Managerial contracting and corporate social responsibility

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Abstract

This paper presents a theory of corporate social responsibility in the form of the private provision of public goods and private redistribution by a firm. These social expenditures are determined by a manager operating under a compensation contract chosen by shareholders in a capital market that prices social expenditures. The theory incorporates three explanations for compensation systems that encompass social performance. First, consumers may reward the firm for its social expenditures; second, managers may have personal preferences for contributing to social causes; and third, the shareholder clientele a firm attracts may prefer social expenditures. Social incentives are higher powered the more consumers reward the firm and the stronger are shareholders’ warm glow preferences for social expenditures. Profit incentives are higher powered the more consumers reward the firm but are independent of shareholder preferences. When consumers reward the firm for its social expenditures, firms with higher ability managers have both higher operating profits and higher social expenditures when times are good, so a positive correlation is predicted. In bad times, however, the correlation is negative, except for firms with very low ability managers in very bad times, where the correlation is zero.

Keywords: Corporate social responsibility; Incentive contracts

1. Introduction

Corporate social responsibility is much discussed by executives and often occupies a prominent position on corporate Internet sites. An increasing number of companies are publishing corporate social responsibility reports and discussing it in annual reports. Firms have also established compensation programs that include the evaluation of the social performance of managers. One form of this evaluation is the balanced scorecard advocated by Kaplan and Norton (1992, 1996), which can be extended to social performance. Cohen and Roy (2005) note an increase in the use of non-financial criteria in CEO compensation and within the balanced scorecard framework identify 12 performance factors identified in the literature. Three of the factors, ethics and values, environmental, health, and safety, and management of external relations, fall under the rubric of corporate social responsibility. In their study of board compensation committee reports of 59 industry-leader firms, Cohen and Roy found that all used financial performance in determining compensation and 14 used at least one of the three corporate social responsibility factors. Other firms have developed triple bottom line performance evaluation systems based on financial, environmental, and social measures. Many firms have established environmental, health, and safety reporting systems linked to compensation...
systems. The incentives firms provide for social performance necessarily interact with incentives for financial performance. For example, if corporate social expenditures affect the demand for a firm’s products, incentives for financial performance affect the incentives for social performance. Conversely, providing incentives for social performance can affect the incentives for financial performance and hence for the operations of the firm.

This paper provides a positive theory of corporate social responsibility in which managers instead of markets allocate resources, including social expenditures, through the corporate form. The social expenditures could constitute redistribution or public goods and are funded from the financial returns of shareholders. Although managers allocate resources, their compensation is set by shareholders. The resulting managerial compensation contacts are limited to observable measures of performance, such as profits and social expenditures, and contracting is second-best because of hidden information, hidden effort, and limited observability. The theory focuses jointly on the operational management of the firm and on its social expenditures as influenced by incentives chosen by shareholders. The theory provides an explanation for compensation systems that encompass social performance.

The theory also provides a framework for studying the private provision of local public goods by firms. These goods can include community projects and support, philanthropy, training and educational programs, workers’ rights initiatives, environmental abatement and protection, and alternatives to animal testing. One form of private provision is self-regulation as manifested in environmental programs to reduce toxic emissions (Lyon and Maxwell, 2004), safety and pollution abatement in the chemical industry (King and Lenox, 2000), sustainability as in the case of participation in Forest Stewardship Council and the Sustainable Forestry Initiative programs (Cashore et al., 2005), and improvements in managerial practices relating to environmental, health, and safety (Prakash and Potoski, 2006). Firms also participate in voluntary government programs as in the case of the EPA’s private-public program to reduce carbon dioxide emissions (Delmas, 2006) or industry-NGO voluntary programs such as recently announced coalition of ten U.S. companies and four NGOs to reduce greenhouse gas emissions and to work for mandatory government programs with flexibility and incentives. The number of such initiatives and programs appears to have increased substantially in recent years. One explanation is that citizens’ support has increased for private parties to address externalities and social problems beyond the mandates of government; i.e., to privately provide public goods. This paper provides a framework for studying certain agency aspects of corporate social responsibility and the private provision of public goods as induced by citizens’ preferences. That is, the citizens who own firms choose compensation systems to induce managers to serve their interests, taking into account the contracting limitations due to hidden actions, hidden information, and private observability. This requires that firms be embedded in a capital market in which citizens choose whether to hold shares in firms that provide local public goods and how to compensate the managers who operate the firms in which they become shareholders.

Graff Zivin and Small (2005) present a model in which investors have preferences for both financial and social returns and can invest in firms that engage in corporate social responsibility. They show that if citizens are indifferent between personal giving to social causes and their ownership share of corporate social expenditures, the market values of firms are independent of their social expenditures. Corporate social expenditures thus perfectly crowd out personal giving. Baron (2007a) considers a model in which shareholders are not indifferent between personal giving and corporate social expenditures, in which case corporate social expenditures are costly to shareholders. The social entrepreneurs who establish the firms that make social expenditures then bear the cost of their social expenditures. Baron (2007b) considers the motivation underlying corporate social responsibility in a setting in which firms compete directly in a market. One firm is morally motivated and voluntarily addresses a negative externality associated with its production. The other firm is self-interested and addresses the externality only if sufficiently pressured to do so. The firms segment the market with the morally-motivated firm setting a high price and attracting consumers who value mitigation of the externality and the self-interested firm setting a low price and attracting consumers who do not value those expenditures as highly. Activists funded by citizens can apply social pressure to one of the two firms, and if citizens do not distinguish between moral management and corporate social performance induced by social pressure, morally-managed firms are softer targets than self-interested firms. Social pressure then is more likely to be directed to morally-managed firms, and the demands made on those firms are higher. The present paper focuses on the role of managers in corporate social policy in the absence of social pressure.

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4 A bibliography with over 500 recent studies on corporate social responsibility is available at http://environment.yale.edu/profile/9827/workshop_on_research_in_corporate_social.
Corporate social responsibility has three explanations in the theory. First, social expenditures could be rewarded. Consumers may value those expenditures and hence be willing to pay more for a firm’s product. Similarly, corporate social responsibility could improve the productivity of a firm by inducing employees to work harder or better. Second, managers may engage in corporate social responsibility as a consumption activity or for public acclaim. Third, investors may value corporate social responsibility, in which case they may hold shares in the firm even if, because of its corporate social expenditures, its financial return is lower than returns available elsewhere in the capital markets.

One explanation for corporate social responsibility not considered here is to forestall private or public politics. Corporate social responsibility could forestall or redirect NGOs, activists, and citizen pressure to other firms. That is, corporate social expenditures could satisfy the agenda of those challenging the firm in the arena of public sentiment, as considered by Baron (2001) and Baron and Diermeier (2007). Corporate social responsibility could also forestall public politics that could lead to additional regulation or restrictions on the firm. Maxwell et al. (2000) present a model in which reducing emissions below the level permitted by environmental regulation decreases the likelihood of more stringent regulation. Empirically, they find that firms reduced their emissions more the greater the proportion of Sierra Club members in a state.

Citizens have three roles in the theory. First, they are consumers who may reward the firm for its corporate social expenditures. Second, they are investors and potentially shareholders in the firm, and those who become shareholders contract with the manager to elicit effort and encourage social expenditures. Third, they contribute to social causes directly through personal giving.

Citizens thus can express their social preferences in two ways in the model. First, they can give a portion of their wealth to social causes. Independent Sector reports that in 2005 1.5 million organization received $260.3 billion in contributions and estimates that the dollar value of volunteer time was an additional $280 billion. Second, they can hold shares in a firm that makes social expenditures. The market value of the firm then equals its financial return plus the market’s valuation of the firm’s social expenditures, where citizens’ preferences for personal giving allow corporate social expenditures to be priced. Shareholders who have a preference for corporate social expenditures pay a premium above the financial return, so the financial return on shares is lower than for firms that do not make social expenditures. Because corporate social expenditures are an untraded good, shareholders are not unanimous in their preferences regarding contracting with managers. Shareholders are thus assumed to be represented by a board of directors that serves shareholder interests in the aggregate.

When corporate social expenditures are rewarded by consumers, shareholders choose compensation systems that provide both profit and social incentives. This compensates for the distortions in the incentives for financial performance required to address hidden information and hidden effort problems. These problems can result in low-powered profit incentives that discourage social expenditures even when those expenditures are profit enhancing. If the shareholder clientele attracted by the firm has warm glow preferences for social expenditures, stronger social incentives are provided. The theory thus lends support for compensation systems based on both financial and social performance. In particular, firms with products whose demand is influenced by social expenditures would be expected to have compensation systems that are broader than financial performance, regardless of whether the shareholders value those expenditures.

The theory predicts that corporate social expenditures and profits are positively associated. Financial performance is increasing in managerial ability, but higher ability managers make greater social expenditures than do lower ability managers only in good times. Since firms with higher ability managers have both higher operating profits and higher social expenditures when times are good, a positive correlation is predicted. In bad times, however, the correlation is negative, except for firms with very low ability managers in very bad times. Longitudinal data thus could reveal no correlation, whereas cross-section data in good times could reveal a positive correlation and in bad times a negative or no correlation. Panel data would have to be estimated in a manner to isolate the predictions for good and bad times. Because of hidden information and effort and limited observability, profit incentives are lower powered than in a first-best contract, but when social expenditures are contractable social incentives in expectation equal the optimal social expenditures for shareholders and managers. Social expenditures, however, are not sufficiently responsive to the opportunities of the firm unless the reward by consumers for those expenditures is contractable. In good times social expenditures are lower than the first-best, whereas in bad times social expenditures are higher than the first-best. This

5 Private politics is introduced by Baron (2001, 2003).
results because managers can observe the opportunities of the firm whereas shareholders cannot, so shareholders must contract with the managers under limited observability.

