

Derivative Corporate Social Responsibility: An Economic Model of ESG Expenditure

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Abstract

This paper develops a formal model in which corporate managers engage in non-GAAP expenditures—including ESG and DEI—because such investments are instrumental in maximizing expected firm returns under political constraints. Applying a dynamic common agency framework, the analysis shows how firms seeking political favor internalize the preferences of politicians, who themselves assign weight to societal welfare due to electoral incentives. As a result, corporate behavior reflects a derivative representation of public utility, mediated through the politician’s utility function.

At equilibrium, firms select a bundle of societal and private contributions that equate the marginal return to each, weighted by the politician’s corruption index and the relative cost to the firm. This endogenizes social welfare in the firm’s optimization problem and provides a utility-theoretic rationale for CSR expenditures. The model thus formalizes how lobbying-like mechanisms can yield socially beneficial outcomes, and under certain conditions, ESG spending emerges as a derivative of the CSR preferences adopted by government.

1 Introduction

1.1 Non-GAAP Activities: CSR, ESG, and DEI

Corporate Social Responsibility (CSR) encompasses voluntary or strategic firm behaviors intended to address economic, legal, ethical, and discretionary responsibilities that extend beyond shareholder profit maximization. Environmental, Social, and Governance (ESG) criteria have emerged as a more standardized and investor-facing articulation of CSR priorities, emphasizing measurable outcomes such as emissions targets, labor practices, and governance structures. Within the ESG framework, Diversity, Equity, and Inclusion (DEI) initiatives represent a subset focused on internal human capital investment and organizational justice.

Although CSR, ESG, and DEI are sometimes discussed as independent constructs, a growing body of literature supports their interpretation as

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interrelated components of the same broader class of corporate behavior: non-GAAP activities directed toward the social and political environment in which the firm operates. In this view, ESG and DEI constitute particular domains of CSR implementation, shaped by the institutional logic of accountability to both stakeholders and policymakers. These expenditures, while not recognized on financial statements as GAAP items, may nonetheless affect firm valuation by influencing regulatory, reputational, and capital access conditions.

1.2 Overview of Contributions

This paper introduces a formal model in which corporate managers engage in non-GAAP expenditures—including ESG and DEI—because such investments are instrumental in maximizing expected firm returns under political constraints. The model assumes that political agents pursue re-election and private benefit, and therefore assign positive weight to societal preferences when allocating political favor. When firms seek favorable treatment from politicians—such as regulatory forbearance or procurement access—they must consider not only their own utility but also that of the politician. As a result, the corporate objective function incorporates a derivative representation of public utility, transmitted through the preferences of the politician.

This framework offers an economic explanation for non-GAAP social expenditures within a standard utility-maximizing setting. It formalizes how lobbying-like behavior can result in CSR activities that are profit-maximizing in equilibrium, and it highlights the conditions under which firms choose to allocate resources toward social rather than purely private returns. By modeling the political utility function as incorporating social preferences, and the firm’s behavior as a best response to that political function, the analysis captures a subtle but economically significant channel through which societal interests may be internalized by corporate actors.

2 Common Agency Models

Perhaps the most influential model used to describe the interaction between politicians and interest groups in recent years is the model developed by Grossman and Helpman. As noted before, this model is based on the common agency model of Bernheim and Whinston. While the Grossman and Helpman model shares many features with the Bernheim and Whinston model, it generalizes the model in significant ways. First of all, the Grossman and Helpman model does not assume quasi-linear utility functions.¹ In fact, while Grossman and Helpman (1994) do not impose specific functional forms on utility, several of their results either require or are sharpened by assuming concavity. This paper likewise assumes concave utility to preserve generality while allowing comparative statics.

A foundational principle of the Grossman-Helpman model is that governmental agents may act in their own self-interest—a concept rigorously introduced into the economic literature by proponents of public choice theory (Buchanan and Tullock, 1962). A critique of the more extreme versions of public choice is that they discount the possibility that policymakers might also

¹By quasi-linearity, I mean that, for many purposes, the functions may be treated as linear. Grossman and Helpman (1994) reject this functional form, citing distributional reasons. I agree, but also avoid the assumption of quasi-linearity on the theory that it is highly unlikely that the politician’s utility of personal wealth is anything like a linear function.

care about societal welfare. The Grossman-Helpman framework integrates both perspectives by modeling politicians as agents whose utility functions include both private benefits and the public interest. In standard formulations, societal welfare influences the politician's utility indirectly—by affecting the probability of reelection—rather than through any assumed intrinsic altruism. Crucially, whether concern for the public arises from genuine normative commitment or from instrumental electoral calculation does not materially affect the model's equilibrium outcomes. Such differences in motivation can be captured parametrically by adjusting the weight placed on social welfare in the reelection function, allowing the model to accommodate a spectrum of political behavior while preserving its analytical tractability.²

A further key feature of the Grossman-Helpman model is the timing of contributions relative to policy choice. In the standard framework, interest groups offer contributions *ex ante*, anticipating how policy will be shaped by the politician's preferences. This temporal structure is critical: it allows the firm to influence policy indirectly by making contributions conditional on future outcomes. In this way, the firm's optimization problem is embedded within the politician's, and vice versa. From a public choice perspective, the model formalizes the idea that the politician is a strategic actor who weighs the political value of policy decisions alongside the direct utility of personal and social outcomes.

2.1 A Game-Theoretic Analysis of Grossman-Helpman

A central assumption of the Grossman-Helpman framework is that strategic interaction unfolds under a “truthful” Nash equilibrium - one in which agents reveal their preferences honestly and adhere to their commitments.³ If we relax this assumption, we see the optimizing problem faced by both politicians and firms becomes more complex.

