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Strategic Corporate Purpose

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ABSTRACT

We propose a theory of strategic corporate social responsibility (CSR). Value-maximizing shareholders play an industry CSR game where they can opt for an objective function that extends beyond shareholder value, thus conditioning other strategic firm decisions. The theory provides a formalization of the "doing well by doing good" adage in an industry setting. We develop conditions such that the CSR game is a pure coordination game, which provides a natural and novel theory of strategic leadership in CSR: By committing to a CSR objective function, a first mover leads the industry to a Pareto superior equilibrium. The theory can rationalize recent evidence on correlated industry-wide CSR adoption, and carries implications for competition policy.

1 | Introduction

The corporate social responsibility (CSR) adage of "doing well by doing good" is normally understood in the sense that a firm can achieve higher shareholder value by balancing the goals of different stakeholders. In this paper, we argue that the balancing act between shareholder interests and stakeholder interests extends beyond the corporation's decision as is traditionally assumed: It includes other industry participants as well.[1] For example, a firm may invest on the resilience of its supply chain, but such investment may prove of limited value if its suppliers do not do the same. Or a car manufacturer may commit to switching to all-electric vehicle production, but such a move will not be sustainable unless other manufacturers follow suit as there will not be a dense network of electric charging stations unless a significant fraction of the car fleet switches to EV.[2]

To fix ideas, consider the problem of clean-technology adoption. Assume that adoption by one firm in isolation leads to high production marginal costs for that firm, whereas adoption by multiple firms leads to all-around lower costs.[3] This assumption captures the usual first-mover disadvantage that often is the reason why CSR fails (according to the traditional view). Indeed, under our assumptions, a one-shot technology-adoption game played by shareholder-value maximizers has the nature of a prisoner's dilemma: Sticking to the legacy technology is a dominant strategy even though both firms would be better off if both switched to the new technology. In other words, in the equilibrium of the one-shot game, the polluting-technology status quo prevails.

Our contribution to the strategic analysis of CSR is to construct a CSR game that adds an initial game stage that we refer to as the mission statement stage to the technology-adoption stage. At this initial stage, *profit-maximizing shareholders* choose an objective function (i.e., a mission statement) for the second-stage one-shot subgame. Shareholders may choose a function that encompasses stakeholder interests besides financial profits or remain strict profit maximizers. We provide conditions such that value-maximizing shareholders benefit from committing to a mission statement that embodies CSR. In brief, we provide conditions such that the following is a Nash equilibrium: in the first stage, firms commit to a stakeholder function that places a sufficiently high weight on the adoption of a clean technology; and in the second stage, firms adopt the clean technology. Our

interpretation of "doing well by doing good" is that CSR helps solve a strategic dilemma, in this case, a prisoner's dilemma. In other words, by committing to departing from straight profit maximization, firms are able to effectively increase profits.

Our model suggests an additional perspective on CSR, namely, that of strategic leadership. We provide conditions such that the mission statement game is a pure coordination game: Firms are better off by committing to CSR, but no firm has the incentive to unilaterally do so. This observation provides a natural and novel interpretation of strategic leadership in the CSR context: By committing to CSR, a firm effectively pulls other industry participants along, thus internalizing an externality that might otherwise lead to an inefficient equilibrium.

We consider two additional applications of our two-stage CSR game, where we change the nature of the second-stage subgame. In a second application, firms set wage rates. The externality we highlight in this application is connected to industry reputation: Consumers may not be aware of what each firm in the industry is doing in terms of wages (or more broadly, labor conditions), but associate every firm's reputation with the industry's worst performer. As in the first application, we prove the existence of multiple equilibria in the two-stage game, including one where firms commit to a mission statement that places positive weight on the wage rate and then set high wages in the second stage. Also, as in the first application, we show that firms end up earning higher profits than they would when playing the one-shot wage-setting game, where a low wage rate is a dominant strategy. While we focus on reputation for treating workers well in terms of salary, other examples that fit this framework include reputation for dealing on blood diamonds, reputation for using forced labor in the cotton industry, or reputation of poor working conditions in the clothing industry.

Unlike the first two applications, where firms belong to the same industry ("horizontal" firm interaction), in the third application, we consider firms located at different stages of the value chain ("vertical" firm interaction). One setting we have in mind is the investment to create a sustainable supply chain, such as when Unilever moved its Lipton tea to a 100% sustainable tea production. Another setting concerns resiliency investments, investments that increase the probability of remaining operational following a disruption in the supply chain where the firm may value remaining in existence upon a shock to the supply chain, over and above profit maximization, to provide job security for its employees. In these cases, the externality results from the fact that a firm does not incorporate the benefit that its resiliency investment confers on firms connected through the supply chain. Differently from the first two applications, we show that, in the supply-chain application, opting for a CSR mission can be a dominant strategy. Intuitively, the built-in complementarities in resilience investments in the model are so significant that, independently of what the other firm does, a firm optimally opts for a mission statement that places weight on resiliency and ends up investing on resiliency beyond what a profit maximizer would do.