The provision of public goods by non-profit organizations and the organization and performance of the public sector have been surveyed by Rose-Ackerman (1996) and Dixit (2002). Some of the literature considers agents who have non-standard preferences for their actions or for the outcomes of their work or have attributes that limit their motivation. The focus is then on how workers select into the private and public sectors and how organizations in those sectors perform. Dixit (Section IV.D) discusses the motivation of agents in the public sector, focusing on their liking the task, a sense of purpose, and professionalism. Prendergast (2007) considers bureaucrats who have preferences to serve their clients. The type of bureaucrat to hire then depends on the congruence between the preferences of the bureaucracy and its clients. For example, if preferences are aligned, the bureaucracy prefers workers who are biased in favor of the clients.

Glazer (2004) considers an agent who can provide unverifiable effort above a verifiable base level of effort. The agent can be devoted in the sense of valuing the output of the organization in which he is employed, and the analysis characterizes the effect of that valuation on the principal’s choice of a capital input, efficiency, and output. Francois (2000) focuses on public service motivation as an explanation for the government provision of services. A private firm can pay the agent based on his services, whereas a bureaucracy cannot and instead provides a budget to the agent. Francois identifies conditions under which the bureaucracy attracts agents who have a public service motivation and explains why low-powered incentives would be provided. The theory presented here characterizes the power of the incentives provided to managers as a function of the preferences of their principals, the shareholders, for financial and social performance as well of the preferences of managers and any rewards by consumers.

Delfgaauw and Dur (2004) consider agents who may be dedicated, lazy, or regular workers and may work in either the public or the private sector. When effort is unverifiable, the public sector offers compensation contracts that attract dedicated and lazy workers but not regular workers who are dissuaded by the low-powered contracts designed for lazy workers. In contrast, the theory presented here does not focus on sorting or selecting agents but instead on providing incentives for financial and social performances for a manager with private information about her ability and a disutility of effort.

Corneo and Rob (2003) consider a model in which agents can allocate their effort between an individual and a cooperative task. Agents have a privately-known preference for cooperation and can choose to work in the private or public sector. They show that if the public firm values the welfare of its employees it offers lower-powered incentives that do not regular workers who are dissuaded by the low-powered contracts designed for lazy workers. In contrast, the theory presented here does not focus on sorting or selecting agents but instead on providing incentives for financial and social performances for a manager with private information about her ability and a disutility of effort.

Bagnoli and Watts (2003) consider the strategic use of corporate social responsibility to appeal to consumers who have warm glow preferences for the public goods aspects of the private goods provided by firms. They study both Cournot and Bertrand competition and conclude that the provision of the public good is inversely related to the competitiveness of the market, so entry reduces the provision of the public good. Although the public good is undersupplied in most circumstances, Bagnoli and Watts identify circumstances in which it is oversupplied. To focus on incentive issues in this paper, consumer choice and product differentiation are represented by a reduced form profit opportunity for the firm.

Besley and Ghatak (2005) consider a matching model in which principals of different types attract workers of different types to their firms. Some of the principals and agents are motivated and have non-pecuniary preferences for the mission of the firm. The authors identify a contracting equilibrium in which no party has an incentive to negotiate a different contract. They take the mission of a firm as exogenous, whereas in the model considered here, the mission; i.e., the level of social expenditures, of the firm is endogenous to which citizens hold its shares, as well as to the effort and ability of the manager and the information observed by the manager about the opportunities of the firm.

Besley and Ghatak (2006) consider a model in which a subset of caring consumers have a demand for public goods, where firms can provide those goods jointly with their private goods. Firms differentiate their offerings, and Bertrand competition leaves the surplus with consumers, but the public good is undersupplied relative to the first-best. Besley and Ghatak also consider the sustainable level of private provision when consumers have an imperfect monitoring technology. They also compare private provision to public provision and provision by non-profits and identify a role, albeit a limited one, for private provision.
This paper does not consider alternative organizational forms for the provision of public goods. The model can be thought of as pertaining to those types of corporate social responsibility for which the firm is the low-cost provider of the public good, as in the case in which the public good (or bad) is associated with the provision of a private good. The focus then is on how investors shape the incentives of managers who choose the levels of private provision of the private and public goods in a setting involving a high level of management discretion due to a hidden action, hidden information, and opportunities observable only to the manager. The structure of both profit incentives and social incentives thus are important to the financial and social performance of the firm.

2. The model

2.1. Timing

In the first stage citizens make their investment decisions. In the second stage those citizens who become shareholders in the firm select a manager, who has private information about her ability, and offer her a compensation contract. If the manager accepts the contract, she operates the firm. That is, she observes the opportunities of the firm and chooses her effort and the social expenditures of the firm conditional on those opportunities. Profits and social expenditures are then observed, compensation is paid to the manager, and the remaining profits are distributed to shareholders.

2.2. The firm

The profit \( \pi \) of the firm is a function of the ability \( a \in A \) of the manager, her effort \( e \in [0, \infty) \), social expenditures \( S \), and the opportunities available to the firm, which are represented by the parameter \( \phi \in \Phi \subset \mathbb{R} \) and are observable only to the manager. The manager contributes to the economic performance of the firm in three ways. First, she expends effort, which is more productive the higher is her ability. Second, she chooses social expenditures. Third, she responds to the opportunities \( \phi \) available to the firm by adjusting her effort in response to its productivity. The manager’s ability and effort contribute to the operations of the firm, but managers are assumed not to have any special expertise pertaining to social expenditures. For example, managers are trained to operate the firm rather than to support social causes, and at lower levels of management may not be responsible for social activities or expenditures. Hence, their experience, training, and ability may have no effect on the efficacy of \( S \).

To simplify the notation and analysis, the operating profit (not including the compensation of the manager) is specified as

\[
\pi = \phi(ae + \tau S) - S,
\]

where \( \tau \in [0, \infty) \) is a parameter that reflects consumers’ valuations of the social expenditures. For example, for a consumer goods firm \( \tau \) could be positive, and for an industrial products company it could be zero. The parameter \( \tau \) could also reflect greater productivity of employees induced by the firm’s social expenditures. The opportunities represented by the parameter \( \phi \) can be interpreted as how good the “times” are for the firm, where high \( \phi \) corresponds to good times and low \( \phi \) to bad times. Note that the effect of social expenditures on profits is independent of ability, since managers are assumed not to have particular expertise about social activities.

Social expenditures represent a variety of activities and policies that go beyond normal business activity and compliance with laws and regulations. As indicated above, the expenditures could represent redistribution through

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7 In contrast to career concern models (Holmstrom, 1982) this model pertains to experienced managers who know their ability better than does the labor market. This private information can be viewed as remaining after the managers have self-selected into the private sector. Managers are assumed to be unable to reveal credibly their remaining information.

8 The model can be extended in a straightforward manner to the case in which effort and ability are substitutes. For example, let profit be

\[
\pi = \phi(\mu(a + e) + (1 - \mu)ae + \tau S) - S,
\]

where \( \mu \in [0, 1] \) identifies the extent to which ability and effort are substitutes (\( \mu = 1 \)) or complements (\( \mu = 0 \)). This extension provides no additional insights, although the managerial compensation contract has properties that differ somewhat from those with \( \mu = 0 \), as considered below.

9 If ability also affects the marginal product \( \phi \tau \) of social expenditures, the manager’s choice of effort is unaffected and in (5) below \( \phi \tau \) is replaced by \( \phi \tau \). The optimal contract and the manager’s compensation are determined using the same approach presented below.
corporate philanthropy, human rights policies, or paying a living wage. The expenditures could also provide local public goods such as community projects, greater abatement than required by environmental regulation, and so on.\textsuperscript{10}

The effect $\phi \tau S$ of social expenditures on the profit of the firm is to be interpreted as a reduced form of an increment to profit due to consumers’ preferences for the social expenditures of the firm. For example, consumers could reward the firm for the public goods provided by the social expenditures, which could provide product differentiation and yield a higher price. Alternatively, consumers could respond to social expenditures in a manner similar to a response to advertising for the firm’s product or brand.\textsuperscript{11} Fisman et al. (2005) find that corporate social responsibility is higher for consumer products companies that are advertising intensive, which is consistent with the view that corporate social responsibility is undertaken to enhance a brand or product. The effect $\phi \tau S$ may be thought of as an additional willingness to pay of consumers that is not affected by effort and ability.\textsuperscript{12}

 Both the operating profit and the social expenditures of the firm are assumed to be observable and contractable. For example, social expenditures can be audited along with profit, but auditing is assumed not to be able to distinguish whether a consumer bought the firm’s product because of its social expenditures or because of its price and quality. That is, the marginal contribution $\phi \tau$ cannot be distinguished from the contribution $\phi e$. Social expenditures thus differ from managerial effort and ability, which are not observable and hence not contractable. Social expenditures also differ because they may be valued only by a subset of investors, whereas all investors prefer higher ability managers and no investor prefers shirking on effort.

3. Management

The shareholders of the firm are assumed to contract with a manager selected at random from a pool of potential managers each of whom knows her ability, whereas the shareholders know only the distribution of abilities. In relation to the selection literature on public versus private provision, these are managers who have selected into the private sector, and ability $a$ represents the private information not revealed in that selection. Individual managers could be credit constrained, in which case shareholders may prefer not to auction the firm among the potential managers. The shareholders could auction the firm to other investors, but those investors would then have to hire a manager, leaving the same contracting problem as the shareholders have. It is this contracting problem that is the focus of the model. This section characterizes the manager’s actions given a compensation contract, and the optimal contract is characterized in Section 5.

The managers in the pool are assumed to be identical except for their abilities which are distributed according to a distribution function $H(a)$ with support $A = [a_l, a_r]$. A manager’s preferences are represented by a utility function $u$ specified as

$$u = I - \psi(e) + v(S),$$

where $I$ is the income from the managerial compensation contract, $\psi(e)$ is the disutility of the effort expended by the manager, and $v(S)$ is the manager’s utility from making social expenditures and being recognized for doing so. The disutility of effort is assumed to be strictly increasing and strictly convex with $\psi'(0) = 0$. The utility from social expenditures may be interpreted as personal satisfaction or acclaim for the manager from citizens who value such expenditures. The function $v(S)$ is assumed to be increasing and concave. The manager is risk neutral in income, so insurance incentives are not present.