To understand this problem, we must note that the model assumes that, where an interest group proposes a payment schedule to a politician, and the politician takes the requested course of action, the lobbying group will necessarily pay off as promised. This is generally modeled as a two-stage extensive form game (Dixit, Grossman and Helpman, 1997). However, under these assumptions, the model provides limited incentive for either the politician or the lobbyist to honor their commitments. One of the best ways to model this problem is as a form of Prisoner's Dilemma. Let us assume that politicians have a utility function which includes both the public and their own private interest, and that those attempting to influence government have only their own interest reflected in their utility function. The bargaining problem arises because these agents cannot write enforceable contracts about political influence. If we simplify the game to a binary choice between granting favorable treatment in the form of benefit β to the firm or not (in symbols, $\beta = \beta^*$, or $\beta = 0$), and the campaign contribution as either a set amount or nothing ($C = C^*$, or $C = 0$),

²The utility function of the politician is described in equation (1) below as $U_p = U(m_p) + U(S)$, a combination of personal and societal utility.

³By assuming a truthful Nash equilibrium, which includes perfect disclosure of preferences and perfect willingness to abide by previous agreements, Grossman and Helpman are able to ignore the problems of preference revelation and enforcement of agreement. Likewise, Bebchuk and Neeman (2010) follow the Grossman and Helpman (1994) truthful Nash assumption, engaging with the logic of preference revelation which largely abstracting from enforcement challenges.

we can consider this interaction as a one-shot game exhibiting the classic payoff structure of the Prisoner's dilemma.⁴

As is well known under this payoff condition, both parties have a dominant strategy to defect, leading to a subgame perfect Nash equilibrium characterized by mutual noncooperation. Converting this game from the standard normal form version of the prisoner's dilemma into an extensive form game involving sequenced behavior will not increase the cooperative behavior. Here, the second moving player would have no incentive to cooperate, having a dominant strategy of defection.⁵ Knowing this, the first player would then have an incentive to defect as well.

To the extent that bargaining between lobbyists and politicians can be represented by either a single-shot normal or simple extensive form game, we have seen that politicians will not cooperate with corporate agents and therefore the degree of corruption would be limited. That is, if the politician and the firm interact only once, and are not permitted to enter into enforceable contracts, the dominant strategy for both parties is to defect when they can, and the subgame perfect Nash Equilibrium will be that neither party will be able to derive the benefits from collusion.⁶

In standard business situations, this problem is commonly solved by the use of legally binding contracts. If the parties can form a contract to which they are both bound, cooperation is possible. However, because contracts concerning the trading of political influence would normally be thought to be against public policy, such contracts would not be enforceable. Therefore, the parties have no access to legal institutions to solve this problem.

Bargaining is possible, notwithstanding an inability to form complete contracts, if certain conditions are met. It is a staple of the game theory literature that in an infinitely repeated game there is a Nash equilibrium strategy of cooperation of the parties. In that case, cooperation would amount to the politician and the corporate lobbyist being able to collude against the general welfare. This cooperative conclusion is a natural consequence of the so-called Folk Theorems, which hold that cooperation is a subgame perfect Nash equilibrium in an infinitely repeated game (Friedman, 1971). The analysis which allows for a collusive solution between the lobbying interest and the governmental agent would have to presume that either voters are unaware of the collusion, have no concern regarding it, or are unable to work against it because of some type of collective action problem. (Becker, 1976) If voters were both aware of and did not favor such arrangements, it is likely that a less-corrupt competitor could defeat the current legislator (Ginitis, 2000).

⁴This is a simplification of the Grossman-Helpman model which assumes that there is some cost to the politician of conveying the benefit. One could modify the payoff matrix such that, if the cost of conveying the benefit is ϵ , the payoff in the upper row would be $C^* - \epsilon$, $\beta^* - C^*$ in the first column, and $-\epsilon$, β^* in the second.

⁵Although it is unclear in the context of any particular bargain whether the legislative action or the related contribution would occur first, we can see initially that these actions would not likely occur simultaneously and are therefore best represented as an extensive form game.

⁶By this I mean adopting a policy that benefits a special interest at the expense of the general interest in exchange for either a benefit or the expectation of a benefit. One of the benefits of an enforceable contract is that the parties would be able to avoid the prisoner's dilemma problem. While the parties may benefit from these transactions, society would not and therefore would have no incentive to enforce these contracts.

While static representations discourage cooperation, the dynamics shift under repeated interaction. If a game will be repeated an indeterminate number of times, there is a Nash equilibrium of cooperation if the probability of repetition is high enough (Erev and Roth, 1998). In particular, an equilibrium of cooperation is present where the probability of repetition exceeds the ratio of the benefits of defecting to the costs of cooperation (Roth, 1999). Note that this is a non-unique equilibrium; there is also a Nash equilibrium where both players defect in each time period. Neither strategy will be dominant. One can make the argument therefore that, because interactions between politicians and firms are typically repeat games, cooperation can be enforced by the behavior described in the Folk Theorems. It is also clear that, while cooperation is a possible result of repeat interactions, it is not a necessary result.

2.2 An Incomplete Contracting Approach to the Bargaining Problem

Such a game theoretic analysis provides some insights into those agreements reached between politicians and firms. For example, if two players—the politician and the corporate agent—are unlikely to have repeat dealings,⁷ their ability to enter into agreements will be low. As we have seen, legislative reactions to special interests are generally extensive form games, in which the legislative actions and the related payoffs do not occur at the same time. In essence, then, these bargains amount to incomplete contracts. Therefore, we might inquire into the mechanisms by which the agreements are enforced in the same manner as one addresses the enforcement of incomplete contracts.

We know from the incomplete contracting literature the importance of reputation and repeated interactions as efficient means of self-enforcement (Hart, 1989, 1995; Hart and Moore, 1999). Because cooperation is not a dominant strategy, each party will wish to know the strategies of the other parties and will adopt strategies that will attempt to screen for those with cooperative strategies (Stiglitz, 1975). The prior behavior of each agent will therefore be important in determining the behavior of the other agent. Moreover, legislative action often changes greatly over a very short time frame. This may cause the usefulness of any terms agreed upon at the time of the contribution to be significantly diminished by subsequent events, while other potential actions might significantly increase in importance. Incomplete contracting theory concerns these bargaining situations where the state of nature is only known *ex post*. In short, the focus of our attempt to understand the mechanics of political influence should be on benefits that are difficult to contract for but which are valuable to both parties *ex post*, and which therefore require informal mechanisms—such as reputation, reciprocity, or long-term alignment of interests—for their realization.