Our model provides a possible explanation for the increasing evidence about firm leadership in CSR adoption that does not necessarily fit in the traditional view of CSR. Cao, Liang, and Zhan (2019) show that product-market peer firms appear to adopt CSR policies after a close-call CSR proposal adoption by another firm in the industry. She and Zaldokas (2019) show that environmental and social disclosures in firms' press releases and analyst conference calls are correlated among peer firms and leads Environmental, Social, and Governance (ESG) ratings changes. Bolton and Kacperczyk (2021) find evidence of a positive correlation between the fraction of firms in an industry that have committed to reducing their carbon emissions either through the Carbon Disclosure Project or the Science-Based Target Initiative and the subsequent decision of other firms in the industry to adopt similar commitments. The finance industry has developed products that are intended to capture industry-wide benefits: BlackRock's site advertises thematic funds, for example, on climate change and resource scarcity, meant to capture "one-off shifts that can change an entire industry."[4] Sustainable investors may also request to asset managers thematic funds which can signal to the portfolio companies the bet placed on their joint success. Information shocks—for example, green technology becomes less expensive due to innovation—are an alternative hypothesis to explaining correlated CSR adoption. This alternative hypothesis does not necessitate the strategic interaction of firms, but can perhaps be identified through the arrival of new technologies to the marketplace.

Our paper also offers an insight into a form of public policy intervention that fosters greater ownership of externalities by firms. Specifically, we propose that industrial policies can induce, through subsidies or tax schemes, strategic complementarities at the industry level which then may lead to greater CSR adoption. Explicit coordinated action among firms yet provides an alternative avenue to achieve a sustainable outcome. The European Commission's Draft Horizontal Guidelines allow for sustainability benefits to be accounted for when reviewing horizontal mergers or horizontal agreements. However, with the exception of a 1999 ruling, the European regulator has largely remained within the consumer welfare framework (Schinkel and Spiegel 2017; Inderst and Thomas 2022).[5] We view coordinated horizontal "sustainability agreements" and individual firm CSR leadership, as suggested by our framework, as enriching the toolkit of policy makers towards a more sustainable outcome.

If CSR is so good for firms and for society—as we argue can be the case—then one cannot avoid the question of why it has not been adopted in the past, at least not to a great extent. One first answer is that CSR policies are being adopted and that the pure Friedman firm is a thing of the past. The evidence of CSR metrics in executive pay, or the sharp increase in active investing, is consistent with this view, at least to some extent (Cao, Liang, and Zhan 2019). A second possible answer is that the phenomenon of "doing well by doing good," as developed in this paper, depends crucially on the firm's ability to commit to a stakeholder function. But, as illustrated by Schelling (1960) and others, the ability to commit to a course of action, namely, in a corporate setting, is far from trivial and cannot be created out of thin air. In many ways, the history of civilization is a history of mutual commitments: Contracts (and more generally the rule of law) may be interpreted as a form of commitment. In this sense,

our message may be rephrased by stating that society is evolving in the direction of allowing active investing and mission statements to work as commitment instruments, not so much based on the rule of law but rather on corporate reputation as an instrument for enforcement. We may even argue that the change implied by the CSR mentality corresponds to what Henderson (2020) refers to as "architectural innovations," innovations that break away from long-standing status quo and take time to occur.

In his game-theory classic, Schelling (1960) elaborates at length on the conditions under which a commitment is more likely to be credible. He argues that, "to be convincing, commitments usually have to ... rest on some rationale" and that "a potent means of commitment ... is the pledge of one's reputation." Consider the following such choices that satisfy these requirements. First, the adoption of a mission statement. For example, in January 2021 General Motors declared that, by 2035, it would phase out petroleum-powered cars and trucks and sell only vehicles that have zero emissions. Time will tell whether GM will live up to its promise, but it seems reasonable to assume that, if it fails to do so, then GM will suffer a significant reputation shock.[6]

Second, the firm may hire board members and a chief executive officer (CEO) with a reputation for CSR, thus better communicating (both internally and externally) the firm's corporate purpose (Mayer 2021), as well as being friendly to outside investors with a preference for CSR. Third, compensation pay practices that reward CSR are yet another form of commitment. Bebchuk and Tallarita (2022) report that over 50% of firms in the S&P 500 use ESG metrics to compensate their executives, and Cohen et al. (2022) document that this preponderance is present worldwide.[7] Fourth, another source of commitment is by registering as a B-corporation, that is, a corporation whose objective differs from straight profit maximization. Recently, for example, shoemaker Allbirds filed a "sustainable" initial public along with a commitment to follow an ESG philosophy.[8] Fifth, commitment to CSR policies may also be forced onto the firm through CSR-conscious active investors. According to insightia.com, the number of activist campaigns involving public environment-related demands increased from eight in each of 2020 and 2021 to 42 during the first 4 months of 2022. For example, in June 2021, an Exxon activist investor "successfully waged a battle to install three directors on the board of Exxon with the goal of pushing the energy giant to reduce its carbon footprint" (Phillips 2021). Azar et al. (2021) document that the top three asset managers, BlackRock, Vanguard, and State Street Global Advisors, are engaging firms to lower their carbon emissions, particularly so in those firms where their ownership stake is highest.[9]