The manager’s disutility of effort and utility of social expenditures functions are assumed to be common knowledge, and all potential managers are assumed to have the same $\psi(e)$ and $v(S)$. That is, every manager is assumed to view effort as costly, and every manager is assumed to like the public praise that comes through the media and from awards.
for good deeds, one of which could be allocating corporate resources to social causes. Corporate social expenditures thus could be a form of consumption by managers. This acclaim for social expenditures is received only if the public learns about the social expenditures, so it is in the manager’s interest to disclose $S$. Moreover, as noted above social expenditures can be audited. The disclosure of $S$ is consistent with Navarro’s view of corporate social responsibility as advertising.

The managerial compensation contract is assumed to be enforceable by a third-party and can be based on information reported by the manager in addition to the observables. The contract is specified as a linear function of the observable profit and social expenditures, so income $I$ is

$$I = \beta(\phi(ae + \tau S) - S) + \gamma S + k,$$

where $\beta$ is the profit incentive, $\gamma$ is the social incentive, and $k$ is a lump-sum, each of which can depend on information reported by the manager about her ability. Shareholders are assumed not to be able to change managers after the selected manager has reported her information, so if the manager rejects the contract offered, the firm cannot recruit another manager in the current period, so $e$ and $S$ are 0. A linear contract is considered to simplify the analysis and allow examples to be presented.

The manager has two tasks, $e$ and $S$, and conditional on the compensation contract in (2), observes $\phi$ and then chooses according to

$$(e^*, S^*) \in \arg \max_{e, S} u = \beta(\phi(ae + \tau S) - S) + \gamma S + k - \psi(e) + v(S).$$

To allow closed-form characterizations, let $\psi(e) = \frac{c}{2} e^2$, $c > 0$, and $v(S) = bS - \frac{m}{2}S^2$, $b, m \geq 0$, where $\frac{b}{m} > S$ in the relevant region of $S$. The manager’s actions then are

$$e^* = \frac{\beta\phi a}{c}$$

and

$$S^* = \begin{cases} \frac{\beta(\phi\tau - 1) + \gamma + b}{m} & \text{if } \beta(\phi\tau - 1) + \gamma + b \geq 0 \\ 0 & \text{if } \beta(\phi\tau - 1) + \gamma + b < 0. \end{cases}$$

The social expenditures $S^*$ are initially assumed to be positive, and a sufficient condition will be given in conjunction with the characterization of the optimal compensation contract. Note that both $e^*$ and $S^*$ depend on the profit incentive $\beta$, since both effort and social expenditures contribute to profits (if $\phi \tau > 0$).

The actions in (4) and (5) identify two differences between the profit and the social incentives in the managerial compensation contract. First, because of the separability of the profit function the effort choice is independent of the social incentive. Second, the effect $\phi\tau S$ of social expenditures on profit is not observable separately from profit, so the choice of social expenditures depends on both the profit and social incentives. More importantly, because of the limited observability the responsiveness of social expenditures to the opportunities $\phi$ is only that induced by the profit incentives. The social incentive thus cannot be used to restore the first-best responsiveness of social expenditures to the times.

The effort in (4) is increasing in $\phi$, as are the social expenditures when $\tau > 0$, so good times result in both greater effort and greater social expenditures. The manager responds to good times by spending more on social causes because the marginal product of social expenditures in higher. The manager also works harder, since good times, effort, and ability are complements.

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13 In the equilibrium the manager is voluntarily willing to disclose $S$ and have it audited.

14 For the more general formulation in which effort and ability can be substitutes, $e^* = \frac{\beta a}{2} (\mu + (1 - \mu)\tau)$ and $S^*$ is as given in (5). If the manager had no preferences over $S$; i.e., $v(S) = 0$, $\forall S \geq 0$, the choice of $S$ is bang-bang, and the set of $S$ would have to be bounded.

15 Managerial effort is decreasing in $c$, which could correspond to the opportunity cost of time, aversion to certain of the tasks of management, or laziness.
In addition to the observables \( \pi \) and \( S \), the managerial compensation contract can be based on a report \( \hat{a} \) by the manager about her ability. That is, the contract parameters are \((\beta(\hat{a}), \gamma(\hat{a}), k(\hat{a}))\). Social expenditures \( S^*(\phi, \hat{a}; a) \) are thus given in (5) with \( \beta = \beta(\hat{a}) \) and \( \gamma = \gamma(\hat{a}) \). Similarly, the manager’s effort in (4) is \( e^*(\phi, \hat{a}; a) \). In contrast to the literature on the performance of public agencies, the contract here is not used in selecting a manager but instead provides incentives, along with the privately observable \( \phi \), for effort and social expenditures.

The operating profit \( \pi(\phi, \hat{a}; a) \) of the firm when \( S^*(\phi, \hat{a}; a) > 0 \) is

\[
\pi(\phi, \hat{a}; a) = \frac{\beta(\hat{a})\phi^2 a^2}{c} + \frac{(\phi - 1)(\beta(\hat{a})(\phi - 1) + \gamma(\hat{a}) + b)}{m},
\]

and the expected profit with respect to the firm’s opportunities \( \phi \) is

\[
E_\phi \pi(\phi, \hat{a}; a) = \int_{\phi} \pi(\phi, \hat{a}; a) dF(\phi),
\]

where \( F(\phi) \) is the distribution function of \( \phi \) with support \( \Phi = [\phi_L, \phi_R] \).

4. Citizens, personal giving, and the capital market

Citizens have an initial endowment they can allocate between investments and personal giving to social causes. Those social causes are assumed to be the same as the causes that receive corporate social expenditures. The investment alternatives for citizens are savings, which has a return normalized to one, and shares of the firm. The shares have a financial return

\[
\hat{\pi}(\phi, \hat{a}; a) = \pi(\phi, \hat{a}; a) - I,
\]

equal to the operating profit less the compensation of the manager, and a social return \( S^*(\phi, \hat{a}; a) \), both of which are uncertain ex ante. To simplify the analysis, citizens, like managers, are assumed to be risk neutral with respect to their financial and social returns.

Citizens vary in their preferences on two dimension. First, they differ in their preferences for contributing to social causes. A 2000 survey conducted by Independent Sector found that 89% of U.S. households contributed time or money. As indicated below those who prefer not to give have no effect on the results. Second, those citizens who prefer contributing can differ in their warm glow preferences for personal giving and corporate social expenditures, as considered by Andreoni (1989, 1990),\(^{16}\) That is, they receive satisfaction from the act of personal giving and from purchasing shares in a firm that makes social expenditures.\(^{17}\) Corporate social expenditures are, however, less personal than a citizen’s own giving, so let \( \theta \in [0, 1] \) index the satisfaction from corporate social expenditures relative to the satisfaction from personal giving. Then, a citizen who has preferences for giving to social causes has total social satisfaction \( \sigma \) given by

\[
\sigma = g + \eta 0 S^*(\phi, \hat{a}; a),
\]

where \( g \) is personal giving and \( \eta \) is the share of the firm purchased by the citizen.\(^{18}\) Since the preferences of citizens could differ, let \( J(\theta) \) represent the distribution function of \( \theta \), which may have a mass point at \( \theta = 0 \) representing citizens who are interested only in the financial return and personal giving.

\(^{16}\) Becker (1974) also discusses such 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.

\(^{17}\) Citizens could also have altruistic preferences for the beneficiaries of the social expenditures, but those social expenditures can be crowded out by government-provided public goods financed by lump-sum taxes (Andreoni, 1988, Nyborg and Rege, 2003). Rather than model government provision and crowding out, citizens are assumed to have only warm glow preferences for social expenditures.

\(^{18}\) Social expenditures by the firm can crowd out personal giving by some citizens. Since the focus here is on managerial contracting, the extent of the crowding out will not be characterized. In models without managerial compensation contracts Baron (2007a) and Graff Zivin and Small characterize crowding out.
The utility function \( W_\theta \) of a citizen of type \( \theta \) is specified as
\[
W_\theta = z + \eta \tilde{\pi}(\phi, \hat{a}; a) + \hat{a} \tilde{y}(\sigma),
\]
where \( z \) denotes savings, the utility \( \tilde{y}(\sigma) \) from social satisfaction \( \sigma \) is assumed to be strictly increasing and (weakly) concave, and in the simplest formulation \( \tilde{z} \in \{0, z\} \) denotes whether the citizen has no preference (\( \tilde{z} = 0 \)) for contributing to social causes or has (\( \tilde{z} = z > 0 \)) such a preference. In their investment decisions the former group will not give personally nor will they hold shares in the firm, so they do not affect the results that follow.\(^{19}\) The analysis thus focuses on those with \( \tilde{z} = z > 0 \), and to simplify the notation, let \( y(\sigma) = z \tilde{y}(\sigma) \). Letting the initial wealth of a citizen of type \( \theta \) be \( w^\theta(\theta) \), the budget constraint is
\[
\eta \rho + g + z \leq w^\theta(\theta) + \eta^\theta(\theta) \rho,
\]
where \( \rho \) is the market value of the firm and \( \eta^\theta(\theta) \) is the initial endowment of shares held by a citizen of type \( \theta \).\(^{20}\)

A citizen maximizes with respect to \((g, \eta)\) the expectation \( E_{\phi,a} W_\theta \) of the utility in (7) with \( z \) given by the equality in (8). A citizen is assumed to be small relative to the capital market and hence not to affect the subsequent managerial contracting. The capital market equilibrium is characterized by the necessary conditions
\[
\frac{\partial E_{\phi,a} W_\theta}{\partial g} = -1 + E_{\phi,a} y'(\sigma) \leq 0; \quad \frac{\partial E_{\phi,a} W_\theta}{\partial \eta} g^*(\theta) = 0,
\]
where \((g^*(\theta), \eta^*(\theta))\) are the optimal allocations and \( \rho^* \) is the equilibrium market value. Savings is then recovered from the budget constraint in (8).