3 Empirical Problems of the Grossman-Helpman Models

One of the key assumptions of the Grossman-Helpman model is that politicians are compensated for their extension of legislative favor with campaign contributions. While earlier models such as that developed by Stigler (1971) described currying favor directly with voting groups, Grossman and Helpman

⁷Repeated interactions are important because they allow for the possibility of self-enforcing cooperation, particularly when formal contracts are not possible.

viewed this as too ephemeral. In other words, Grossman and Helpman sought to describe bids for influence in a more rigorous fashion and, toward that end, made the simplifying assumption that campaign contributions actually influence votes. If this assumption does not hold empirically, the model, though elegant, fails to accurately describe observed legislative behavior, thereby limiting its applicability to real-world policy influence

Notwithstanding the prevalence of this viewpoint, the empirical evidence seems to indicate that campaign contributions do not directly influence voting records. Garrett and de Figueiredo (2004) argue that campaign contributions do not buy votes but rather more subtle things like access.⁸ In an analysis detailing the results of almost three dozen studies on the subject, Stephen Ansolabehere et al. (2003) concluded that “[i]n three out of four instances, campaign contributions had no statistically significant effects on legislation or had the ‘wrong’ sign – suggesting that more contributions lead to less support.” Moreover, using time-series data to study the changes in PAC contributions to congressmen in their last term and their voting behavior, Stephen Bronars and John Lott (1997) found that voting patterns were not correlated with contribution levels, but rather with ideology.

Fisch (2005) developed a notion of political capital to account for the political influence of firms in the face of empirical evidence which undermines the popular notion that money buys votes. Fisch introduces a concept of political influence which is far more extensive than the simpler vote-buying models and contemplates corporate influence through investments in information-gathering, relationship-building, and reputation-formation by corporate executives over many years. This concept of political capital functions as a reputational enforcement mechanism, akin to those seen in incomplete contracting models, where long-term relationships substitute for formal enforceability. These activities might be better understood through the lens of behavioral economics, where reciprocity, trust, and informal norms govern strategic exchange.⁹

Personal bargaining allows politicians and lobbying interests to acquire goods and services that would be difficult if not impossible to purchase with money. For example, one study has shown that it is not unusual for CEOs to make decisions about where to locate factories or which factories to close based on the desire to reciprocate political favor (Bertrand et al. 2004). These actions indicate deeper commitment to these politicians than merely giving money to their campaign. It is common for personal bargaining to be characterized by exchanges of personalized goods and services.

The Grossman and Helpman model does not incorporate notions such as access or personal bargaining. Their model relies solely on campaign contributions as a mechanism for influence. By reformulating the model to include such notions as access, repeat dealing, et cetera, we derive a richer model with increased explanatory and predictive power for the behavior of politicians and firms. Such an enriched model aligns with the derivative CSR framework advanced in this paper, in which corporate managers strategically invest in rela-

⁸Access, in this context, refers to opportunities for private dialogue, agenda-setting, and influence over regulatory interpretation—benefits that may shape legislative outcomes even if no vote is directly purchased.

⁹See, e.g., Ernst Fehr and Simon Gächter, 2000. “Fairness and Retaliation: The Economics of Reciprocity,” *Journal of Economic Perspectives* 14(3): 159–181; Matthew Rabin, 1993. “Incorporating Fairness into Game Theory and Economics,” *American Economic Review* 83(5): 1281–1302.

tionships—not merely campaign finance—in order to optimize expected returns under political constraints.

4 Formal Framework

The model developed in this paper shares key structural features with the Grossman–Helpman framework. First, it is a *common agency model*, in which multiple principals (e.g., firms) attempt to influence the behavior of a single agent (the politician). Second, it assumes that politicians derive utility from both personal and societal sources—that is, both private wealth and social welfare enter into their objective function. However, several crucial distinctions set this model apart. In particular, campaign contributions are reconceptualized: they do not guarantee compliance, and neither politicians nor lobbying interests can rely on enforceable commitments. As a result, trust and reputational capital emerge as central to strategic interaction. As elaborated in Section 2.1, sustained contributions over time are more influential than large one-time payments. Finally, unlike standard Grossman–Helpman models, the present framework incorporates heterogeneity in player strategies, allowing for richer dynamics in the political–economic equilibrium.

4.1 The Objective Function of Politicians

As does the Grossman and Helpman model, we will make the assumption that the personal and societal portions of the politician’s utility function are additively separable. This can be represented as:

$$U'' = U(m'') + U(S) \quad (1)$$

In the model, m_p represents the wealth of the politician, and S represents social welfare. To allow for varying weights between these two components of welfare, we define the politician’s utility function as $\alpha U(m_p) + (1 - \alpha)U(S)$, where α represents the weight assigned to the politician’s own wealth, and $1 - \alpha$ represents the weight assigned to social welfare.¹⁰ If $\alpha = 1$, the politician is solely interested in personal gain, whereas if $\alpha = 0$, the politician is completely interested in the social welfare of her constituents. We can interpret α as a measure of the politician’s level of corruption, a kind of “corruption index.” For simplicity, we will initially assume that both individual welfare and societal welfare functions have the same form and are concave, implying diminishing marginal returns for contributions and increases in societal welfare.¹¹

To begin, we will assume – in a manner similar to that of models such as that developed by Bebchuk and Neeman – that there are two firms that wish to influence the decision of the politician. We will initially assume that the objective functions of the corporate agents of these firms do not include social welfare and are of the form $U(m_i), U(m_0)$, where m_i is the level of wealth of the i -th corporate agent. This is to say, we can assume that firms and their agents are interested only in their own wealth and not in the welfare of society. One can see from this simple model that the politician will choose between these two

¹⁰We normalize the total weighting to 1 so that the weight on social welfare is equal to $1 - \alpha$.

