligned}$$

A citizen chooses  $(a, g, \eta_m, \eta_s)$  to maximize  $u$ , which is assumed to be strictly concave in the citizen’s choices.

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<sup>17</sup> A similar specification of social satisfaction is used by Graff Zivin and Small.

The necessary conditions for an equilibrium  $(a^*, g^*, \eta_s^*, \eta_m^*)$  are

$$\frac{\partial u}{\partial a} = -1 + \gamma \alpha S^{\alpha-1} \frac{\tau z}{A^*} \theta \leq 0; \quad \frac{\partial u}{\partial a} a^* = 0. \quad (19)$$

$$\frac{\partial u}{\partial g} = -1 + \gamma \alpha S^{\alpha-1} \leq 0; \quad \frac{\partial u}{\partial g} g^* = 0. \quad (20)$$

$$\frac{\partial u}{\partial \eta_m} = \pi_m^* (1 - h) - \tau(x^* + Jz_m^*) - \rho_m^* + \gamma \alpha S^{\alpha-1} (\pi_m^* h + \tau x^*) \theta \leq 0; \quad \frac{\partial u}{\partial \eta_m} \eta_m^* = 0. \quad (21)$$

$$\frac{\partial u}{\partial \eta_s} = \pi_s^* - \tau(1 - J)z_s^* - \rho_s^* \leq 0; \quad \frac{\partial u}{\partial \eta_s} \eta_s^* = 0, \quad (22)$$

where  $\rho_m^*$  and  $\rho_s^*$  are the equilibrium market values of the firms. Investing in the self-interested firm is equivalent to savings, so the market value is

$$\rho_s^* = \pi_s^* - \tau(1 - J)z_s^*.$$

If the self-interested firm is targeted by the activist ( $J = 0$ ), its shareholders bear the full cost  $\tau z_s^*$  of the anticipated bargain.

To further characterize the equilibrium, consider a citizen  $\theta^*$  who is indifferent between personal giving and holding shares in the morally-managed firm. Then, (20) and (21) hold as equalities at  $\theta^*$ , and substituting (20) into (21) provides an expression for the market value  $\rho_m^*$ , which is

$$\rho_m^* = \pi_m^* (1 - h) - \tau(x^* + Jz_m^*) + \theta^* (\pi_m^* h + \tau x^*). \quad (23)$$

The market value equals the financial return  $\pi_m^* (1 - h) - \tau(x^* + Jz_m^*)$  plus the market's valuation  $\theta^* (\pi_m^* h + \tau x^*)$  of the CSP of the firm. The morally-managed firm thus receives credit in the capital market, which reduces the cost of moral management. The market value of the morally-managed firm could be higher or lower than that of the self-interested firm, depending on the product market and hence the operating profits  $\pi_m^*$  and  $\pi_s^*$ , target selection by the activist, the moral duty  $x^*$ , and the market's valuation  $\theta^*$  of CSP.

If for all citizens corporate actions and contributions to the activist are perfect substitutes for personal giving, then  $\theta = 1$ , and  $\theta^* = 1$ . Moral management and corporate giving  $\pi_m^* h$  are then costless; i.e., they have no effect on the market value of the firm. This result is due to Graff Zivin and Small, who refer to it as a Modigliani-Miller result in the sense that an increase in corporate giving is exactly offset by a reduction in aggregate personal giving by citizens. Corporate social performance perfectly crowds out personal giving.<sup>18</sup> Conversely, moral management is fully

<sup>18</sup> To see this, note that (20) implies that  $S$  is a constant for all citizens. Then, an increase in  $h$  or  $x^*$  reduces  $g$ .

rewarded by citizens and thus is not costly to shareholders. Moreover, moral management can increase operating profits if citizens reward it in the marketplace. When  $\theta^* < 1$ , moral management and corporate giving are not neutral with respect to the market value but instead are costly to shareholders.<sup>19</sup>