Denoting the citizen who is indifferent between personal giving and holding shares in the firm by \( \theta^* \), it is straightforward to show that citizens with \( \theta < \theta^* \) hold no shares of the firm and give personally \((g^*(\theta) > 0)\) to social causes, whereas citizens with \( \theta > \theta^* \) hold shares \((\eta^*(\theta) > 0)\) of the firm and do not give personally.\(^{21}\) The shareholders of the firm are thus those with \( \theta \in \Theta^* \equiv [\theta^*, \bar{\theta}] \).

To obtain an expression for the market value \( \rho^* \) of the firm, evaluate (10) at \( \theta^* \) which yields
\[
\rho^* = E_{\phi,a} \tilde{\pi}(\phi, \hat{a}; a) + \theta^* E_{\phi,a} S^*(\phi, \hat{a}; a) y'(\sigma).
\]
Since \( S^*(\phi, \hat{a}; a) \) is non-negative and \( y'(\sigma) > 0 \), the market value of the firm exceeds its financial return \( E_{\phi,a} \pi(\phi, \hat{a}; a) \). Substituting from (9) as an equality yields
\[
\rho^* = E_{\phi,a} \tilde{\pi}(\phi, \hat{a}; a) + \theta^* E_{\phi,a} S^*(\phi, \hat{a}; a) + \theta^* \text{cov}_{\phi,a}(S^*(\phi, \hat{a}; a) y'(\sigma)),
\]
where \text{cov}_{\phi,a}(\cdot, \cdot)\) denotes covariance. The market value is thus the expected financial return plus the expected social return \( E_{\phi,a} S^*(\phi, \hat{a}; a) \) less the covariance both valued at \( \theta^* \), which is the marginal rate of substitution of corporate social expenditures for personal giving for the citizen who is indifferent between personal giving and holding shares in the firm. The expected social return is positive, but since the covariance is non-positive, the market value of the social return is (weakly) less than the investors’ warm glow valuation of the expected social return. Since the value of the social return is positive if \( \theta^* > 0 \), firms that engage in corporate social responsibility sell at a premium relative to their financial return whenever shareholders value those expenditures.\(^{22}\) Shareholders with strong (\( \theta > \theta^* \)) warm glow preferences for corporate social expenditures thus accept a lower financial return on their shares. Those shareholders, however, gain a warm glow surplus because the social expenditures are valued at the lowest marginal rate of substitution \( \theta^* \) among the shareholders.

---

19 This assumes that the set of citizens with \( \tilde{z} = 0 \) and \( \theta > 0 \) have sufficient wealth to hold the shares of the firm.

20 This model of the stock market was introduced by Graff Zivin and Small.

21 From (9) as an equality, \( g^*(\theta) = g^* \) for all \( \theta < \theta^* \).

22 The firm is thus subject to take-over by citizens who do not value social expenditures, as considered in Baron (2007a). Shareholders can prevent a take-over by having shares held by a socially-responsible mutual fund. The Social Investment Forum reported that the total net assets of “socially screened mutual funds” increased from $12 billion in 1995 to $179 billion in 2005.
The characterization of the equilibrium in the capital market is completed by the market clearing condition on the shares of the firm or

\[ \int_{0}^{\bar{\theta}} \eta^*(\theta) dJ(\theta) = 1, \]

where the number of shares is normalized to 1.

The properties of the capital market equilibrium are summarized in the following proposition.

**Proposition 1.** Capital Market Equilibrium: Citizens with \( \theta < \theta^* \) hold no shares in the firm and give personally to social causes, whereas citizens with \( \theta > \theta^* \) hold shares in the firm and do not give personally. The market value of the firm equals the expected financial return plus the expected social return less the covariance between the social return and marginal social satisfaction, both valued at \( \theta^* \).

5. Managerial contracting

5.1. Shareholder preferences

The second-stage preferences of a shareholder of type \( \theta \) are represented by the expected utility function

\[ W^*(\theta) = \int_{\bar{\alpha}}^{\tilde{\alpha}} E_{\phi} \eta^*(\theta)(\pi(\phi, \hat{\alpha}; a) - \beta(\hat{\alpha})\pi(\phi, \hat{\alpha}; a) - \gamma(\hat{\alpha})S^*(\phi, \hat{\alpha}; a) - k(\hat{\alpha})) + y(\eta^*(\theta)\theta S^*(\phi, \hat{\alpha}; a)) dH(\hat{\alpha}). \]

Abstracting from collective choice considerations and recognizing an absence of shareholder unanimity, shareholders are assumed to maximize their aggregate expected utility \( W^* \) given by

\[ W^* = \int_{\bar{\alpha}}^{\tilde{\alpha}} E_{\phi} \eta^*(\theta)(\pi(\phi, \hat{\alpha}; a) - \beta(\hat{\alpha})\pi(\phi, \hat{\alpha}; a) - \gamma(\hat{\alpha})S^*(\phi, \hat{\alpha}; a) - k(\hat{\alpha}) + E_{\theta \in \Theta^*} y(\eta^*(\theta)\theta S^*(\phi, \hat{\alpha}; a)) dH(\hat{\alpha}), \]  

where \( E_{\theta \in \Theta^*} \) is the expectation over \( \Theta^* \). For example, shareholders could elect a board of directors with a fiduciary duty to serve their interests. The shareholders then contract with the manager through the board to maximize \( W^* \) in (13).

To simplify the analysis, the preferences of a shareholder for social satisfaction are assumed to be linear; i.e., \( y(\sigma) = \delta \sigma \), \( \delta > 0 \), so aggregate preferences of shareholders are

\[ \int_{\bar{\theta}}^{\tilde{\theta}} \delta \sigma dJ(\theta) = \delta \theta^* S^*(\phi, \hat{\alpha}; a), \]

where \( \theta^0 = \int_{\bar{\theta}}^{\tilde{\theta}} \eta^*(\theta) dJ(\theta) \) is the aggregate, weighted warm glow preferences of shareholders.\(^{24}\)

\(^{23}\) If \( \phi \) were not uncertain or \( \tau = 0 \), shareholders would be unanimous in their preferences for the profit incentive \( \beta(\hat{\alpha}) \) but not unanimous in their preferences for \( \gamma(\hat{\alpha}) \). When \( \phi \) is uncertain and \( \tau > 0 \), shareholders are unanimous in their preferences for neither \( \beta(\hat{\alpha}) \) or \( \gamma(\hat{\alpha}) \).

\(^{24}\) If individual warm glow preferences are linear in \( S \), shareholdings \( \eta^*(\theta) \) are determined by the budget constraints of citizens with preference parameter \( \theta \) at least \( \theta^* \). That is, the shareholders are from (10) those citizens with \( \beta_{E_{\theta \in \Theta^*} W^*} S^* \geq 0 \), and their shareholdings are \( \eta^*(\theta) = \frac{1}{\rho}(\theta^*(\theta) + \rho^*(\theta)) \), so the market clearing condition in (12) is

\[ \int_{\bar{\theta}}^{\tilde{\theta}} \frac{1}{\rho^*}(\theta^*(\theta) + \rho^*(\theta)) dJ(\theta) = 1. \]

This implies

\[ \rho^* = \frac{\int_{\bar{\theta}}^{\tilde{\theta}} \theta^*(\theta) dJ(\theta)}{1 - \int_{\bar{\theta}}^{\tilde{\theta}} \eta^*(\theta) dJ(\theta)}. \]

The market value is given by the expression in (11), and \( \theta^* \) and \( \theta^0 \) are given by

\[ E_{\phi, \hat{\alpha}}^*(\phi, \hat{\alpha}; a) + \theta^0 \delta E_{\phi} S^*(\phi, \hat{\alpha}; a) = \frac{\int_{\bar{\theta}}^{\tilde{\theta}} \theta^*(\theta) dJ(\theta)}{1 - \int_{\bar{\theta}}^{\tilde{\theta}} \eta^*(\theta) dJ(\theta)}, \]

and \( \theta^0 = \int_{\bar{\theta}}^{\tilde{\theta}} \eta^*(\theta) dJ(\theta). \)
Substituting the utility $U(\phi, \hat{a}; a) = u$ from (3) evaluated at $e^*(\phi, \hat{a}; a)$ and $S^*(\phi, \hat{a}; a)$ into (13) yields the objective $W^*$ of the board:

$$W^* = \int_a^\bar{a} E_\phi [\pi(\phi, \hat{a}; a) - U(\phi, \hat{a}; a) - \psi(e^*(\phi, \hat{a}; a)) + \nu(S^*(\phi, \hat{a}; a)) + \theta^0 \delta S^*(\phi, \hat{a}; a)]dH(a)$$

$$= \int_a^\bar{a} E_\phi \left[ \frac{\beta(\hat{a}) \phi^2 \hat{a}^2}{c} + (\tau \phi - 1)S^*(\phi, \hat{a}; a) - \frac{\beta(\hat{a})^2 \phi^2 a^2}{2c} + bS^*(\phi, \hat{a}; a) - \frac{m}{2} S^*(\phi, \hat{a}; a))^2 - u(\phi, \hat{a}; a) + \delta^0 S^*(\phi, \hat{a}; a) \right]dH(a).$$

(14)

5.2. The contracting problem

Shareholders face a contracting problem with two actions, one of which (S) is observable and the other (a) is unobservable. In addition, the profit of the firm is observable, so the contract can be a function of $\pi, S, a$, and a report $\hat{a}$, or selection, on the hidden information.