¹¹This can be formalized as $U' \leq 0$.

firms based both on what each can do for the politician and what each can do for society, based of course upon the politician's relative preferences for personal versus public interest. The element of the argument of the politician's utility function denominated m'' will be composed of $c_1 + c_0$, where c_1 is the benefit that the n -th firm is willing to give to the politician in exchange for political favor, and the argument denominated S will be comprised of $s_1 + s_0$, where s_1 is the social contribution of the n -th firm as a result of the cooperation of the politician. The politician will maximize:

$$U'' = \alpha U(c_1 + c_0) + (1 - \alpha)U(s_1 + s_0) \quad (2)$$

Let us next assume that the social contribution and the personal contributions of the two firms are functions of the level of "cooperation" of the politician with the firm. Moreover, let us initially assume that "cooperation" is a scarce, finite resource that can be allocated between the two firms. We will denominate the level of cooperation extended to firm one as χ . Normalizing the total amount of cooperation to 1, the level of cooperation given to firm two will be $1 - \chi$.¹² Because the level of benefit provided to the politician, either societal or personal, is dependent on the level of cooperation that was earlier extended to the competing firm, s_n and c_n can be written as $s_1(\chi)$ and $c_1(\chi)$. Because we can express the contribution and societal welfare functions as functions of either χ or $1 - \chi$, we will discuss the contribution functions of both firms as functions of χ .¹³ This results in the objective function becoming:

$$U'' = \alpha U(c_1(\chi) + c_0(\chi)) + (1 - \alpha)U(s_1(\chi) + s_0(\chi)). \quad (3)$$

Given the way we have set up the problem, it is likely that $\frac{\partial c_1}{\partial \chi} > 0$, $\frac{\partial c_0}{\partial \chi} < 0$, and that $\frac{\partial s_1}{\partial \chi} > 0$, and $\frac{\partial s_0}{\partial \chi} < 0$. Of course, this objective function could result in a corner solution (perhaps the politician should give all of her cooperation to only one of the two parties), but we will assume an interior solution (where she lends at least some cooperation to each firm). By taking the first order conditions, we have that:¹⁴

$$\alpha U' \left[\frac{\partial c_1}{\partial \chi} + \frac{\partial c_0}{\partial \chi} \right] + (1 - \alpha)U' \left[\frac{\partial s_1}{\partial \chi} + \frac{\partial s_0}{\partial \chi} \right] = 0 \quad (4)$$

and rearranging them, we can see that the politician will choose χ such that:

$$\alpha U' \left[\frac{\partial c_1}{\partial \chi} + \frac{\partial c_0}{\partial \chi} \right] = -(1 - \alpha)U' \left[\frac{\partial s_1}{\partial \chi} + \frac{\partial s_0}{\partial \chi} \right] \quad (5)$$

¹²Of course, if there are more than two firms bidding for favor from the politician, this will no longer work, and we should then denominate the level of cooperation given to any one firm as χ_1, χ_2, \dots , with the total ($\sum \chi_n$) being equal to 1.

¹³Although the cooperation extended to firm two is accurately stated as $1 - \chi$, we can simplify the objective function as with respect to χ alone because, once the politician has chosen χ , she has, *ipso facto*, chosen $1 - \chi$, and we can reformulate $1 - \chi$ to χ .

¹⁴Here I am using U' to represent the derivative of the utility function with respect to its argument (either $c_1 + c_2$ or $s_1 + s_2$) such that we can restate either $\frac{\partial U}{\partial(c_1+c_2)}$ or $\frac{\partial U}{\partial(s_1+s_2)}$ as U' .

If we rearrange these terms, we derive the relationship between the marginal utility of social versus private welfare at the margin for the politician of:¹⁵

$$\frac{\alpha}{1-\alpha} = - \left[\frac{U' \left[\frac{\partial s_1}{\partial \chi} + \frac{\partial s_0}{\partial \chi} \right]}{U' \left[\frac{\partial c_1}{\partial \chi} + \frac{\partial c_0}{\partial \chi} \right]} \right] \quad (6)$$

This equation means that χ will be chosen such that, at the margin, the ratio of the utility effect of a marginal increase in cooperation on societal benefits to the utility effect of a marginal increase in cooperation on private benefits will have the ratio of $\alpha/(1-\alpha)$. We might think of this as akin to the politician's marginal rate of substitution of social benefits to personal benefits from cooperation with firm one.

4.2 Extending the Model to Multiple Firms

The analysis of the situation in which there are only two corporations can be extended to a situation in which there are n firms. In this case, the politician faces the constrained optimization problem:

$$\max_{\chi_1, \dots, \chi_n} \alpha U(c_1(\chi_1) + \dots + c_n(\chi_n)) + (1-\alpha)U(s_1(\chi_1) + \dots + s_n(\chi_n))$$

Subject to:

$$\sum_{i=1}^{\infty} \chi_i = 1$$

One can see that from the first order conditions that:

$$\alpha U'_i(c'_i) = (1-\alpha)U'_i(s'_i)$$

From which it follows that:

$$\frac{\alpha}{1-\alpha} = \frac{U'_i(c'_i)}{U'_i(s'_i)}$$

This will be true for each firm. Therefore, the same basic conclusion of the two-firm analysis can be extended to the n-firm case.

¹⁵We cannot eliminate the separate portions of the politician's utility function from the equation because it is not clear that they are evaluated at the same point. That is, societal benefit and personal benefit may not be the same and thus they cannot be cancelled out.

In this description, we have framed the problem as an extensive form game where the politician moves first, deciding how to cooperate based on the reciprocal actions of the firms in the second period.¹⁶ We can think of this as a two-period model largely for expositional purposes. If both parties are aware that the game will continue for only two periods, as described earlier, cooperation will likely break down. The feedback mechanism for the maintenance of cooperation as well as the conditions required for cooperation will be discussed later in this section. For ease of exposition, I will continue to use a two-period model to illustrate the operation of the model, with the understanding that the proof of how cooperation arises derives from the results in more complicated settings.¹⁷

We can use this somewhat stylized model to derive the results discussed by Bebchuk and Neeman that, if corporate officials can influence politicians better than can investors – in part because they have direct access to corporate funds – corporate laws may well be more lax than would be optimal from a societal perspective, because of this differential ability of CEOs to lobby politicians. That is, if s and s_0 remain constant, but $\frac{\partial c'_1}{\partial \chi}$ is increased relative to $\frac{\partial c_0}{\partial \chi}$, the equilibrium level of cooperation extended to firm one will increase.¹⁸ That is, if the contribution to social welfare of either side is held constant, but there is an increase in the contribution to personal utility of the politician by one of the lobbying groups, then the contributing group will be favored. These conclusions are entirely consistent with the standard Grossman-Helpman models.