As indicated above, responding to the externality is morally required and is assumed to be costly in the sense that the market value  $\rho_m^*$  is decreasing at  $x = x^*$ . That is,

$$\left. \frac{d\rho_m^*}{dx} \right|_{x=x^*} = \left[ \left. \frac{d\pi_m^*}{dx} (1 - h(1 - \theta^*)) - \tau(1 - \theta^*) \right] \right|_{x=x^*}$$

is assumed to be negative, where the firm is assumed to be small relative to the economy, so  $\theta^*$  is constant in  $x^*$ . Since  $\left. \frac{d\pi_m^*}{dx} \right|_{x=x^*} > 0$  from (7), a necessary and sufficient condition for moral management not to make business sense is<sup>20</sup>

$$\tau > \frac{1}{1 - \theta^*} \left[ \left. \frac{d\pi_m^*}{dx} (1 - h(1 - \theta^*)) \right] \right|_{x=x^*} . \quad (24)$$

The condition in (24) means that the morally-managed firm does not respond more to the externality than is morally required.

In the capital market equilibrium citizens with low  $\theta$  ( $\theta < \theta^*$ ) give personally and hold shares in the self-interested firm. They neither hold shares in the morally-managed firm nor contribute to the activist because those are poor substitutes for personal giving. For citizens with high  $\theta$ , holding shares in the morally-managed firm and contributing to the activist are good substitutes and citizens do at least one of the two. They may also invest in the self-interested firm, but they do not give personally. The equilibrium is stated in the following proposition, and the proof is given in the Appendix.

**Proposition 3:** The capital market equilibrium is for  $\theta \in [0, \theta^*)$ ,  $g^*(\theta) > 0$ ,  $\eta_m^*(\theta) = a^*(\theta) = 0$ , and for  $\theta \in [\theta^*, 1]$ ,  $g^*(\theta) = 0$ ,  $\eta_m^*(\theta) \geq 0$ ,  $a^*(\theta) \geq 0$ , with at least one of the two inequalities strict, where  $\theta^*$  is characterized in (31) below. Citizens with  $\theta \in [0, \theta^*)$  have  $\eta_s^*(\theta) > 0$ , and citizens with  $\theta \in [\theta^*, 1]$  also may hold shares in the self-interested firm. Moreover,

$$A^* = \theta^* \tau z, \quad (25)$$

where  $A^*$  is the equilibrium aggregate contribution to the activist.

<sup>19</sup> If  $\theta = 0$  for all citizens so that there are no warm glow preferences, contributions to the activist are zero, citizens give personally, and the market value  $\rho_m^*$  equals its financial return.

<sup>20</sup> If the derivative in (24) is negative at  $x^* = 0$  and the market value is concave in  $x$ , the firm would not respond to the externality if it were not morally required.

Consequently, a low- $\theta$  citizen gives personally, does not contribute to the activist, and holds no shares in the morally-managed firm. The equilibrium personal giving  $g^*$  is then

$$g^* = (\gamma\alpha)^{\frac{1}{1-\alpha}}. \quad (26)$$

Moreover, for  $\theta > \theta^*$  a citizen does not give personally, since the derivative in (20) is negative for  $\theta > \theta^*$  by definition of  $\theta^*$ . Note first that  $a^*(\theta) \neq 0, \forall \theta \in [\theta^*, 1]$ . To show this, suppose that  $a^*(\theta) = 0 \forall \theta \in [0, 1]$ . Then,  $A^* = 0$ , and the derivative  $\frac{\partial u}{\partial a}$  in (19) is positive, which contradicts  $A^* = 0$ . In equilibrium  $A^* = \theta^* \tau z$ , which is the response  $\tau z$  by the target to social pressure priced at the capital market valuation of CSP. Contributions to the activist thus equal the market value of the induced change made by the target firm.