If ability were known to shareholders and the manager were not credit constrained, the optimal contract would have $\beta(\hat{a}) = 1, \forall \hat{a} \in [a, \bar{a}]$. Shareholders in effect would sell the firm to the manager for an amount $h(\hat{a})$. Incentives are then high-powered. When ability is the private information of the manager, however, shareholders prefer not to use high-powered incentives, since high-powered incentives allow the manager to earn rents on her private information. Shareholders prefer to trade off the power of the incentives for lower information rents.

Since effort and ability are complements, the marginal product of effort is increasing in ability and shareholders want to induce greater effort from a high ability manager than from a low ability manager. This suggests that $\beta(\hat{a})$ should be an increasing function of the report $\hat{a}$. But, this means that low ability managers have an incentive to report that they have high ability to obtain a larger share of the profits; i.e., greater information rents. Dampening this incentive to misreport ability by choosing a lower $\beta(\hat{a})$, however, dampens the incentives for social expenditures. This effect can be mitigated, but not corrected, through the social incentive $\gamma(\hat{a})$, as indicated below.

Contracting takes place prior to the manager observing the firm’s opportunities $\phi$, so the expected utility $U(\hat{a}; a)$ of the manager with ability $a$ who reports $\hat{a}$ is

$$U(\hat{a}; a) = E_\phi U(\phi, \hat{a}; a) = \frac{\beta(\hat{a})^2 E_\phi \phi^2 \hat{a}^2}{2c} + \frac{E_\phi (\beta(\hat{a}) (\phi \tau - 1) + \gamma(\hat{a}) + b)^2}{2m} + k(\hat{a}),$$

(15)

where $S^*(\phi, \hat{a}; a)$ is taken to be positive for all $(\phi, a)$.

The revelation principle applies to this contracting problem, so the problem can be reformulated as a direct revelation game in which truthful reporting is a dominant strategy for the manager. That is, it is sufficient to consider contracts such that the manager has an incentive to report her ability truthfully ($\hat{a} = a$). The Appendix shows that in any incentive feasible contract that elicits the participation of the manager $\beta(a)$ must be a non-decreasing function of the ability $a$ of the manager. Shareholders thus must provide weakly more powerful profit incentives for higher ability types. The Appendix also shows that the expected utility of the manager is increasing in ability and independent of the contractual incentives for social expenditures. The latter results because the marginal profit from social expenditures is independent of the hidden information about the manager’s ability.

As shown in the Appendix, incorporating the incentive constraints ((A1) and (A2) in the Appendix) into the shareholders’ aggregate utility $W^*$ in (14) yields

$$W^* = \int_a^\bar{a} E_\phi \left[ \frac{\beta(\hat{a}) \phi^2 \hat{a}^2}{c} - \frac{\beta(\hat{a})^2 \phi^2 \hat{a}^2}{2c} - \frac{\beta(\hat{a})^2 \phi^2 a^2}{c} \left( 1 - \frac{H(a)}{h(a)} \right) - U(a) \right.$$

$$+(\tau \phi - 1)S^*(\phi, a) + bS^*(\phi, a) - \frac{m}{2} (S^*(\phi, a))^2 + \theta^0 \delta S^*(\phi, a) \bigg] dH(a),$$

(16)

where $S^*(\phi, a) = S^*(\phi, a; a)$, $h(a)$ is the density function corresponding to $H(a)$, $U(a) = U(a; a)$, and

$$U(a) = \int_a^\bar{a} E_\phi \beta(\hat{a})^2 \phi^2 \hat{a}^2 \left( 1 - \frac{H(\hat{a})}{h(\hat{a})} \right) d\hat{a} + U(a)$$

are the information rents for a manager of ability $a$. 


5.3. The profit incentive

The optimal managerial compensation contract maximizes \( W^* \) in (16) and is presented here for a uniform distribution \( H(a) \), so \( \frac{1-H(a)}{h(a)} = \bar{a} - a \). The characterization is also presented for the case in which \( S^*(\phi, a) \) is positive for all \((\phi, a)\) when evaluated at the optimal \( \hat{\beta}^*(a) \) and \( \gamma^*(a) \). A necessary and sufficient condition for \( S^*(\phi, a) > 0 \) is given below, and the case in which social expenditures are zero for some \((\phi, a)\) is considered.

To determine the optimal profit incentive \( \hat{\beta}^*(a) \), differentiate (16) with respect to \( \beta(a) \) and \( \gamma(a) \) which yields\(^{25}\)

\[
\hat{\beta}(a) = \frac{E_\phi \phi^2 a^2 + \frac{ct^2 \text{Var}\phi}{m}}{E_\phi \phi^2 a (2\bar{a} - a) + \frac{ct^2 \text{Var}\phi}{m}},
\]

(17)

where \( \text{Var}\phi \) denotes the variance of \( \phi \). If \( \hat{\beta}(a) \) is non-decreasing in \( a \), it is incentive feasible and hence optimal. For example, if consumers do not reward \((\tau=0)\) the firm for its social expenditures,

\[
\hat{\beta}(a) = \frac{a}{2\bar{a} - a},
\]

which is strictly increasing in \( a \) and thus incentive feasible and hence optimal; i.e., \( \hat{\beta}^*(a) = \hat{\beta}(a) \).

If, however, consumers reward \((\tau>0)\) the firm, the function \( \hat{\beta}(a) \) in (17) can be U-shaped and hence not incentive feasible. This results from the influence of profit incentives on the responsiveness of social expenditures \( S^*(\phi, a) \) to the opportunities of the firm. This induces the manager with low \( a \) to report \( \hat{a} > a \) to obtain a higher \( \beta \) and also a higher \( \gamma \) as indicated below. Misrepresenting her ability is not very costly to the manager, since effort is low when \( a \) is low. For higher ability managers the cost of effort reduces the incentive of the manager to overstate her ability. Hence, \( \hat{\beta}(a) \) is increasing for high ability managers.

The profit incentive \( \hat{\beta}(a) \) in (17) is U-shaped if

\[
a < a^- \equiv q \left( \sqrt{\frac{1}{1 + \frac{1}{q}}} - 1 \right) > 0,
\]

(18)

where

\[
q = \frac{ct^2 \text{Var}\phi}{\bar{c}mE_\phi \phi^2} \left( \sqrt{\frac{1}{1 + \frac{\bar{c}mE_\phi \phi^2}{ct^2 \text{Var}\phi}}} - 1 \right).
\]

For example, if \( a = 0 \), then \( \hat{\beta}(a) = \hat{\beta}(\bar{a}) = 1 \). The bound \( a^- \) is strictly increasing in \( q \), and hence is strictly increasing in \( c, \tau, \text{ and Var}_E \frac{\phi}{E_\phi} \) and strictly decreasing in \( \bar{a} \) and \( m \). If the support of \( a \) is sufficiently bounded away from 0, \( \hat{\beta}(a) \) in (17) is non-decreasing and hence optimal.

\(^{25}\) For the formulation in which effort and ability can be substitutes or complements, the profit incentive \( \hat{\beta}(a) \) satisfying the first-order conditions is

\[
\hat{\beta}(a) = \frac{E_\phi \phi^2 (\mu + (1-\mu)a)^2 - \mu cE_\phi \phi(a - a) + \frac{ct^2}{m} \text{Var}\phi}{E_\phi \phi^2 (\mu + (1-\mu)a)(\mu + (1-\mu)(2\bar{a} - a)) + \frac{ct^2}{m} \text{Var}\phi},
\]

which reduces to (17) for \( \mu = 0 \). The social incentive \( \gamma^*(\theta) \) is given by the same expression in (21) below. The profit incentive is increasing in \( a \) for \( \mu \in [\mu^2, 1] \), \( \mu^2 < 1 \), in which case \( \hat{\beta}(a) \) is incentive feasible and optimal. The profit incentive could be zero; for example, if \( \mu = 1 \), \( \hat{\beta}(a) = 0 \) for \( a \leq \bar{a} = \bar{a} - \frac{E_\phi \phi}{E_\phi \phi} \). Stronger incentives are generally provided for complements than for substitutes for low ability managers, but \( \hat{\beta}(\bar{a}) = 1 \) for all \( \mu \). When positive, the profit incentive \( \hat{\beta}(a) \) is strictly increasing in \( \tau \), so the more consumers reward the firm for its social expenditures the higher powered are the profit incentives.
When (18) is satisfied, the profit incentive must be flat on an interval \([a, a^\circ]\) to be incentive feasible. That is, the optimal profit share \(\beta^*(a)\) is constant for \(a \in [a, a^\circ]\) and equals \(\hat{\beta}(a)\) on \((a^\circ, \hat{a})\). As shown in the Appendix, the optimal profit incentive \(\beta^*(a)\) when (18) is satisfied is

\[
\beta^*(a) = \begin{cases} 
\beta^\circ & \text{if } a \leq a^\circ \text{ and } a^\circ = \hat{a}^\circ \\
\hat{\beta}(a^+)^\circ & \text{if } a \leq a^\circ \text{ and } a^\circ = a^+ \\
\hat{\beta}(a) & \text{if } a > a^\circ 
\end{cases}
\]  

(19)

where \(a^+\) is the argmin of \(\hat{\beta}(a)\) and \(\beta^\circ\) and \(\hat{a}^\circ\) are given in the Appendix. Thus, if \(a^\circ = a^+\), the optimal profit incentive \(\beta^*(a)\) in (19) is constant at \(\hat{\beta}(a^+)\) where \(\hat{\beta}(a)\) is decreasing and equals \(\hat{\beta}(a)\) where it is increasing. If \(a^\circ = \hat{a}^\circ\), then \(\beta^\circ > \hat{\beta}(a^+)\), so stronger profit incentives are provided on \([a, a^\circ)\). Furthermore, \(\hat{a}^\circ\) is strictly increasing in \(\tau\) and \(c\) and strictly decreasing in \(m\) and \(a\), and \(\beta^*(a)\) has the same properties.