The rest of the paper is organized as follows. In Section 2, we review related literature. This is particularly important in the present case as there is an extensive literature on CSR as well as a series of papers developing games where firms' payout function deviates from profit maximization. Our basic framework is developed in Section 3 together with our main application. We present two other applications in Section 4. Section 5 includes a discussion of our results. Section 6 concludes the paper.

2 | Related Literature

Our paper relates to an economics and finance literature focused on departures from the neoclassical paradigm of the profit-maximizing firm, a literature developed mostly, though not exclusively, in the context of CSR. Baron (2001) proposes an integrated firm strategy that extends the standard model to include private politics and CSR. Bénabou and Tirole (2010) argue that the "standard definition of CSR is that it is about sacrificing profits in the social interest," adding that CSR emerges in response to a combination of government failure, private interests, and other factors. In line with Bénabou and Tirole (2010), Hart and Zingales (2017) revisit the Friedman (1970) doctrine in the case "where shareholders are prosocial and externalities are not perfectly separable from production decisions." Broccardo, Hart, and Zingales (2022) discuss the role of voice versus exit as strategies by socially responsible investors (see also Landier and Lovo 2022 for a model of socially responsible funds). Allen, Carletti, and Marquez (2014) and Magill, Quinzii, and Rochet (2015) take the heterogeneity of corporate forms (shareholder maximizers and stakeholder maximizers) as a given and evaluate their relative merit. Closest to our paper, Magill, Quinzii, and Rochet (2015) develop a general equilibrium model with workers, consumers, and shareholders and show how a stakeholder model may internalize an externality between consumers and workers. Fleurbaey and Ponthière (2023) use a similar setting to that of Magill, Quinzii, and Rochet (2015) and show that stakeholder maximization obtains via constrained profit maximization, taking prices as given. Kopel, Lamantia, and Szidarovszky (2014) and Kopel and Lamantia (2018) study, in various industry settings, the dynamic evolution of the fraction of firms that adopt a stakeholder model versus those that are profit maximizers. The evolution relies on an exogenous rule, and firms, being static optimizers, do not choose whether to adopt a stakeholder model or remain profit maximizers.

Our contribution to this strand of the literature is three-fold. First, we explore the possibility of strategic *interaction* in a CSR context. Second, we provide an explicit and formal narrative for the transition from a "Friedman firm" (i.e., a classic shareholder-value maximizer as in Friedman 1970) to a socially conscious one. Specifically, whereas in Baron (2001), for example, CSR is a means for an active shareholder to pursue his or her private agenda (which may lead to higher costs and thus differs from straight value maximization), in our framework a *value-maximizing* shareholder uses CSR as a means to increase shareholder value. Third, our theory can help rationalize the evidence presented above that suggests that the adoption of CSR is correlated across firms within an industry with no apparent first-mover disadvantage present. Ostrom (2015) discusses a solution to the prisoner's dilemma that arises in common-pool problems where the agents are allowed to change the rules of the game. In her model, she adds a first stage to the prisoner's dilemma problem where the agents can agree on a contract to split the common resource and pay a third party to enforce the contract. Our solution differs from hers in that no enforcer is needed, though a commitment mechanism is.

In parallel with the above (largely theoretical) literature on CSR, there is a series of recent empirical studies on the nature

and implications of CSR. For example, Dimson, Karakaş, and Li (2015) show that "success in engagements is more probable if the engaged firm has reputational concerns and higher capacity to implement changes." Starks, Venkat, and Zhu (2023), in turn, provide evidence of sorting between shareholders and firms. Specifically, "longer-horizon investors tilt their portfolios towards firms with high-ESG profiles." As discussed in Section 5, our model predicts the possibility of shareholder sorting as in Dimson, Karakaş, and Li (2015) and Starks, Venkat, and Zhu (2023). The empirical literature addresses also the question of whether CSR has a real effect (as opposed to babbling at best or greenwashing at worst). For example, Dimson, Karakaş, and Li (2015) discuss conditions that increase the likelihood of successful engagements, including, for example, the presence of and collaboration among several investors. Several papers have proposed a positive causal link of CSR on firms' financial performance. Flammer (2015) shows using a regression discontinuity design that marginally successful shareholder proposals linked to ESG policies result in positive abnormal returns. Albuquerque, Koskinen, and Zhang (2019) use instrumental variables estimation to identify a link between higher ESG firm metrics and lower firm systematic risk.