In this equilibrium a citizen of type  $\theta \in [\theta^*, 1]$  can both hold shares in the morally-managed firm and contributes to the activist. The financial return-social satisfaction  $(R, S)$ -space is spanned by the financial return on the self-interested firm and the social return from the activist. The return on the morally-managed firm thus can be written as a linear combination of the return on the self-interested firm and the social return from contributing to the activist. The absence of arbitrage opportunities means that the market price  $\rho_m^*$  and the contributions  $A^*$  to the activist must equilibrate with  $\rho_s^*$  and the social return from personal giving. A citizen of type  $\theta \in (\theta^*, 1]$  who invests \$1 in the morally-managed firm obtains a financial return  $\frac{\pi_m^*(1-h) - \tau(x^* + Jz_m^*)}{\rho_m^*}$  and a social return  $\frac{(\pi_m^* h + \tau x^*)\theta}{\rho_m^*}$ . The citizen can obtain the same social return by contributing

$$\phi_A = \frac{(\pi_m^* h + \tau x^*)\theta}{\frac{\rho_m^*}{\tau z \theta} A^*}$$

to the activist and the same financial return by investing

$$\phi_s = \frac{\frac{\pi_m^*(1-h) - \tau(x^* + Jz_m^*)}{\rho_m^*}}{1}$$

in the self-interested firm which has a financial return of 1. The absence of arbitrage opportunities implies that

$$\begin{aligned} 1 &= \phi_A + \phi_s \\ &= \frac{(\pi_m^* h + \tau x^*)\theta}{\frac{\rho_m^*}{\tau z \theta} A^*} + \frac{\frac{\pi_m^*(1-h) - \tau(x^* + Jz_m^*)}{\rho_m^*}}{1}. \end{aligned}$$

This condition is satisfied only by (25). Consequently, citizens with  $\theta > \theta^*$  both can hold shares in the morally-managed firm and contribute to the activist, but the shareholding  $\eta_m^*(\theta)$  and contribution  $a^*(\theta)$  are indeterminate.

A closed form characterization can be obtained for the equilibrium indirect social contribution for a citizen with  $\theta > \theta^*$ . From (19) or (21) it follows that

$$\eta_m^*(\theta)(\pi_m^* h + \tau x^*) + a^*(\theta) \frac{\tau z}{A^*} = \left( \frac{\gamma \alpha}{\theta^*} \right)^{\frac{1}{1-\alpha}} \theta^{\frac{\alpha}{1-\alpha}}. \quad (27)$$

The right side of (27) is increasing in  $\theta$ , so citizens for whom moral management and CSP induced by social pressure are close substitutes for personal giving invest more in those activities.

The market clearing conditions are

$$\int_{\theta^*}^1 \eta_m^*(\theta) dF(\theta) = 1 \quad (28)$$

and

$$\int_{\theta^*}^1 a^*(\theta) dF(\theta) = A^*, \quad (29)$$

where the number of shares of the morally-managed firm is normalized to 1.<sup>21</sup> Integrating (27) and using (28) and (29) yields an expression characterizing  $\theta^*$ :

$$\pi_m^* h + \tau x^* + \tau z = \left( \frac{\alpha \gamma}{\theta^*} \right)^{\frac{1}{1-\alpha}} \int_{\theta^*}^1 \theta^{\frac{\alpha}{1-\alpha}} dF(\theta). \quad (30)$$

This condition identifies  $\theta^*$ , and  $A^*$  is then obtained from (25). Consequently, a higher  $\theta^*$  corresponds to greater aggregate contributions to the activist.

The comparative statics are straightforward from (30), since the right side is decreasing in  $\theta^*$ . Consider an economy with many firms and many activists, and interpret  $\pi_m^*$  as the aggregate profit of all morally-managed firms,  $x^*$  as their ex ante aggregate mitigation of the externality and  $z$  as the aggregate bargain with activists. An increase in the aggregate profits  $\pi_m^*$  decreases  $\theta^*$ . That is, as the financial return on the morally-managed firm increases, a larger set of citizens hold shares in that firm.<sup>22</sup> Similarly, an increase in  $x^*$  increases the social return  $\pi_m^* h + \tau x^*$  from the morally-managed firm, which decreases  $\theta^*$ . This decrease in  $\theta^*$  offsets some of the capital market credit for CSP. Similarly, more effective social pressure that increases  $z$  decreases  $\theta^*$ , so there is broader citizen support for the morally-managed firm and the activist but less is contributed to the activist.