4.3 The Influence of Time, Uncertainty, and Asymmetric Information

In order to address the empirical problem inherent in the assumption that campaign contributions, without more, purchase influence from politicians, we need to introduce notions of uncertainty and asymmetric information, the consequent behavior which results and, ultimately, relax the assumption of the two-period game. This model will assume that both politicians and firms adopt cognitively plausible strategies to address these problems. That is, we will not assume an infinite ability on the part of firms to perform calculations such as perfect backward induction or an ability to instantly solve an n period dynamic optimization.¹⁹ Instead, we will rely on models such as the social capital model developed by Edward Glaeser, David Laibson, and Bruce Sacerdote (2002). Under this type of model, individuals take account of the past behavior of others to make inferences about their future behavior. This model is a computational model, which is to say it is an iterative model in which what occurs at each stage affects the next stage, and indirectly all those stages which occur after. In the Glaeser, Laibson, and Sacerdote model social capital is derived from inter-

¹⁶This is slightly different than the standard Grossman-Helpman two-stage game in which the first period consists of lobbying interests choosing the optimal schedule of benefits to offer the politician and the second of the politician choosing the optimal schedule.

¹⁷In future work, I will expand the model to a truly multiperiod model. However, this would significantly complicate the exposition at this time. Therefore, this version discusses the multi-period model by the use of simple two and three period models.

¹⁸Under this model, we might analogize what Bebchuk and Neeman (2010) would describe as “corporate insiders” – managers and controlling shareholders with some amount of control over firm decisions – to firm one and “institutional investors” to firm two.

¹⁹While dynamic optimization describes the optimal solution to n-period dilemmas including long-term bargaining relationships, such calculations are both unnatural and quite difficult to the overwhelming majority of individuals to perform. Selten (2001).

actions with a community – which is to say, reputation with others or “social” reputation.

In other similar models, (such as McCabe and Smith, 2001) reputation is based purely on one’s actual prior interactions with another to create “personal” reputation. The reader will recall that reputational effects and prior personal dealings are each mechanisms by which contracting may occur without legal enforcement mechanisms. The model in this paper can accommodate both mechanisms to yield the trustworthiness of any agent, corporate or governmental. By introducing concepts of trust based on past behavior, this model becomes a kind of dynamic version of the Grossman-Helpman model.

Continuing, then, with the development of the model, let us next simply assume that any current-period cooperation on the part of the politician will have effects on the next period and the period after. When introducing the notion of time to the model, it is appropriate to incorporate the notion of temporal discounting (Rubinstein, 1982). We will denote the discount rate, δ , which we will assume is constant and used in an exponential fashion through the entire model. The politician will want to maximize the expected utility of cooperation extended. The objective function of the politician for a two-period decision thus becomes:

$$\begin{aligned} \max_{\chi} & \quad \alpha [U_1(c_{11}(\chi) + c_{12}(\chi)) + \delta U_2(c_{12}(\chi) + c_{22}(\chi))] \\ & + (1 - \alpha) [U_1(s_{11}(\chi) + s_{12}(\chi)) + \delta U_2(s_{12}(\chi) + s_{22}(\chi))] \end{aligned} \tag{7}$$

where superscripts such as U^I represent utility in the m th period, and similarly with c^I , and s^I . We have assumed, perhaps unrealistically, that the discount rate for the politician’s own welfare is the same as the politician’s rate of discount for social welfare.²⁰

In this exposition of the model, one can think of the model as having three periods.²¹ In the first, at time zero, the politician chooses the level of cooperation to extend to the two firms. In the next two periods, the corporate lobbyists pay off the level of cooperation chosen in the first period. Adding a temporal dimension to the model introduces the idea of a trade-off between payoffs in different periods, thereby reflecting the politician’s concern with whether the lobbyist will continue to reciprocate in future periods in addition to any immediate payoff.

²⁰One might imagine that, if the politician innately cares about societal welfare, rather than derivatively, the social discount rate may be lower than the personal discount rate; whereas, if the politician is only interested in her own welfare, and does not plan to die in office but will retire from politics at some point, the discount for societal welfare will be larger than the personal discount rate. Recall that the politician who is entirely self-interested has a corruption index of $\chi = 1$. She is only derivatively interested in social welfare and thus will assign for herself a social discount rate greater than her personal discount rate. This could be incorporated into the model more easily in the context of the simulations discussed below.

²¹In the fully worked out version of the model, there will be more than one period in which cooperation is extended, that is we can denote these as $\chi_1, \chi_2, \dots, \chi_n$ for the n periods of the model. The first order conditions will then be of the form of the partial derivatives of the utility function with respect to the cooperation in each period, setting each of these equal to zero. Each of these first order conditions will have a form similar to that set forth in the body, and so the discussion in the body describes the basic thrust of the argument.

Under this model, the politician will balance the cost of current cooperation with longer term benefits of cooperation. That is, if the politician expects firm one to contribute in the future,²² even if it is less contributive in the current period, she might still extend current cooperation, but this will depend on the effect of not extending cooperation currently on later contributions by the firm. Politicians²³ will choose the level of cooperation to extend so that the net discounted present value of the benefits of cooperation with one firm just equal the net discounted present value of the costs of not cooperating marginally more with the other firm. To put it formally, the first order condition of expression (7) will be:

$$(\partial U_1^1 / \partial \chi) + \delta (\partial U_1^2 / \partial \chi) = - \left(\frac{\partial U_2^1}{\partial \chi} + \delta \frac{\partial U_2^2}{\partial \chi} \right) \quad (8)$$

or, rearranging terms:

$$(\partial U_1^1 / \partial \chi) + (\partial U_2^1 / \partial \chi) = -\delta \left(\frac{\partial U_2^2}{\partial \chi} + \frac{\partial U_1^2}{\partial \chi} \right) \quad (9)$$

where U_m represents the total contributions²⁴ to the utility of the politician from the actions of the n^{th} agent in the m^{th} period. We can see from Equation (8) that, at the optimum, the benefits of current cooperation with one firm will equal the marginal benefits of cooperation with the other firm.²⁵ Expression (9) tells us that if, at the optimum, the marginal benefits associated with one firm are greater than those associated with another in one period, it will follow that in the other period the opposite will be the case,²⁶ and the difference in benefits between the two periods are scaled by the discounting factor.