Our model is related to the industrial organization literature on strategic delegation, in particular Vickers (1985), Fershtman and Judd (1987), and Sklivas (1987).[10] This literature shows that, in a competitive context, profit-maximizing shareholders pay CEOs to maximize a function that differs from firm profits, the specific nature of this function depending on the nature of product-market competition. We complement this literature in two ways. First, we model a two-stage game with an explicit choice of objective function in the first stage. This modification is what allows us to describe the industry game as a pure coordination game and to speak to the novel aspect of strategic leadership in CSR. Second, the results on these papers and ours depend on shareholders' ability to commit to an objective function that differs from profit maximization. We believe that in our setting commitment may be easier to affirm as it relies on investor preferences and reputational concerns with regard to her preferences as discussed above. For example, arguing that McDonald's failed its 2012 promise to phase out the use of gestational crates, the activist investor Carl Icahn bought a small stake in McDonald's in early 2022 and nominated two new board members aimed at improving the treatment of pregnant pigs, an animal for which the investor "has a particular soft spot" (Torrella 2022). In contrast, the previous literature models a shareholder-manager agency conflict where the possibility of secretly renegotiating the manager's contract undermines any commitment efforts.

Along similar lines, our framework is also related to Rotemberg's (1994) model of altruism. He considers the problem of cooperation in the workplace. Like ours, his framework consists of two stages: in the first stage, workers choose an altruism parameter γ; in the second stage, a game is played and payoffs are received. Rotemberg (1994) shows that there exist equilibria of the two-stage game whereby selfish workers commit to be altruistic. From a game-theoretic point of view, there is a clear relation between our model and Rotemberg's (1994). However, there are also differences stemming from differences in the real-world problem we address. Altruism consists of augmenting one's utility function by including another player's payoff. CSR, by contrast, consists of extending a firm's goal by a metric other than straight profitability. There are also important differences in terms of the way commitment is achieved. We propose a firm's mission statement as a natural channel. Consistently with his application, the first-stage credible moves considered by Rotemberg (1994) include body language of gifting.

Finally, our paper relates to an extensive economics, strategy, and management literature on leadership. In game theory and industrial organization, leadership is normally associated with the order of moves in a sequential-move game, as in, for example, the Stackelberg model (von Stackelberg 2011). Similar to this literature, in our framework, leadership is a commitment modeled by a sequential-move game. Different from this literature, we consider commitment to an objective function rather than commitment to an action (e.g., output or capacity level). The term leadership is often associated with the ability of a leader (e.g., a CEO) to induce other organization members to follow him or her. Dinh et al. (2014) provide a survey of the organizational behavior, whereas Hermalin (1998) follows an economics and game-theory approach. By contrast, we consider the possibility of a firm leading other industry players, either direct competitors or other firms along the value chain.

3 | The Model

3.1 | The General Framework

We model a two-stage game played by two firms, i and j. In the first stage, profit-maximizing firms choose an objective function. It is best to think of this stage as a firm committing to a mission statement, that is, an objective function that will guide the firm's decisions during the second stage. Specifically, we assume the firm's objective function is described by $\theta_i \in \{0, \bar{\theta}\}$. If $\theta_i = 0$, then the firm is a financial-value maximizer (also referred to throughout the paper as a "Friedman" firm). If, by contrast, $\theta_i = \bar{\theta}$, then the firm's objective function differs from straight financial profit maximization. Specifically, we assume the firm's objective function during the second stage is given by

$$v_i(t_i, t_j; \theta_i) = \pi_i(t_i, t_j) + \theta_i f(t_i), \tag{1}$$

where t_i denotes a strategic variable chosen during the second stage, $\pi_i(t_i, t_j)$ the firm's profit, and $f(t_i)$ a component that stakeholders (other than value-maximizing shareholders) care about. Without loss of generality, below we assume that $f(t_i) = t_i$.

We study subgame-perfect Nash equilibria in pure strategies. Accordingly, we solve the game backwards, beginning with the second period. At this point, the values of θ_i and θ_j are common knowledge, that is, both players know both firms' objective function. Firm i chooses t_i to solve

$$\max_{t_i} v_i(t_i, t_j; \theta_i).$$

Note that t_i is the firm's strategy; t_j is the firm i's belief regarding the firm j's choice in the second period; and θ_i reflects the firm

i's CSR commitment. Note that the value of θ_j does not enter firm i's value function directly. However, the value of θ_j (which by now is common knowledge) does affect the firm i's belief regarding the firm j's choice t_j.