Comparative statics on the distribution of citizen preferences can also be conducted. Let  $F_1(\theta)$  stochastically dominate  $F_2(\theta)$  in the first degree on  $\theta \geq \theta^*$ ; i.e.,  $F_1(\theta) \leq F_2(\theta)$ , and for some

<sup>21</sup> The market clearing condition for shareholdings in the self-interested firm is analogous to (28), but  $\eta_s^*(\theta)$  and savings are indeterminate.

<sup>22</sup> Presumably, higher profits  $\pi_m^*$  increase the market value  $\rho_m^*$ , since otherwise the firm would simply burn money to increase its market value.

$\theta$ ,  $F_1(\theta) < F_2(\theta)$ . Then,  $\theta_1^* > \theta_2^*$ , where  $\theta_i^*$  is the cutpoint corresponding to  $F_i(\theta)$ ,  $i = 1, 2$ . Since  $\theta_1^* > \theta_2^*$ , the higher valuation is reflected in a higher market value  $\rho_m^*$  and greater contributions to the activist. Also, if citizens value the warm glow more highly in the sense of first-degree stochastic dominance, more citizens rely on personal giving and fewer hold shares in the morally-managed firm and contribute to the activist. This results because citizens with  $\theta > \theta^*$  have a higher demand for social satisfaction from moral management and social pressure, and market clearing then requires some citizens at the margin to shift to personal giving.

As an example, let  $F_2(\theta)$  be given by

$$F_2(\theta) = \nu + (1 - \nu)F_1(\theta),$$

where  $\nu$  is the fraction of citizens who receive no social satisfaction from moral management or generating social pressure through the activist. An increase in  $\nu$  thus results in a stochastically dominated distribution. Then, (30) is

$$\pi_m^* h + \tau x^* + \tau z = \left(\frac{\alpha\gamma}{\theta^*}\right)^{\frac{1}{1-\alpha}} (1 - \nu) \int_{\theta_2^*}^1 \theta^{\frac{\alpha}{1-\alpha}} dF_1(\theta). \quad (31)$$

An increase in  $\nu$  in (31) thus reduces  $\theta_2^*$  and hence the market value of the firm. A first-order stochastic dominance shift in citizen preferences thus results in a higher  $\theta^*$  and hence a higher market value for the morally-managed firm.

From (25) higher aggregate contributions to the activist result the higher is citizens' valuation of the effect of social pressure. Social pressure and the market value of the morally-managed firm are thus positively correlated when the self-interested firm is targeted by the activist. The quality  $q$  of the activist affects the contributions it receives. If the activist is small relative to the capital markets so that  $\theta^*$  is constant in  $q$ , higher quality activists receive greater contributions, since from (25)  $\frac{dA^*}{dq} = \theta^* \tau \frac{dz}{dq} > 0$ . Activism is thus a normal good. In addition, contributions are increasing in the threat and actuality of the harm the activist can cause.

The principal results of this section are summarized in the following proposition.

**Proposition 4:** The morally-managed firm attracts as its shareholder clientele those citizen-investors for whom moral management is a good substitute for personal giving to social causes, and those citizen-investors also generate social pressure by contributing to the activist. Citizen-investors for whom moral management is a poor substitute contribute personally to social causes and hold shares in the self-interested firm, but neither hold shares in the morally-managed firm nor contribute to social pressure. As citizen-investors view CSP as a better substitute for personal

giving in the sense of first-degree stochastic dominance, the market value of the morally-managed firm increases as do the contributions to the activist.

### C. Proactive Measures by the Self-Interested Firm

The self-interested firm that anticipates ( $J = 0$ ) being targeted by the activist may have an incentive to make a proactive ex ante response to the externality. This would have an effect in the marketplace and in the capital markets, and it could contribute to a favorable reputation that mitigates the harm the activist delivers in the campaign. Citizens, however, may distinguish between a response to the externality induced by social pressure and a morally-motivated response, so it will be assumed that in the marketplace the morally-motivated firm receives more credit and attracts more high  $\psi$  consumers.