The profit share \(\beta^*(a)\) in (19) is (weakly) increasing and convex in the ability \(a\) of the manager. Only for the highest ability type \(\hat{a}\) do shareholders sell the firm to the manager. Otherwise, shareholders retain a share of the profits. For managers with sufficiently low ability \((a < a^\circ)\), the profit share is constant in ability because of incentive compatibility constraints when (18) is satisfied. For higher ability managers higher powered profit incentives are provided because the marginal product of effort is greater the higher the ability. Shareholders also obtain greater financial returns the more able is the manager. The firm has maximal profits, conditional on \(\phi\), only for the highest ability manager.

The profit share \(\beta^*(a)\) is increasing in \(\tau\) for \(\tau > 0\) and \(a > 0\), so the more consumers reward the firm for its social expenditures the higher powered are the profit incentives provided for the manager. This results because the marginal product of social expenditures is increasing in \(\tau\), so shareholders want to incent the manager to increase those expenditures. As shown in the Appendix, the manager’s utility \(U(a)\) under the optimal compensation contract is increasing in \(\tau\) because \(\beta^*(a)\) is increasing in \(\tau\).

Similarly, the profit incentive is increasing in \(E_\phi \phi^2\), since the marginal products of both effort and social expenditures are higher the better are the times. The profit incentive is also increasing in the variance of \(\phi\), since the manager responds ex post to how good the times are by expending more effort when times are good and less when times are bad. The profit incentives are increasing in the parameter \(c\) of the marginal disutility of effort, since a higher cost of effort reduces effort and the shareholders compensate by providing higher powered incentives to elicit greater effort and social expenditures at the margin. The utility \(U(a)\) of the manager is decreasing in \(c\), however, as shown in the Appendix.

The characterization of the profit incentive \(\beta^*(a)\) is summarized in the following proposition.

**Proposition 2.** Profit Incentive: The profit incentive \(\beta^*(a)\) is non-decreasing and convex in ability. If the support of \(a\) is sufficiently bounded away from 0 (i.e., (18) is not satisfied), the profit incentive in (17) is strictly increasing in \(a\). Otherwise the profit incentive in (19) is constant for low ability and strictly increasing for higher ability. Profit incentives are higher powered the more consumers reward the firm for its social expenditures and the more variability there is in the opportunities of the firm. Shareholders provide stronger profit incentives the greater the marginal disutility of effort of the manager. The profit incentive is independent of the strength of the warm glow preferences of shareholders.

The lump-sum payment \(k^*(a)\) is characterized in the Appendix and is negative for \(a = a^\circ\) and constant in \(a\) for low ability \((a < a^\circ)\) managers. Consequently, \(k^*(a) < 0\) at least for low \(a\), so the optimal managerial incentive contract involves a fixed payment from the manager to the shareholders plus pay for performance. Shareholders, however, retain some residual control through ownership except for the highest ability manager.

### 5.4. The Social Incentive

The partial derivative of \(W^*\) in (16) with respect to \(\gamma^*(a)\) yields the following expression for the expected social expenditures

\[
E_\phi S^*(\phi, a) = \frac{1}{m} [\theta^\circ \delta + b + \tau E_\phi \phi - 1].
\]  

(20)

26 The shareholders can be viewed as lending \(k^*(a)\) to the manager.

27 The incentive feasibility problem with \(\beta(a)\) in (17) does not affect the optimality condition for \(\gamma^*(a)\).
The expected social expenditures are independent of the contract incentives and hence of the ability of the manager, as considered in the context of (21) below. Expected social expenditures are increasing in their expected marginal product $\tau E_{\phi}\phi$ and in both the manager’s valuation $b$ and the shareholders’ valuation $\delta$. These expenditures are decreasing in $m$ reflecting the manager’s decreasing marginal utility for social expenditures. Since expected social expenditures and the power of the profit incentive are increasing in $\tau$, firms that have higher social expenditures on average have a stronger correlation between profit and the compensation of managers.

The social incentive $\gamma^*(a)$ is then given by

$$
\gamma^*(a) = \theta^\delta + (1 - \beta^*(a))(\tau E_{\phi}\phi - 1),
$$

(21)

so when (18) is satisfied $\gamma^*(a)$ is constant in $a$ for $a \leq a^\omega$. If (18) is not satisfied or $a > a^\omega$, $\gamma^*(a)$ is strictly decreasing (increasing) in $a$ as $\tau E_{\phi}\phi > (<) 1$, where 1 is the marginal cost of social expenditures. Shareholders choose $\gamma^*(a)$ equal to the shareholders’ marginal valuation $\theta^\delta$ of social expenditures plus their residual claim $(1 - \beta^*(a))$ of the contribution of social expenditures to profits. Note that $\gamma^*(a)$ does not depend on the manager’s preferences for social expenditures although from (20) expected social expenditures depend on those preferences. Note also that when consumers reward the firm shareholders prefer to base compensation on social expenditures even if shareholders have no preference ($\theta^\delta = 0$) for those expenditures.

The total incentive for social expenditures from (3) is

$$
\beta^*(a)(\phi\tau - 1) + \gamma^*(a) = \theta^\delta + \tau E_{\phi}\phi - 1 + \beta^*(a)\tau(\phi - E_{\phi}\phi).
$$

Since the incentive $\beta^*(a)$ is low powered to reduce the information rents of the manager, shareholders do the best they can to restore the incentives for social expenditures by increasing the incentive by $(1 - \beta^*(a))(\tau E_{\phi}\phi - 1)$. In expectation, the manager faces the full profit incentives $\tau E_{\phi}\phi - 1$ plus the shareholders’ marginal preferences $\theta^\delta$, but only the profit incentive induces responsiveness to the opportunities $\phi$ of the firm.

Substituting (21) into (5) yields the social expenditures

$$
S^*(\phi, a) = \frac{1}{m} \left( \beta^*(a)(\phi\tau - 1) + b + \theta^\delta + (1 - \beta^*(a))(\tau E_{\phi}\phi - 1) \right).
$$

(22)

Social expenditures in (22) are strictly increasing in $\phi$ and weakly decreasing (increasing) in $a$ for $\phi < (>) E_{\phi}\phi$. That is,

$$
\frac{dS^*(\phi, a)}{da} = \frac{\tau}{m} \beta^*'(a)(\phi - E_{\phi}\phi),
$$

almost everywhere, where $\beta^*'(a) = 0$ for $0 < a^\omega$. When (18) is satisfied, low ability ($a < a^\omega$) managers all choose the same social expenditures, whereas high ability ($a > a^\omega$) managers and, if (18) is not satisfied, all managers have higher social expenditures in good times ($\phi > E_{\phi}\phi$) and lower social expenditures in bad times. Note that if the manager or shareholders value social expenditures, those expenditures can be positive even though the expected marginal (and average) return $\tau E_{\phi}\phi$ is less than the marginal (and average) cost. Both the social incentive $\gamma^*(a)$ and social expenditures $S^*(\phi, a)$ are increasing in shareholder preferences $\theta^\delta$. Moreover, a first-degree stochastic dominance shift in the distribution $H(\theta)$ of shareholder preferences increases $\gamma^*(a)$ and hence social expenditures.

Social expenditures in (22) are positive for all $(\phi, a)$ if and only if

$$
1 - \phi \tau \leq b + \theta^\delta.
$$

(23)

---

28 To show (21), take the expectation of (5) with respect to $\phi$, assuming $S^*(\phi, a)$ is positive for all $(\phi, a)$, to obtain

$$
E_{\phi}S^*(\phi, a) = \frac{1}{m}(\beta^*(a)(E_{\phi}\phi\tau - 1) + \gamma^*(a) + b).
$$

Substituting this into (20) and solving yields $\gamma^*(a)$.

29 If the manager’s ability affected the marginal product of social expenditures, shareholders would face a trade off between restoring the incentives for social expenditures and the information rents of the managers. The social incentive would then be lower powered, and the manager would not face in expectation the full profit incentives for social expenditures.
The manager and shareholders must value the social expenditures by more than their marginal cost less their minimum marginal return \( \phi \tau \) or else some (low ability) manager will make no social expenditures in sufficiently bad times (low \( \phi \)). If \( \phi \tau \geq 1 \), social expenditures are non-negative for all \((a, \phi)\).30

Since a higher ability manager produces better financial performance (higher profits), there is a positive correlation between financial performance and corporate social expenditures in good times. In bad times, however, the correlation is generally negative. That is, higher ability managers have better economic performance, but their social expenditures are lower. For very low ability \((a < a^0)\) managers when \((18)\) is satisfied, however, the correlation is zero. Consequently, an empirical study using cross-section data would find a positive correlation in good times, whereas in bad times it could reveal no or a negative correlation. Longitudinal data that includes bad as well as good times could find no correlation.

The principal results for the social incentive and social expenditures are summarized in the following proposition.

**Proposition 3.** Social Incentive: Expected social expenditures are independent of ability, whereas the social incentive \(\gamma^*(a)\) is decreasing (increasing) in the ability of the manager if the expected marginal product \(\tau E_{\psi} \phi\) is greater (less) than the marginal cost of social expenditures. The social incentive \(\gamma^*(a)\) provides the full profit incentive in expectation, but the responsiveness of social expenditures to the opportunities \(\phi\) is due only to the profit incentive and hence is low powered. When consumers reward the firm for its social expenditures, shareholders base compensation on those expenditures even if they have no warm glow preferences. Both the incentive \(\gamma^*(a)\) and expected social expenditures are higher the stronger are shareholders’ warm glow preferences. Ex post social expenditures are higher the better are the times and are weakly increasing in ability in good times and decreasing in bad times.

6. Comparison with the shareholders’ first-best contract

The first-best effort for the shareholders and manager is \(e^+(\phi; a) = \frac{a \phi}{\tau}\), so the effort \(e^*(a; \phi)\) is lower than \(e^+(\phi; a)\) for all except the highest-ability manager. The first-best effort can be implemented by a contract with a profit incentive \(\beta^+(a) = 1\). This is not social welfare maximizing, however, unless the reward by consumers for the firm’s social expenditures equals the social benefits from those expenditures.