We now move back to the first stage. Anticipating a second-stage subgame equilibrium, that is, choices $\hat{t}_i(\theta_i, \theta_j)$ and $\hat{t}_j(\theta_i, \theta_j)$, firm i's choice of θ_i in the first stage solves

$$\max_{\theta_i} \pi_i(\hat{t}_i(\theta_i, \theta_j), \hat{t}_j(\theta_i, \theta_j)). \tag{2}$$

Equation (2) makes an implicit assumption, namely that first-stage shareholders are firm-value maximizers. We make this assumption to be consistent with historical observation: Firms decide whether to *become* socially responsible or not from a financial-value-maximization perspective. We also make this assumption so as to address the idea of "doing well by doing good," namely, the hypothesis that CSR is good for profit maximizers.[11]

3.2 | Clean-Energy Technology Adoption

As a primary application of the above general CSR framework, in this section, we study the adoption of a clean-energy technology (as opposed to sticking to a legacy, "dirty," technology).[12] Specifically, we now assume that $t_i \in \{0, 1\}$ stands for the firm's technology choice: $t_i = 0$ corresponds to a legacy technology (dirty technology), whereas $t_i = 1$ corresponds to a green technology (clean technology). The value of θ, in turn, measures the firm's weight on green technology adoption *beyond its implications for financial performance* (which are included in the profitability term π).

We assume that $\pi_i(t_i, t_j)$, firm i's profit function, results from an equilibrium where firms compete in setting quantities q_i given a linear market demand $Q = a - bp$, where by appropriate unit changes we normalize the intercept and the slope to 1.[13] Marginal cost c_i is constant (with respect to q_i) but depends on the choices t_i *and* t_j. Specifically, we assume that if only one firm adopts the green technology, then its marginal cost of production is $\bar{c}$, whereas if both firms adopt the clean technology, then each firm's marginal cost of production is $\underline{c} < \bar{c}$. Finally, the legacy technology implies a marginal cost c (regardless of the rival firm's technology-adoption decision).

Since the relation between t_i and c_i is at the core of our clean-technology application, some notes are in order. We have in mind an externality associated with nonexcludable learning by doing in the spirit of Romer (1986). One example is given by the adoption of solar panels. To the extent that the technology is subject to steep nonexcludable learning by doing, we expect that the production cost of an adopter is lower the greater the number of other firms that make the same choice. Another motivating example is given by electrical vehicles. If General Motors is the only large US car manufacturer switching to electrical vehicles, then the investment in complementary assets such as charging stations or better batteries will be low. If, by contrast, many manufacturers commit to EVs, then there will be more complementary investments and as a result the production of EVs will be more efficient on a value-for-the-money basis.[14]

Since technology choice determines marginal cost, it also affects the firms' output choices and, ultimately the firms' profits. For intermediate values of marginal cost, equilibrium profit is given by

$$\tilde{\pi}_i = \frac{1}{9}(1 + c_j - 2c_i)^2. \tag{3}$$

If, by contrast, the firm j's cost is sufficiently high, specifically if $c_j > (1 + c_i)/2$, then firm i is effectively a monopolist, earning equilibrium profits of

$$\tilde{\pi}_i = \frac{1}{4}(1 - c_i)^2. \tag{4}$$

As mentioned before, the firms' technology choices t_i determine the firms' marginal costs, which equals $\bar{c}$ if a firm unilaterally adopts the green technology, $\underline{c}$ if *both* firms adopt the new technology, and c if a firm sticks to the legacy technology. We make some assumptions regarding the values of c, $\bar{c}$, and $\underline{c}$:

Assumption 1. $\underline{c} < c < 2\bar{c} - 1$.

The first inequality implies that, if both firms choose the clean technology, then marginal costs are lower than under the legacy technology. In other words, a social planner would choose to adopt the new technology (for simplicity, we assume zero adoption costs). The second inequality implies that, if a firm goes solo in adopting the clean technology, then its cost is so high that effectively it is priced out of the market, that is, it leaves the rival firm as a monopolist.[15] This parameter restriction describes the status quo where firms remain with the legacy technology. We make additional assumptions regarding $\bar{\theta}$ and the cost parameters:

Assumption 2. $0 < \frac{1}{4}(1 - c)^2 - \frac{1}{9}(1 - \underline{c})^2 < \bar{\theta} < \frac{1}{9}(1 - c)^2$.

These inequalities ensure that the solution to the CSR game is interior: First, we ensure that the green technology, when adopted by both firms, has lower cost than the legacy technology, but not so much lower that duopolists with $\underline{c}$ would make more profit than a monopolist with c. Second, we ensure that social responsibility (as measured by the value of $\bar{\theta}$) is sufficiently high that a firm prefers to be a duopolist with a green technology with respect to a monopolist with the legacy technology; that is, a high $\bar{\theta}$ guarantees that investing in the clean technology is a best response to the other firm also investing in the clean technology. However, it is important to note too that $\bar{\theta}$ is assumed not so high that a firm would prefer to completely sacrifice its duopoly profits under the legacy technology (i.e., too much "warm glow" is not allowed), which would trivialize the problem. These assumptions thus identify both the maximum shareholders are willing to sacrifice in terms of financial profitability, as well as the minimum preference for CSR required so as to generate an equilibrium with the implementation of the clean technology.[16]

The proof of the next proposition and the other results in the paper can be found in the appendix.