Suppose that citizens receive a warm glow from some portion  $\zeta \in [0, 1]$  of the activist-induced ex ante response  $x_s$  to the externality. If citizens do not distinguish between moral management and CSP,  $\zeta = 1$ , and if citizens reward only moral management,  $\zeta = 0$ . The social satisfaction is then

$$S = g + \theta \left( \eta_m (\pi_m^* h + \tau x^*) + \eta_s \zeta \tau x_s + \frac{a}{A^*} \tau z_s^* \right).$$

The shares of the self-interested and morally-motivated firms are not perfect substitutes, so consider a portfolio of savings and shares in the self-interested firm. Investing  $\phi^o$  in the self-interested firm yields the same social return as investing \$1 in the morally-managed firm when

$$\phi^o = \frac{\frac{\theta(\pi_m^* h + \tau x^*)}{\rho_m^*}}{\frac{\theta \zeta \tau x_s}{\rho_s^*}}. \quad (32)$$

The financial return from the investment  $\phi^o$  is

$$\phi^o \frac{\pi_s^* - \tau x_s}{\rho_s^*} = \frac{\pi_s^* - \tau x_s}{\rho_m^*} \frac{\pi_m^* h + \tau x^*}{\zeta \tau x_s}. \quad (33)$$

Let  $\Delta$  be the difference in financial returns between the morally-managed firm and that in (33), so

$$\Delta = \frac{\pi_m^* (1 - h) - \tau x^*}{\rho_m^*} - \left( \frac{\pi_s^* - \tau x_s}{\rho_m^*} \right) \frac{\pi_m^* h + \tau x^*}{\zeta \tau x_s}. \quad (34)$$

The absence of arbitrage opportunities implies that  $\Delta + \phi^o = 1$ , which from (32) and (34) implies that the market value of the self-interested firm is<sup>23</sup>

$$\rho_s^* = \pi_s^* - \tau(x_s + z_s^*) + \theta^* \zeta \tau x_s, \quad (35)$$

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<sup>23</sup> Because of the arbitrage condition the share demands of the two firms and the contribution to

where  $\pi_s^*$  from (4) and  $z_s^*$  from (14) depend on  $x_s$ . As in the case of the morally-motivated firm, the responses to the externality does not make business sense, since  $1 > \theta^* \zeta$ . If  $\zeta = 0$ , shareholders of the self-interested firm bear the full cost of any proactive measure.

The self-interested firm chooses  $x_s$  to maximize its market value. The necessary condition from (35) is<sup>24</sup>

$$\frac{d\rho_s^*}{dx_s} = \frac{d\pi_s^*}{dx_s} - \tau(1 - \zeta\theta^*) \left(1 + \frac{dz_s^*}{dx_s}\right) \leq 0, \quad (36)$$

where the firm is assumed to be small relative to the market, in which case  $\theta^*$  is constant in  $x_s$ .

A proactive measure has three effects reflected in (36). The first is the effect  $\frac{d\pi_s^*}{dx_s}$  on profits in the marketplace. This is zero or negative if consumers give the firm credit, since a proactive measure by the self-interested firm reduces product differentiation which reduces profits  $\pi_s^*$ . If the proactive measure also increases marginal cost, profit is reduced further.

The second effect is a credit  $\zeta\theta^*$  from investors because of the proactive measure. The credit reduces the marginal cost of the proactive measure, thereby encouraging a proactive response.

The third effect is through the reputational credit given by citizens, which can shield the firm from some of the potential harm from the activist campaign and hence reduce  $z_s^*$ . This is reflected in the term  $\frac{dz_s^*}{dx_s}$  on the right side in (36) and depends on the reputational credit earned as a result of a measure undertaken in anticipation of targeting by the activist. If there is no reputational credit, then  $\frac{dz_s^*}{dx_s} = 0$ . Then, since  $1 > \zeta\theta^*$ , the market value is a decreasing function of  $x_s$ , so the self-interested firm does not proactively respond to the externality. In this model, a reputational credit is a necessary condition for the self-interested firm to take a proactive measure. If the reputational credit is sufficiently great, the activist could shift and target the morally-managed firm.