The first-best social expenditures \(S^+(\phi)\) are independent of \(a\) and are given by

\[
S^+(\phi) = \frac{1}{m} (\phi \tau - 1 + b + \theta^2 \delta),
\]

provided the right side is positive, which requires that the condition in \((23)\) be satisfied. This condition is assumed to be satisfied for the comparisons in this section.

Comparing \((24)\) and \((5)\) indicates that the first-best can be implemented with a social incentive

\[
\gamma = \theta^2 \delta,
\]

so the first-best social incentive equals the shareholders’ marginal valuation. The social incentive \(\gamma^*(a)\) is thus lower (higher) powered than the first-best if the expected marginal product of social expenditures is greater (lower) than the

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30 If \(S^*(\phi, a)\) in \((5)\) is negative for some \((\phi, a)\), the term \(E_{\psi} \phi\) in \((22)\) is replaced by \(\int_{\phi^*}^{\phi} \phi dF(\phi)\), where \(\phi^*(a) = \frac{\beta^*(a) - \gamma^*(a) - b}{\beta^*(a) \tau}\),

if \(\beta^*(a) - \gamma^*(a) - b \geq 0\) and \(\phi(a) = 0\) otherwise. As an example, suppose that \(F(\phi)\) is uniform on \(\Phi = [\phi, \phi]\). Then, the social incentive is

\[
\gamma^*(a) = \frac{\beta^*(a)}{1 + \beta^*(a)} \left[ -b \left( \frac{1 - \beta^*(a)}{\beta^*(a)} \right) + 2 \theta^2 \delta + (1 - \beta^*(a))(\tau \phi - 1) \right],
\]

and \(\beta(a)\) is as given (implicitly) in \((17)\) with \(\text{Var}\phi^*\) replacing \(\text{Var}\phi\), where

\[
\text{Var}\phi^* = \int_{\phi^*}^{\phi} \left( \phi - \int_{\phi^*}^{\phi} \frac{\phi - \phi}{\phi - \phi} d\phi \right)^2 d\phi.
\]
marginal cost. The optimal managerial compensation contact thus differs from the shareholders’ first-best contract because the firm’s opportunities are observable only to the manager, the manager’s effort is unobservable, and the manager’s ability is not known to shareholders.

The difference between the first-best and second-best social expenditures when both are positive is

\[ S^*(\phi) - S^*(\phi, a) = \frac{(1 - \beta^*(a))\tau(\phi - E_\phi\phi)}{m}. \]

If \( \tau = 0 \) so that consumers do not reward the firm for its social expenditures, the first-best and second-best social expenditures are the same, since both are then independent of \( \phi \). Even if consumers reward \( (\tau > 0) \) the firm, the expected difference between the first-best and second-best social expenditures is zero. Although both are increasing in \( \phi \), the second-best social expenditures are greater than the first-best in bad times \( (\phi < E_\phi\phi) \) and lower than first-best in good times \( (\phi > E_\phi\phi) \).

The second-best social expenditures in (22) are less responsive to opportunities \( \phi \) than are the first-best, however. This results because only the profit incentive \( \beta^*(a) \) induces responsiveness to the opportunities \( \phi \) of the firm and that incentive is low powered. Moreover, since \( \phi \) can only be observed from within the firm, shareholders provide only average incentives \( (1 - \beta^*(a))\tau E_\phi\phi \) for the manager. In addition, shareholders provide low-powered incentives to low ability managers and higher powered incentives to high ability managers. The difference in social expenditures thus is greater for low ability managers than for high ability managers. The difference is zero only for the highest ability type.

The following proposition summarizes the principal results from this comparison.

**Proposition 4.** Comparison with the shareholders’ first-best contract: The profit incentive \( \beta^*(a) \) is lower powered than the first-best except for the highest ability manager. The social incentive \( \gamma^*(a) \) is lower (higher) powered than the first-best as the expected marginal product of those expenditures is greater (lower) than their marginal cost. Social expenditures are greater than first-best in bad times and lower in good times, and in expectation the \( y \) are equal.

7. Implications for empirical analysis

The private provision of local public goods by firms is determined by managers in an agency relationship with shareholders, and that relationship can be complicated by hidden actions, hidden information, and imperfect observability. Compensation contracts thus are second-best, and those contracts can include social incentives as well as profit incentives. The theory predicts that firms with products that consumers can directly reward will base their compensation systems on social expenditures. Such firms could include consumer goods producers with branded products as well as retailers and service providers with a brand name. A firm that does not produce consumer products or does not have a brand could also have an incentive to make social expenditures if its customers had a program requiring its suppliers to meet certain social criteria. Firms could also provide local public goods because shareholders or managers prefer those expenditures, and the compensation systems of those firms would be based on both financial and social performance. In contrast, firms for which neither consumers, shareholders, nor managers have a preference for social expenditures will base their compensation systems solely on financial performance.

If consumers reward \( (\tau > 0) \) the firm, social expenditures are higher in good times than in bad times because the marginal product of social expenditures is higher. If consumers do not value social expenditures, social expenditures are independent of the times and positive only if managers and shareholders value them more than their marginal cost. Social expenditures thus depend on preferences but vary based on how managers are rewarded and how favorable are the times.

Because the compensation system of a firm depends on whether consumers reward it for its social expenditures, more variation in compensation systems should be observed across rather than within industries. If consumers reward the firm for its social expenditures, those expenditures can increase profits. If consumers do not reward the firm, social expenditures are made only because managers or shareholders prefer them. Also, the more consumers reward the firm for its social expenditures the higher powered are the profit incentives, which increases managerial compensation. Corporate social responsibility thus is associated with higher managerial compensation when social expenditures are rewarded by consumers.
Good financial performance is positively correlated with higher social expenditures in the sense that both are increasing in $\phi$.\(^{31}\) This results because the marginal products of both effort and social expenditures are increasing in how good the times are. Thus, even if shareholders do not value social expenditures, expenditures are made because they improve financial performance when consumers reward the firm for its social actions. If times are sufficiently bad, however, social expenditures may be zero.

The expected social expenditures $E_{\phi}S^*(\phi, a)$ are independent of ability (when social expenditures are positive for all $\phi$), but actual, or ex post, social expenditures $S^*(\phi, a)$ depend on ability through the profit share $\beta^*(a)$. Consequently, in good times higher ability managers make greater social expenditures than do lower ability managers but the opposite is true in bad times. Financial performance is increasing in ability, so the correlation between financial performance and social expenditures is positive in good times ($\phi > \phi_{\text{eq}}$) and stronger for firms with higher ability managers. That is, better managed firms have both better financial performance and higher social expenditures in good times when consumers reward the firm for those expenditures. In bad times ($\phi < \phi_{\text{eq}}$) higher ability managers have lower social expenditures than lower ability managers, so the correlation between financial performance and social performance depends on whether the times are better or worse than average. Empirical studies using cross-section data thus would yield different conclusions depending on how good the times were in the data period. Empirical studies using longitudinal data could also yield different conclusions depending on the mix of good and bad times in the period covered by the data. Empirical analysis thus should take into account how good the times were in the data period.\(^{32}\)

An issue that has plagued empirical studies relating corporate financial performance and corporate social performance is the direction of causation—whether social expenditures lead to good financial performance or good financial performance leads to higher social expenditures. For example, when times are good, allows firms the luxury of social expenditures.\(^{33}\) In the theory presented here, financial performance and social expenditures are jointly determined, so the direction of causation can run in both directions. Social expenditures can increase profit, provided that consumers reward the firm. Social expenditures can also be made when consumers do not reward the firm, since they may be valued by managers or shareholders. They must, however, value them by more than their cost. In this case social expenditures are financed from profits, so it is good financial performance that allows social expenditures. The direction of causation is identified by whether consumers reward the firm for its expenditures.

Lev et al. (2006) studied the relation between corporate charitable contributions and sales for 251 firms from 1989 to 2000. They concluded that changes in contributions Granger-cause sales growth, but sales growth does not Granger-cause changes in contributions. This is consistent with $\tau > 0$ in the model. They also investigated whether the quality of management represented by a measure of organizational capital could account for the positive association between corporate charitable contributions and sales growth. Controlling for the quality of management does not change the significance of their results, although sales growth is strongly associated with managerial quality. The latter finding is consistent with profits in the model increasing in management quality but social expenditures increasing or decreasing depending on whether times are good or bad.

Dowell et al. (2000) studied whether better voluntary environmental standards of firms cause better financial performance. They found no evidence that more stringent global environmental standards Granger-cause higher values of Tobin’s $q$.\(^{34}\) Their sample was composed of large manufacturing and mining firms with operations in developing countries, and Lev, Petrovits, and Radhakrishnan also found no significant relation between contributions and sales growth for a subset of industrial products companies. These results are consistent with $\tau$ small in the model.

8. Private provision

In contrast to the literature on public goods that focuses on the supply side and is driven by the motivation of workers, in this model the preferences of citizens in their roles as consumers and investors drive the results, with the

\(^{31}\) Using a consumer-oriented measure of corporate social responsibility, Fisman, Heal, and Nair found that corporate social responsibility is positively correlated with profitability.

\(^{32}\) This could pose econometric challenges if the opportunities of a firm are not highly correlated with observable measures of the times.

\(^{33}\) The direction of causation is discussed in Baron (2006, pp. 669–671) and examined empirically by McGuire et al. (1988) and Waddock and Graves (1997), as well as in the papers discussed here.

\(^{34}\) King and Lenox (2001) also find a relationship between emissions reductions and Tobin’s $q$ for a sample of firms with toxic emissions, but they are unable to identify the direction of causation.
manager’s preferences bounding the extent of corporate social expenditures. The preference of some consumers to reward a firm for its social expenditures or the warm glow and altruistic preferences of some investors for holding shares in such firms in effect reduces the cost to the firm of its social actions. This provides a justification for the private provision of some public goods. The firm privately provides the public good in response to the preferences of its consumers, shareholders, and managers, and if shareholders had altruistic preferences for the beneficiaries of the social expenditures more would be provided subject to any crowding out by government expenditures.