Proposition 1. *There exist three different subgame-perfect equilibria of the* (θ, t) *two-stage game. These equilibria correspond to the following paths:*

a. $\theta_1 = \theta_2 = 0$, *followed by* $t_1 = t_2 = 0$;

b. $\theta_1 = \theta_2 = \bar{\theta}$, *followed by* $t_1 = t_2 = 1$;

c. $\theta_1 = \theta_2 = \bar{\theta}$, *followed by* $t_1 = t_2 = 0$.

Moreover, a profit-maximizing firm prefers equilibrium (b).

The three equilibria derived in Proposition 1 have an interesting interpretation in terms of the discussion regarding the nature and the effects of CSR. Equilibrium (a) corresponds to the case when firms do not engage in CSR, which, in broad strokes, might characterize the reality of the corporate world for most of the 20th century. Given that firms remain "Friedman" firms—that is, financial value maximizers—the technology-choice game has a dominant strategy, namely, to stick with the legacy technology. Specifically, the technology-choice subgame has the nature of a prisoner's dilemma: Together, firms would prefer to switch to a green technology, but individually each firm prefers to stick to the legacy technology.

Equilibrium (b) corresponds, essentially, to the idea that when firms *jointly* embrace CSR, then this choice may have real effects. It is important to stress the qualifier "jointly." In fact, if only one firm adopts a CSR policy, then it will have no effect on the technology-choice game. The reason is that, for the firm that does not choose CSR, sticking with the legacy technology remains a dominant strategy; and even a firm that chooses CSR optimally responds to a nonadopting rival by not adopting a green technology. The second statement is guaranteed by our assumption limiting the value of $\bar{\theta}$ and the impact of the "warm glow" effect. By contrast, if *both firms* choose $\theta_i = \bar{\theta}$, then switching to a green technology is a subgame-perfect equilibrium.

It is important to stress that we write "a" subgame-perfect equilibrium, not "the" subgame-perfect equilibrium. If fact, as equilibrium (c) in Proposition 1 suggests, even if both firms choose $\theta_i = \bar{\theta}$, there exists an equilibrium with a subgame leading to no adoption of the green technology. One might refer to this as the failure of CSR, even when CSR corresponds to collective action. From a game-theory point of view, one might appeal to Pareto optimality or forward-induction arguments, both at a theoretical and at an experimental level, to exclude this equilibrium (Schelling 1960; Harsanyi and Selten 1988; Cooper et al. 1990); but it certainly is a subgame-perfect Nash equilibrium. This equilibrium would also disappear if we dropped the upper bound assumption on the value of $\bar{\theta}$ in Assumption 2. We focus primarily on equilibrium (b), which seems more reasonable.

One way of rephrasing the second equilibrium in Proposition 1 is that the joint adoption of CSR effectively turns a prisoner's dilemma game into a coordination game. Specifically, if both firms operate as "Friedman" firms—that is, with $\theta = 0$—then the technology-adoption game has the nature of a prisoner's dilemma: Sticking to the legacy technology is the dominant strategy for each firm individually. By adding the initial CSR stage, where firms have the opportunity to commit to $\theta = \bar{\theta}$, we observe that there exist two equilibria (if we exclude the (c) equilibrium). These equilibria, (a) and (b), are Pareto ranked. Effectively, we have a coordination game. Specifically, there is no dominant strategy regarding the choice of CSR, rather each firm's best response is to follow the same choice as the rival firm.

The "transformation" of a prisoner's dilemma into a coordination game lets us introduce the idea of strategic leadership in CSR. As we have seen, the technology-adoption subgame played by Friedman firms is a prisoner's dilemma. In this context, being a leader is of no help. In fact, a well-intentioned or a strategically motivated leader who adopts the green technology will only find the disappointment of a rival who is grateful for the opportunity to capture market share by sticking to the legacy technology.[17] By contrast, when playing the CSR coordination game there is clear scope for leadership, as there is in any perfect-coordination game. Specifically, sequential choice is the most natural way to induce the "good" equilibrium of a perfect-coordination game. Firm 1 moves first and chooses $\theta = \bar{\theta}$, upon which Firm 2's best response is to choose $\theta = \bar{\theta}$ as well, leading to joint adoption of the green technology—and to higher shareholder value.[18]

4 | Additional Applications

4.1 | Improving Labor Conditions

Worker conditions, both domestically and in countries hosting suppliers, are an important component of CSR. In this section, we consider wages as the relevant dimension of worker conditions but the model can be understood more broadly in the context of any strategic variable relating to labor input, such as work hours or workplace conditions. Specifically, we assume that shareholders can commit to an objective function that values profits and also higher wages. Appendix B.1 provides all model details, and statements and proofs of the results.