The effect of a reputational credit is  $\mu_s(x_s)\xi(A^*)$  from (8), where  $\mu_s(\cdot)$  is a strictly decreasing, differentiable function. The effect of the proactive measure on the bargain  $z_s^*$  with the activist is 

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the activist cannot be separately identified. The share demands, however, can be shown to satisfy

$$\eta_s^*(\theta)\tau\zeta x_s + \eta_m^*(\theta)(\pi_m^* h + \tau x^*) + \frac{a^*(\theta)}{A^*} \tau z_s^* = \left(\frac{\gamma\alpha}{\theta^*}\right)^{\frac{1}{1-\alpha}} \theta^{\frac{\alpha}{1-\alpha}}.$$

Integrating and using the market clearing conditions yields

$$\tau\zeta x_s + \pi_m^* h + \tau x^* + \tau z_s^* = \left(\frac{\gamma\alpha}{\theta^*}\right)^{\frac{1}{1-\alpha}} \int_{\theta^*}^1 \theta^{\frac{\alpha}{1-\alpha}} dF(\theta).$$

<sup>24</sup> A similar analysis can be conducted for corporate redistribution.

from (14)

$$\frac{dz_s^*}{dx_s} = \frac{\mu'_s(x_s)q\xi(A^*)}{\tau + (1 + 2\delta)\frac{\bar{\psi}\beta\kappa}{9}},$$

and a reputational credit can justify an ex ante response to the externality only if<sup>25</sup>

$$\frac{dz_s^*}{dx_s} < -1.$$

This condition means that the bargain struck with the activist must decrease by more than the increase in the proactive measure. This seems unlikely, in which case, the self-interested firm has no incentive to take a proactive measure if it will be the subsequent target of the activist.

The self-interested firm, however, may be able to take a sufficient proactive measure that causes the activist to target instead the morally-managed firm. This requires that  $\mu_m(x^*) > \hat{\mu}_m$  from (16), and  $\hat{\mu}_m$  is an increasing function  $\mu_s(x_s)$ . The greater the shield (lower  $\mu_s(x_s)$ ) and the greater the response  $x_s$ , the lower is  $\hat{\mu}_m$ . If the self-interested firm were able to shift the activist to the morally-managed firm, however, that firm may be able to counter by taking a proactive measure in addition to the morally-required measure  $x^*$ . The two firms thus can be in a race to the top. The race is costly in terms of both the measures to address the externality and the possible reduction in product differentiation. The incentive to avoid social pressure thus can put the firm in a dilemma referred to as the CSP trap. The two firms thus may have an incentive to act collectively against the activist to avoid the race to the top.<sup>26</sup>

The principal result of this section is summarized in the following proposition.

**Proposition 5:** The incentives for proactive measures by the self-interested firm stem primarily from the opportunity to deflect the activist to a different target. This incentive can lead to a CSP trap if a race to the top occurs.

## VI. Conclusions

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<sup>25</sup> The effect  $\frac{d\pi_s^*}{dx_s}$  on the operating profit of the firm has been taken to be negative in accord with the duopoly model in Section III. If, however, the industry had three firms, one of which was morally managed, one of the other two firms could have an incentive to respond proactively to the externality to differentiate its product from the product of the other firm. In this case,  $\frac{d\pi_s^*}{dx_s}$  could be positive, making a proactive response more attractive to the self-interested firm. In that case, (36) could be satisfied as an equality when  $\frac{dz_s^*}{dx_s} > -1$ , in which case the proactive measure is an increasing function of the reputational credit  $\zeta$  given by citizens for the proactive measures of a firm.

<sup>26</sup> In a different model Baron and Diermeier consider a race to the top and incentives to act collectively in the face of a potential targeting by an activist.