²²By this I mean a contribution in the form of either a personal or social contribution in the form of ESG expenditures.

²³Specifically, politicians determine the level of cooperation χ , given each firm's willingness to contribute which, in turn – according to the function unique to each firm – determines c_1 and s_1 (the return to χ).

²⁴In other words, in order that the equation does not become too unwieldy, let U_1 represent firm one's contributions of c_1 and s_1 and $\frac{\partial U}{\partial \chi}$ is the change in total contributions, given χ . If we know the utility function of the politician - and her constituents - the likelihood of reciprocation from each firm to the cooperation χ by the politician, and the likely value of this reciprocation, then we should be able to determine the time path of cooperation (which is to say, how much cooperation occurs in the first period, the second period, et cetera) of the politician.

²⁵It is important to remember that it is likely that $\frac{\partial U_2}{\partial \chi}$ is negative and $\frac{\partial U_1}{\partial \chi}$ is positive, which is to say, if the politician extends cooperation to one firm, she will lessen the cooperation extended to the other.

²⁶Recalling that one side of the expression is negative and the other is positive because the first order conditions of the two periods sum to zero at the optimum, we can see that, if the left side of the equation sums to anything other than zero in time one, we know that the right side sums to something other than zero with the opposite sign. The intuition that if, at the optimum, the marginal benefits associated with one firm are greater than those associated with another in that period, it will follow that, in another period, the opposite will be the case can be illustrated with the following example. If Senator A chooses, at the optimum, to extend favor to both Firm 1 and Firm 2 in time one, knowing that Firm 1 will contribute more – let us say to the Senator's constituency – in the current period, we can conclude that the Senator would not choose to extend legislative favor to Firm 2 unless the Senator believed that, in some future period, Firm 2 would contribute (reciprocate) more than Firm 1 in that period.

One might note that Equation (9) is a form of what is referred to as the Euler equation. As discussed more fully below, understanding the relationships implied by this equation allows us to incorporate a number of the important insights of the consumption literature to the analysis of cooperation.

This analysis can be readily extended to m periods yielding an optimization problem for the politician of:

$$\max_{\chi} \alpha \sum \delta_m U(c_m(\chi) + c_m(\chi)) + (1 - \alpha) \sum \delta_m U(s_m(\chi) + s_m(\chi)) \quad (10)$$

One further element that we should introduce when dealing with future events is that of uncertainty. Neither the politician nor the corporate interests can be assured of the long-term effect of extending or not extending cooperation in the current period. That is, neither knows the strategies of the other entirely. One of the key issues that we must address in introducing both uncertainty and multiple periods to the model is that there are rarely dominant strategies in these circumstances. The optimal strategy for each party will depend upon those strategies selected by the others. The most straightforward method of modeling the effects of time and uncertainty would be to view the effect of current cooperation on future contributions not as deterministic, but rather probabilistic. This can be converted into an expected utility calculation, where $p(x)$ is the density function. The objective function²⁷ would be:

$$\max_{\alpha} \sum_m \delta_m \int U(c_1(\chi) + c_2(\chi)) p(x) dx + (1 - \alpha) \sum_m \delta_m \int U(s_1(\chi) + s_2(\chi)) p(x) dx, \quad (11)$$

where $p(x)$ is the probability density function indicating the likelihood that the agents will cooperate to a particular level, given the level of cooperation shown by the politician.

This objective function yields a first-order condition of:

$$\frac{\partial U_1}{\partial \chi} \left[\left(\frac{\partial U_2}{\partial \chi} \right)^2 \right] (1 + 2) = E \left[-\delta \left(\frac{\partial^2 U_2}{\partial \chi^2} + \frac{\partial^2 U_1}{\partial \chi^2} \right) \right], \quad (12)$$

where $E[\cdot]$ is the expectation operator, introduced because, at time period one, the politician does not know what the marginal contribution of firm one and firm two will be at period two.

Introducing an expected utility framework to this problem also introduces the notion of risk aversion and risk neutrality. If the politician is risk averse, the risk-reward ratio associated with cooperation will matter. If strategies are

²⁷Note that we are integrating over the probabilities and summing over the time periods because we are assuming discrete time periods but continuous probabilities.

heterogeneously distributed, the politician will attempt to choose her dealings with corporate lobbyists so as to reach her desired level of risk and reward. That is, even where one corporate lobbyist will be very helpful if they choose to contribute (that is, reciprocate), if it is true that another agent will always payoff, the latter may well be favored. This addition to the model incorporates the notion of strategy risk. However, while the likelihood of cooperation is now stochastic, the probability density function is still fixed. Our next step will be to generalize the model to allow for updating of the probability of payoff from reciprocal behavior.

4.4 Updating of Probability Functions for Prior Behavior

Under uncertainty about the strategies of others, individuals take account of the past behavior of others to make inferences about their strategies. The probability function $p(x)$ in expression (11) will therefore be dependent on the prior behavior of the firms. We can then write this function as $p(x, g_1, g_2)$ where g_n is the factor used to account for the likely strategy of the n th firm based on past behavior.²⁸²⁹ This factor is a function of the prior strategy choices of the n th firm. The objective function of the politician becomes:

$$\max_{\alpha} \sum_{\delta m} \int U(c_1(\chi) + c_2(\chi)) p(x, g_1, g_2) dx + (1-\alpha) \sum_{\delta m} \int U(s_1(\chi) + s_2(\chi)) p(x, g_1, g_2) dx \quad (13)$$

Each firm begins the interaction with a probability of cooperation factor of g_1 . This g_1 changes over time, depending on how the firm behaves in different time periods. As the firm cooperates and performs as promised, g_1 increases. The reverse happens if the firm defects, which is to say, fails to reciprocate. As a firm's g_1 increases, more trust is extended by the politician to that firm. Because trust is a scarce resource, under certain parameters of this model, it may be possible for firms which were extended a high degree of trust in early periods to dominate the political bargaining interactions and prevent other firms from entering into trust relations with the politician.³⁰ Simulations of models similar to that which is developed here have shown that the form of updating mechanism and the parameters chosen can have an enormous effect on the outcome of the model.