The shareholder clientele of the firm, however, must provide incentives for the manager, and the standard agency problem stemming from hidden action and shirking, hidden information and adverse selection, and inside observability of opportunities can lead to low-powered profit incentives that reduce efficiency. This paper also shows that because of the limited observables on which shareholders can contract with managers, the profit incentive and social incentive features of those contracts are intertwined. Provided that social expenditures are observable (and verifiable), however, shareholders in this model can provide social incentives that in expectation result in social expenditures that maximize the welfare of shareholders and the manager. Ex post social expenditures, however, are insufficiently responsive to how good the times are, so private provision is inefficient. Public provision could also be insufficiently responsive.

As measured by its market value, the firm is rewarded for its social expenditures by consumers and by those investors who have strong warm glow preferences. This means that some firms will voluntarily provide public goods associated with their operations. This also means that government mandated provision by firms may not be required for some public goods, provided that consumer and investor preferences are representative of the social preferences of society.

Although this suggests a role for the private provision of public goods, whether from a normative perspective private provision is superior to public provision or provision by non-profits is an open question. The comparison of alternative means of provision should be conducted in the context of the same model as in Besley and Ghatak (2006), and this is a subject for future research. From a positive perspective, to the extent that consumers and investors reward a firm for its social expenditures, public goods will be privately provided. Managerial compensation contracts then would be expected to provide both profit incentives and social incentives. How efficiently the public goods are provided and how efficiently the firm is operated will depend on observable measures of financial and social performance in a second-best setting.

Appendix A

The revelation principle implies the incentive compatibility constraints

\[ U(a) = U(a; a) \geq U(\hat{a}; a), \forall \hat{a} \in A, \forall a \in A. \]  

(A1)

In addition, the manager must accept the contract, so

\[ U(a) \geq 0, \]  

(A2)

where the right side of (A2) is the reservation utility for the manager, which has been normalized to 0.\(^{35}\)

The utility \( U(\hat{a}; a) \) in (15) can be written as\(^{36}\)

\[ U(\hat{a}; a) = U(\hat{a}) + \frac{\beta(\hat{a})^2 E_o \varphi^2 (a^2 - \hat{a}^2)}{2c}, \]  

(A3)

where \( U(\hat{a}) = U(\hat{a}; a) \). Similarly, the utility \( U(a; \hat{a}) \) can be written as

\[ U(a; \hat{a}) = U(a) + \frac{\beta(a)^2 E_o \varphi^2 (a^2 - \hat{a}^2)}{2c}. \]  

(A4)

\(^{35}\) Note that the reservation utility is independent of \( a \), since the ability of the manager is assumed not to be revealed to the labor market if she rejects the contract. That is, the contract offer is not publicly observable.

\(^{36}\) This method is based on Baron and Myerson (1982).
Then, (A1) and (A3) require
\[
U(a) \geq U(\tilde{a}) + \frac{\beta(\tilde{a})^2 E_\phi \phi^2 (a^2 - \tilde{a}^2)}{2c}.
\] (A5)

Similarly, reversing the roles of \( \tilde{a} \) and \( a \) in (A1) and using (A4) implies
\[
U(\tilde{a}) \geq U(a) + \frac{\beta(a)^2 E_\phi \phi^2 (\tilde{a}^2 - a^2)}{2c}.
\] (A6)

The inequalities (A5) and (A6) imply
\[
\frac{\beta(a)^2 E_\phi \phi^2 (\tilde{a}^2 - a^2)}{2c} \geq U(a) - U(\tilde{a}) \geq \frac{\beta(\tilde{a})^2 E_\phi \phi^2 (a^2 - \tilde{a}^2)}{2c}.
\] (A7)

Considering \( a > \tilde{a} \) indicates that \( \beta(\cdot) \) must be an increasing function to be incentive feasible. Dividing (A7) by \( a - \tilde{a} \) and taking the limit as \( \tilde{a} \to a \) yields, almost everywhere,
\[
U'(a) = \frac{\beta(a)^2 E_\phi \phi^2 a}{c},
\] (A8)
so higher ability managers have higher expected utilities. This means that if all managers would accept the contract the participation constraint in (A2) is satisfied by requiring \( U(a) \geq 0 \).

To obtain an expression for \( U(a) \), integrate (A8) to obtain
\[
U(a) = \int_{\tilde{a}}^{a} \frac{\beta(\tilde{a})^2 E_\phi \phi^2 \tilde{a}}{c} \, d\tilde{a} + U(\tilde{a}).
\] (A9)

Taking the expectation of \( U(a) \) in (A9) and integrating by parts yields
\[
\int_{\tilde{a}}^{b} U(a) h(a) \, da = \int_{\tilde{a}}^{b} \frac{\beta(a)^2 E_\phi \phi^2 a}{c} \left( 1 - H(a) \right) \, da + U(\tilde{a}).
\] (A10)

Substituting (A10) into (16) yields
\[
W^* = \int_{\tilde{a}}^{b} E_\phi \left[ \beta(a) \phi^2 a^2 \left( 1 - H(a) \right) - \frac{\beta(a)^2 \phi^2 a^2}{c} \frac{1 - H(a)}{h(a)} \right] \, dH(a) + (\tau \phi - 1) S^* + bS^* - \frac{m}{2} (S^*)^2 + \theta \delta S^* (\phi, a)
\] (A11)

where for \( h(a) \) uniform, \( \frac{1 - H(a)}{h(a)} = \tilde{a} - a \).

When \( \tilde{a}(a) \) in (17) is decreasing on some interval \([a, a^+]\), the optimal incentive is composed of a flat region on an interval \([\tilde{a}, \hat{a}^0] \), \( \hat{a}^0 \geq a^+ \), and on \((\hat{a}^0, \tilde{a}] \) the increasing portion of \( \tilde{a}(a) \). From (A11) shareholders thus maximize
\[
W^* = \int_{\tilde{a}}^{\hat{a}^0} E_\phi \left[ \beta(\hat{a}^0) \phi^2 \hat{a}^0 \frac{1 - H(\hat{a}^0)}{h(\hat{a}^0)} \right] \, dH(\hat{a}^0) + (\tau \phi - 1) S^* + bS^* - \frac{m}{2} (S^*)^2 + \theta \delta S^* (\phi, a)
\] (A12)

with respect to \( (\beta^0, \beta(a), \gamma(a), U(\tilde{a})) \), where \( \hat{a}^0 \) is defined by \( \tilde{a}(\hat{a}^0) = \beta^0 \).
The partial derivatives of $W^*$ in (12) with respect to $\beta(a)$ and $\beta^o$ yield (19) and

$$\beta^o = \frac{E_\phi \phi^2 ((a^o + a)^2 - a^o a) + \frac{3c^2 \text{Var} \phi}{m}}{E_\phi \phi^2 (a^o (3 \bar{a} - a^o) + g(3 \bar{a} - a - a^o)) + \frac{3c^2 \text{Var} \phi}{m}},$$

which is positive, and $\bar{a}$ satisfies

$$-E_\phi \phi^2 \bar{a}^o (\bar{a}^o + \bar{a}^o a + 2 \bar{a}^2) + \frac{c^2 \text{Var} \phi}{m} (\bar{a}^o (3 \bar{a} - a^o) + g(2 \bar{a}^o + 2 \bar{a} - 3 \bar{a})) = 0,$$

where $\bar{a}$ denotes the argmin of $\beta(a)$ and $a^o=\max\{\bar{a}^o, \bar{a}\}$, so $\beta^o(a)$ is non-decreasing for all $a$. The partial derivative with respect to $\gamma(a)$ yields (20). The aggregate utility $W^*$ of shareholders is strictly decreasing in $U(a)$, so $U(a)=0$ is optimal. The lump-sum $k^*(a)$ is recovered by equating (A9) and (15) with $\bar{a}=a$, and using (A13) yields

$$k^*(a) = \int_a^b \beta^*(\bar{a})^2 E_\phi \phi^2 d\bar{a} - \frac{\beta^*(a)^2 E_\phi \phi^2 a^2}{2c} - \frac{E_\phi (\beta^*(a)(\phi - E_\phi \phi)(E_\phi \phi)\phi - 1 + \beta^*(a)(\phi - E_\phi \phi) + \delta \theta^o + b))}{2m},$$

The derivative is

$$\frac{dk^*(a)}{da} = -\frac{\beta^*(a)^2 a^2 E_\phi \phi^2}{c} - \frac{1}{m} E_\phi (\beta^*(a)(\phi - E_\phi \phi)(E_\phi \phi)\phi - 1 + \beta^*(a)(\phi - E_\phi \phi) + \delta \theta^o + b)),$$

where for $a>a^o$ the first term is negative and the second term is positive.

The utility $U(a)$ of the manager is from (A9)

$$U(a) = \int_a^b \beta^*(\bar{a})^2 E_\phi \phi^2 d\bar{a},$$

which represents the rent on the manager’s private information about her ability. This is strictly increasing in $a$ and $E_\phi \phi^2$ and strictly decreasing in $c$. When (18) is satisfied, substituting $\beta^*(a)$ from (19) for $a^o=\bar{a}^o$ yields

$$U(a) = \begin{cases} 
\beta^o E_\phi \phi^2 a^2 / 2c & \text{if } a \leq a^o \\
\beta^o E_\phi \phi^2 a^2 / 2c + \int_{a^o}^a \beta^*(\bar{a})^2 E_\phi \phi^2 d\bar{a} / c & \text{if } a > a^o.
\end{cases}$$

(A13)

References


37 If $a^o = \bar{a}^o$, $\hat{\beta}(a^o)$ replaces $\beta^o$ in (A13).