Corporate social responsibility can be justified by altruistic or egoistic preferences. Social good provided by citizens' altruistic preferences can be crowded out by government provision financed by lump-sum taxes, so a theory of corporate social responsibility based on altruistic preferences must be grounded in distortionary taxation. An alternative theory based on private good aspects of social contributions are based on egoistic preferences where citizens receive a warm glow from the act of supporting social causes. That support could come from personal giving to social causes, holding shares in firms with CSP, and contributing to activists and NGOs to generate social pressure on firms. Contributing to social causes through shareholdings and activists is indirect and hence less personal, so it may be only an imperfect substitute for personal giving. Corporate social performances can be priced in a capital market in which citizens allocate their endowments among savings, corporate shareholdings, personal giving to social causes, and contributions to activists for the purpose of applying social pressure to firms.

Citizens may distinguish among cases of CSP based on motivation. CSP can be motivated by moral duty, self-interest, or social pressure. The former represents moral management and differs from business as usual, whereas actions supporting social causes motivated by self-interest represent business as usual. Similarly, actions taken in anticipation of or in response to social pressure also represent business as usual. It is moral management that constitutes corporate social responsibility.

The extent to which citizens distinguish between moral management and CSP induced by self-interest or social pressure affects both which firm is the recipient of social pressure and how intense the pressure is. If citizens fail to distinguish between the two, the morally-managed firm is more likely to be targeted than if citizens do distinguish. Moreover, the demand on the firm is higher.

Moral management and corporate social responsibility should be understood in an equilibrium context in which social pressure is endogenous. Corporate social performance can crowd out personal giving to social causes. Moreover, a policy of moral management affects the shareholder clienteles and the investment and personal contribution decisions of citizens.

If citizens receive a warm glow from holding shares in a morally-managed firm, the market value of that firm is greater than the value of its financial return. In that case, however, moral management crowds out personal giving. If citizens receive no warm glow, the market value of the morally-managed firm equals the value of its financial return, but personal giving is not crowded out. The market value of the morally-managed firm and crowding out of personal giving are thus

positively correlated.

Does moral management and corporate social responsibility make business sense? The answer is “no,” unless there is a product differentiation effect sufficient to increase operating profits by more than the cost  $\pi_m^* h + \tau x^*$  less the credit  $\theta^*(\pi_m^* h + \tau x)$  in the capital market.

Is moral management and corporate social responsibility business nonsense? The answer is “no” to the extent that product differentiation increases operating profits or citizens have warm glow preferences for holding shares of firms that contribute to social causes.

Social pressure arises from citizen preferences, and the instruments of citizens increasingly are NGOs and activist organizations. Citizens fund these organizations in addition to contributing directly to social causes. Contributions to the activist are increasing in the quality of the activist and the strength of its threat. Moral management and corporate social responsibility can redirect social pressure to other firms provided that citizens give the firm credit to protect it from social pressure. Both social pressure and the credit arise from citizen preferences, but the target of social pressure is chosen by the activist. The activist’s ability to provide harm, however, may depend on citizens’ willingness to participate in the delivery of harm.

Activists attract a clientele of citizens who view corporate social responsibility and corporate change induced by social pressure as a good substitute for personal giving. That clientele also holds shares in the morally-managed firm.

Moral management and corporate social responsibility can be defensive at two levels. First, if reputation is strengthened, the harm from social pressure can be mitigated. Second, if the reputation is sufficiently strengthened, social pressure can be deterred or deflected to other firms.

The morally-managed firm can be an attractive target for social pressure because its stake can be higher than that of the self-interested firm. But if citizens accord it a stronger reputation because of its CSP, the activist can prefer targeting the self-interested firm. The morally-managed firm is proactive whenever an identified moral duty arises. The self-interested firm is proactive only when the deterrence effect is strong, since CSP reduces product differentiation and profits.

Social pressure is generated based on anticipated results, and higher quality activists have better results and attract greater contributions. In equilibrium citizens contribute an amount equal to the capital market’s social valuation  $\theta^*$  of those results. That social valuation in turn depends on the strength of citizen’s warm glow preferences for moral management and CSP. Stronger warm glow preferences (in the sense of first-degree stochastic dominance) increase the capital market valuation of the social performance by firms and result in greater social pressure through higher

citizen contributions to the activist.