We consider a simple extension of the linear Cournot model of duopoly competition where market demand is given by

$$Q = \min\{w_i, w_j\}(1 - p). \tag{5}$$

The $1 - p$ term corresponds to a standard linear demand. The term, $\min\{w_i, w_j\}$, requires further explanation. The idea is that, due to consumer awareness (Servaes and Tamayo 2013), total demand is a function of the industry's reputation for CSR. Our idea is that consumers may have difficulty identifying the specific actions of each firm. Rather, they have a general perception of the industry's CSR performance. Examples include the generalized lack of trust in the financial services industry following the 2008 subprime crisis (Lins, Servaes, and Tamayo 2017) or the perception that the diamond industry is tainted with conflict diamonds. An alternative explanation for our assumption is that an industry's successful lobbying efforts require unanimity

among all players. Inderst, Rhiel, and Thomas (2022) discuss the possibility that consumers change their preferences (i.e., "adopt a social norm") when the industry as a whole moves, and that short of a generalized industry move, say due to market capacity or resource constraints, such new social norm may not emerge.

The function we consider, $\min\{w_i, w_j\}$, assumes a particularly extreme form: Each firm is as bad as the worst firm in the industry. We believe our qualitative results follow with less extreme functional forms. It is important, however, that there be some complementarity between the firms' efforts in the eyes of consumers. In particular, it is of little use—in terms of market demand—if one firm unilaterally increases its wage rate.

As per Section 3.1, the game unfolds over two stages. First, the simultaneous, profit-maximizing choice of a value of $\theta_i \in \{0, \bar{\theta}\}$, and then, having observed (θ_i, θ_j), the simultaneous choice of $w_i \in \{\underline{w}, \overline{w}\}$. A positive θ in this setting means that the firm values paying higher wages to its employees.

The following proposition describes the equilibria in the model.

Proposition 2. *Assume inequalities (B5)–(B7) hold. There exist three different subgame-perfect equilibria of the (θ, w) two-stage game. These equilibria correspond to the following paths:*

a. $\theta_1 = \theta_2 = 0$, *followed by* $w_1 = w_2 = \underline{w}$;

b. $\theta_1 = \theta_2 = \bar{\theta}$, *followed by* $w_1 = w_2 = \overline{w}$;

c. $\theta_1 = \theta_2 = \bar{\theta}$, *followed by* $w_1 = w_2 = \underline{w}$.

Moreover, a profit-maximizing firm prefers equilibrium (b). Finally, inequalities (B5)–(B7) define a positive-measure subset of the $(\bar{\theta}, \underline{w}, \overline{w})$ space.

There is a clear parallel between Propositions 2 and 1. In both cases, we discover three equilibria that have an interesting interpretation in terms of CSR. Equilibrium (b) is the more interesting (and reasonable) equilibrium. In this equilibrium, CSR turns a prisoner's dilemma into a coordination game. Also, a strategic leader is a firm that in the first stage chooses a mission statement that commits to a stakeholder model. This CSR strategic leader helps solve the coordination game. Finally, equilibrium (b) holds because $\bar{\theta}$ is high enough (given the remaining model parameters) so as to have one firm pay high wages when its rival is paying high wages, but not too high so that the firm would pay high wages even if its rival was paying low wages. That is, there is a limit on profit losses due to the trade-off imposed on the firm against the "warm glow" of high wages. These constraints on $\bar{\theta}$ and the other model parameters are formally written in conditions (B5)–(B7).

4.2 | Supply-Chain Resiliency

Unlike the first two applications, where firms belong to the same industry ("horizontal" firm interaction), our third application considers firms located at different stages of the value chain ("vertical" firm interaction). Specifically, we model a supply chain composed of two vertically integrated firms, each in its own industry. The focus of our analysis is on the resilience of supply chains. We do so by assuming that industries are subject to disruption, which we model as an exogenous shock that halts the production process. Moreover, we assume that these shocks can be global or industry specific. Specifically, with probability $1 - \alpha$ there is no disruption in either industry; with probability $\alpha\phi$, both industries are disrupted; and with probability $\alpha(1 - \phi)$ exactly one industry is disrupted, each with probability $\alpha(1 - \phi)/2$.