In modeling how agents update their beliefs based on prior behavior of other actors, we have to keep in mind that in this model the entire reason any agent

²⁸I am choosing g to resemble that notion of goodwill described by McCabe and Smith as that subjective evaluation by the politician of the likelihood of reciprocity from the firm based on the idea that reciprocity is used by the parties to reduce the risk of exchange. McCabe and Smith, *supra* note 61, at 322. This goodwill accounting mechanism is very similar to the role of social capital in solving free rider problems and reducing the risk of opportunism in the Glaeser-Laibson-Sacerdote model for optimal individual investment decisions.

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³⁰This was the result of agent-based simulations of the goodwill accounting strategy in McCabe and Smith (2001)

extends cooperation is in order to get the other agent to also act cooperatively. The only reason firms extend cooperation is to obtain reciprocal cooperation from the politician and vice-versa. Therefore at the margin what occurs is that each agent weighs the benefits of extending cooperation versus its costs. In order to deal with this and create some type of tractable solution, then we have to deal with the updating functions, and more particular each agent's theory of the strategies of other agents. We will assume that agents correctly understand the updating functions of other agents.³¹ If we do not make this assumption, we can easily be caught in an endless of modeling the models of updating functions. We need to assume that for at least some subset of politicians and firms the probability of repeat interactions will be high enough to sustain cooperation.

5 Applications of the Model

We have so far focused on the effect of dynamic bargaining under uncertainty as described by our reformulated common agency model of the behavior of politicians, albeit within the context of strategic firm behavior. However, the model allows us to make certain predictions about the behavior of firms as well. We have already seen that politicians are likely to favor those firms which are likely to return benefits to the politician over the long term rather than over the short term.

5.1 Effect on the Behavior of Firms

In order to model the behavior of firms, we must first set forth the objective function of the firms. To analyze the behavior of firms, it would be useful to alter the sequence of the extensive form game, so that firms are the first movers, rather than the politicians. If we assume that each firm is attempting to either maximize or minimize χ , (recalling that χ represents cooperation extended to firm one by the politician and depending on whether we are analyzing firm one or firm two), we can state the objective function for the n th firm as:

$$\chi = F(c, s), \quad (14)$$

which under our assumptions can be restated as:

$$\chi = \alpha f(c_1) + (1 - \alpha)f(s_1) \quad (15)$$

where f is an inverse function which determines the level of cooperation, given the level of reciprocity exhibited by the firm, while holding the actions of the other firm constant.³² If the firm has already determined the optimal level of

³¹That is, we in truth have to deal with each agent's perception of the updating function of other agents as well as the actual updating function.

³²That is, f gives the level of cooperation that the politician will extend given a certain level of either social or personal contributions. This function is additively separable as a result of the additive separability of the objective function of the politician given in Expression (3).

total cooperation to expend seeking to influence the politician, (which we dominate M) and we state the levels of personal and social contribution as functions of the amount of resources expended in these pursuits (in other words, MQ is the amount of resources expended to contribute to the politician personally, and MR is the amount of resources expended to contribute to society), the objective function becomes:

$$\alpha f(c_n) \cdot (M_c) + (1 - \alpha)f(s_n) \cdot (M_s) = \chi \quad (16)$$

subject to the additional constraint that $MQ + MR = M$, where M is the total amount of resources spent on influencing the politician.³³

We see that, at the optimum, firms will choose the level of contributions to the politician's personal well-being versus social welfare such that:

$$\frac{\frac{\partial c_1}{\partial M_c}}{\frac{\partial s_1}{\partial M_s}} \times \frac{\alpha}{1 - \alpha} = \frac{M_c}{M_s} \quad (17)$$

where M_c is the amount of firm resources devoted to personal contributions to the politician, M_s represents those firm resources devoted to social contributions, $\frac{\partial c_1}{\partial M_c}$ is the first lobbyist's marginal cost of contributing to the politician personally, and $\frac{\partial s_1}{\partial M_s}$ is the marginal production of social benefit that results from the first lobbyist from expending resources.³⁴ The latter term may often be close to one³⁵ but, in some circumstances, may be less than³⁶ or more than one.³⁷

This tells us that at the optimum, if we assume an interior optimum, firms will choose their contributions to society versus their personal contributions to the politician such that the marginal return to contributions to the politician will be equal to the marginal return to social contributions, weighted by the politician's corruption index and the relative cost of these two contributions to the firm. It is possible that, for some firms, the relative costs of contributing to society may be so expensive that they will choose only to make personal contributions to the politician. To the extent that there are quite a number of such interests, the marginal utility of additional contributions will diminish under the assumption of a concave utility function and therefore those firms which have a comparative advantage in improving society will then have a marginally greater influence on the politician.

An interesting result of this is that, depending upon the extent to which societal versus personal contributions are endogenized, lobbying interests will

³³Here we assume that M is exogenous. We focus on the allocation between c and s . One could also model M as an endogenous choice.

³⁴This is derived from an objective function of the firm, where the firm will attempt to maximize χ , and Equation (6).

³⁵In other words, the cost of bribing someone will likely be close to the cost of the bribe, although there may be additional costs such as the risk of being caught, et cetera.

³⁶This would be the case with respect to gains to trade.

³⁷For example, we might imagine that some non-GAAP expenditures might lead to the firm incurring greater cost than the initial outlay.

effectively become as interested in social benefit on the margin as is the politician. This influence may have positive social effects if politicians are particularly socially interested, which is to say, if they have a corruption index approaching zero. Therefore, the personal bargaining mechanisms described by Glaeser, Laibson and Sacerdote as the formation of social capital – and commonly described as lobbying – may have a socially beneficial effect by encouraging firms to behave in a more socially optimal manner, albeit in order to receive more legislative favor from the politician. We can refer to this activity by firms as derivative corporate social responsibility. That is, even though the corporations are purely attempting to earn profits, these firms will behave in a socially responsible manner in order to influence governmental agents who are interested in societal welfare.