## Appendix

**Proof of Proposition 3:** The proposition is established by the following two lemmas.

**Lemma 1:** In any equilibrium  $g^*(\theta)\eta_m^*(\theta) = 0$  and  $g^*(\theta)a^*(\theta) = 0, \forall \theta \in [0, 1]$ . For  $\theta \in [0, \theta^*), g^*(\theta) > 0$ .

**Proof:** Suppose  $g^*(\theta) > 0$ , so (20) holds as an equality. This implies that  $S$  is constant in  $\theta$  on a nonempty interval. Suppose that  $\eta_m^*(\theta) > 0$ , so (21) holds as an equality. But,  $S$  constant in  $\theta$  implies that the derivative  $\frac{\partial u}{\partial \eta_m}$  is linear in  $\theta$ , so (21) cannot hold as an equality on any nonempty interval on which  $g^*(\theta) > 0$ . Next, if  $a^*(\theta) > 0$ , substituting (20) into (19) yields

$$\frac{\partial u}{\partial a} = -1 + \frac{\tau z}{A^*}\theta,$$

which cannot equal 0 on any nonempty interval.

The proof is completed by showing that  $g^*(\theta) > 0$  for  $\theta < \theta^*$ . Suppose to the contrary that  $g^*(\theta) = 0$  for  $\theta \in [0, \theta'), \theta' > 0$ . Then, the derivative in (20) is infinite at  $\theta = 0$ , so  $g^*(\theta) > 0$  for  $\theta = 0$ . Similarly,  $g^*(\theta) > 0$  for all  $\theta \in [0, \theta^*)$ . Q.E.D.

**Lemma 2:** For  $\theta \in (\theta^*, 1]$  (19) and (20) hold as equalities, and (25) holds.

**Proof:** Suppose that there exists a  $\hat{\theta} \in (\theta^*, 1)$  such that for  $\theta \in (\theta^*, \hat{\theta}), \eta_m^*(\theta) > 0$  and  $a^*(\theta) = 0$  and for  $\theta \geq \hat{\theta}, a^*(\theta) > 0$ .<sup>27</sup> For  $\theta \in (\theta^*, \hat{\theta})$ , (19) must be

$$-1 + \alpha\gamma S^{\alpha-1}\theta \frac{\tau z}{A^*} < 0, \tag{A1}$$

and substituting (23) into the equality in (21) yields

$$-\theta^* + \alpha\gamma S^{\alpha-1}\theta = 0. \tag{A2}$$

Substituting (A2) into (A1) yields

$$\theta^* < \frac{A^*}{\tau z}. \tag{A3}$$

For  $\theta \geq \hat{\theta}$  (19) is satisfied as an equality by hypothesis, and either  $\eta_m^*(\theta) = 0$  or  $\eta_m^*(\theta) > 0$ . For the former, (21) implies

$$-\theta^* + \alpha\gamma S^{\alpha-1}\theta < 0. \tag{A4}$$

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<sup>27</sup> Note that if  $a^*(\hat{\theta}) > 0$ , then  $a^*(\theta) > 0$  for all  $\theta \geq \hat{\theta}$ , since the derivative in (19) is strictly increasing in  $\theta$ .

Substituting from (19) for  $\theta > \hat{\theta}$  into (A4) yields

$$\frac{A^*}{\tau z} < \theta^*,$$

which contradicts (A3). Consequently,  $\eta_m^*(\theta) > 0$  for  $\theta > \hat{\theta}$ .

But, then (A4) holds as an equality, which with (19) for  $\theta > \hat{\theta}$  implies (25), but this contradicts (A3), so (A1) cannot hold.<sup>28</sup> Consequently, both (19) and (21) hold as equalities, so there does not exist a  $\hat{\theta}$  as was assumed. Hence, for  $\theta \in (\theta^*, 1]$ , (19) and (21) hold as equalities, and  $\theta^*$  and  $A^*$  are related by (25). Q.E.D.

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<sup>28</sup> Note that  $z$  is a function of  $A^*$ .

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