This effect may arise even if politicians are not personally interested in society but rather are only interested in themselves. That is, even assuming a pure profit motivation within corporations, and pure selfishness of politicians, because politicians wish to be re-elected, firms will include social benefit in their calculus. To re-iterate, one does not have to assume that either the politicians or corporations are intrinsically interested in social welfare. We must only assume that politicians believe that improving the lives of their constituents is in their interest for it to be profitable for corporations to behave in a socially responsible manner.³⁸

One concern that one might have with this conclusion is that this analysis has effectively assumed that there is only one politician and that politician represents the entire society. While such a model may apply to presidential politics, when it is applied to the legislative branch, additional concerns may enter the analysis. For example, what may be good for the constituents of a particular politician may not be good for society as a whole. Therefore, what we are calling societal benefits may be little other than pork-barrel politics.

One response to this concern is that overall societal benefits are nothing other than the integrated societal benefit of each individual district. In addition, the politicians from each district will bargain over these benefits and so this at a minimum limits the amount of misallocation between districts. That is, there will be an additional bargaining in the shadow of reputation and cooperation that results in some benefit to society.

We might note that although the model has been simplified for expositional purposes, as we have seen the mathematical conclusions do not change if we increase the number of firms attempting to influence politicians. Indeed, as the number of firms increases it would follow that politicians should be better able to maximize their utility. That is politicians should be better able to extract surplus as the number of competing firms increases. This would seem likely to increase social welfare as the politician cares about social welfare.

³⁸A comprehensive approach to ESG would be more complex than that espoused by Alex Edmans (2023) ("ESG is both extremely important and nothing special. It's extremely important since it affects a company's long-term shareholder value.... But ESG is also nothing special ... and companies needn't be forced to report on matters that aren't value-relevant"). Moreover, while Hoepner et al. (2023) are clearly correct that ESG investment by firms can benefit shareholders by reducing downside risk, the ability to bargain over legal rules and the concurrent societal benefit that can result are additional and meaningful consequences of corporate social responsibility.

5.2 Longer Term Cooperation is Favored

One prediction of this model that results from the uncertainty surrounding the politician's strategy choice between firms is that more stable groups are likely to elicit better responses from politicians because they are more likely to be able to return favors later. This prediction is not particularly novel in that it is consistent with earlier models, (Becker, 1983) and is derivable from the standard game theory of coalitions. (Shapley and Shubik, 1954), Shapley, 1989) CEOs and executives are individuals and hence more likely to be able to return favors than disperse groups such as shareholders. This is consistent with the Bebchuk and Neeman proposition that insiders are the only group that can effectively lobby politicians because they can divert corporate resources for this purpose.

Another prediction from the feature of the model that longer term co-operation is favored is that because of the difference in time between campaign contributions and the reciprocal political payoffs that are related to the contributions, the correlation between them might not appear in the empirical evidence which attempts to test the correlation. In order to understand this, one can conceive of political contributions by a firm to a politician as a form of insurance. Just as with insurance, where one does not receive payoffs continually but rather only occasionally upon the occurrence of an adverse event, one might imagine that most firms would not receive payoffs from their "investments" in relationships with politicians in every period. Rather, we can imagine that the payoffs from these investments will tend to be lumpy, such as when adverse or positive legislation is proposed that will affect the firm or firms that have made contributions. Because the politicians would prefer a continuous consumption stream, (Deaton, 1992) – which is to say, to smooth consumption over time – they would prefer to have steady contributions from firms. If contributions are continuous and payoffs are lumpy, this would significantly diminish the observed correlation between the two.

To illustrate this effect of the model, imagine that there are two firms which each make a contribution worth \$20,000 per year to a politician. If, in year one, the first firm receives a legislative benefit and in year two the second firm receives a benefit, it might appear that the level of benefit was uncorrelated with the amount of the contribution (at least as between these two firms). One might be more likely to find a correlation between lifetime contributions and lifetime voting records, but this may be difficult because it might require weighting for financial impact on the firm.³⁹ In this case, simply looking at votes will not be particularly helpful to discerning whether there is relationship between contributions and voting behavior.

Monetary contributions might be distinguished from personal bargaining in another sense. If long-term continuous monetary contributions are predictable from many domestic firms within a single industry, one might observe a correlation with respect to voting behavior on domestic versus foreign trade issues but not with respect to votes that might tend to favor one domestic firm over another. Thus, one might discern a correlation between generalized contributions from domestic firms and protectionist trade policy, but not between monetary contributions and legislative favor for one domestic firm over another.

³⁹In other words, one can imagine that the agreements between firms and politicians held that the politician might not be obliged with regard to some votes but, with respect to others, the agreement might be such that the politician was obliged to vote for the best interests of the firm.

The latter might be explained only by long-term personal bargaining between specific firms and politicians.

6 Conclusion

We can see that, by incorporating a reputational mechanism into a dynamic common agency model, we can explain a variety of phenomena. In particular, we see that the way in which firms attempt to influence politicians and, more specifically, the manner in which the marginal rate of substitution of personal versus societal benefit of the politician will inform the utility – and therefore, at least in part, the societal contributions of the corporation. In short, the adage that “we get the government that we deserve” has consequences not only for the actions of the politician, but for the actions of the corporation.

The mechanism by which corporate social responsibility is derived from public-private bargaining over legal rules allows us to predict which reforms will likely have beneficial societal effects, and which firms – as a function of market power and ability to contribute societal benefits in the form of ESC spending – might be expected to support those reforms. We also see that corporate socially responsible activity is profit maximizing because such activities are a form of lobbying carried on through other means. That is, even if managers of firms have no intrinsic interest in ESG, for example, it is still optimal for them to engage in such socially responsible spending to strengthen their ability to bargain over legal rules.

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