This modeling approach reflects the view that disruption is sometimes limited to a given stage of the value chain, whereas at other times it extends to the entire chain. For example, the September 2000 Taiwan earthquake affected the world supply of memory chips. In terms of the computer supply chain, this can be seen as a shock to one of the stages of the chain. By contrast, the 2020 pandemic provides an example of a shock that affected entire vertical chains. Pankratz and Schiller (2021) provide evidence that climate risks can affect global supply chains. These examples refer to physical exogenous shocks. However, disruption may also take the form of information disclosure. For example, the admission that suppliers use child labor would be an example of a shock limited to a stage of the production chain, whereas the finding that the final product requires a chemical such as asbestos that is harmful to health would affect the entire value chain. Our setting also applies to the setting of sustainable supply chains. Unilever's decision to have 100% of its Lipton tea brand sustainably produced required a transformation of the whole supply chain that would eventually only result in increased brand name recognition and increased demand if all the different points in the supply chain were to change (see Henderson 2020). The probabilities of disruption above can be interpreted as probabilities of change.

Suppose that, by investing $c(x_i)$ dollars, where $x_i \in [0, 1]$ and $c(\cdot) > 0$, a firm can guarantee that it will operate with probability x_i in case its industry is disrupted. We refer to this as a resilience investment. For simplicity, we assume quadratic costs to investing in supply-chain resilience, $c(x_i) = x_i^2/2$. An example of a resilience investment might be to build a generator so as not to be dependent on the power grid or to accumulate inventories. The value obtained from operation is $p > 0$.

As before, we assume that firms are originally profit maximizers and choose their mission statement. Subsequently, given the choices of θ_i and θ_j, firms choose the resilience of their production technology, formally firms choose x_i and x_j. In this model, a positive θ means that firms derive additional value from increasing the resilience probability, say out of a concern for job security for its employees. The following proposition describes the equilibrium of the model. Appendix B.2 provides the full details of the model and the proof of the proposition.

Proposition 3. *There exists $\tilde{\theta} > 0$ such that, if $0 < \bar{\theta} < \tilde{\theta}$ then $\theta_i = \bar{\theta}$ is a dominant strategy in the CSR game. Moreover, shareholder value is greater when $\theta_1 = \theta_2 = \bar{\theta}$ than when $\theta_1 = \theta_2 = 0$.*

From a modeling point of view, our third application differs from the first two in that the second stage corresponds to the

choice of a continuous variable $x_i \in [0, 1]$. The second-stage game has the structure of the (inverse) tragedy of the commons. Due to the positive externality of the investment x_i, the Nash equilibrium of the one-shot game has firms investing at a level that is lower than the joint optimal level. A CSR mission statement implies that firm i has an added reason to increase x_i, which in turn leads the other firm also to increase the value of x_j and ultimately leads to a higher profit provided $\bar{\theta}$ is not too large.

Another important difference with respect to the first two applications is that, in the present context, the first-stage game can be solved by dominant strategies (whereas in Sections 3.2 and 4.1 it corresponds to a pure coordination game). This implies that the order of moves in the first stage is no longer relevant, and thus a CSR strategic leader is no longer necessary.

5 | Discussion

In this section, we discuss various aspects of our results, including what they may imply for public policy and several interpretation issues.

5.1 | Welfare Analysis

Is CSR good from a social welfare point of view? To answer the first question requires a definition of social welfare. A second question, critical to competition policy, is whether CSR leads to higher consumer surplus? A natural definition of social welfare is to add the surplus from all agents in the economy. Specifically, in the clean-energy technology model, social welfare equals the sum of profits and consumer surplus. Because the equilibrium where both firms choose CSR and adopt the clean-energy technology results in lower cost and higher quantity produced—while requiring no additional investment—both profits and consumer surplus increase relative to the equilibria where both firms choose the legacy technology. The statement of the proposition and its proof are in Appendix A.

In the wage-setting model, social welfare equals the sum of profits and consumer surplus plus the portion of the wage bill that exceeds the competitive wage. Note that, in the clean-energy technology model, the hypothesis implicit in the definition of social welfare is that the firms' costs are equal to the social cost. However, in the wage-setting model, firms set wages above the competitive level, thus transferring rents to workers. In this context, social welfare must also account for the portion of the wage bill that exceeds the competitive wage. In Appendix B.1 we show that (i) consumer surplus is higher in the CSR equilibrium and (ii) if firm profits are higher when wages are high, social welfare is also higher.

Finally, in the model of supply-chain resiliency, we do not have an explicit demand curve and as such cannot calculate consumer surplus. However, it is reasonable to assume that consumer surplus increases as the supply chain is made more resilient. Since firm profits also increase in the CSR equilibrium, social welfare trivially increases. Overall, these results suggest that the positive role of CSR, in terms of firm profits, also extends to social welfare.

5.2 | Public Policy

While most of our analysis is focused on firm strategy, our framework and equilibrium results also have implications for public policy following the results in Section 5.1. The analysis suggests that inducing strategic leadership actions can be an alternative to a competition policy that acknowledges "sustainability agreements" as is being considered in the European Union. The critical feature that leads to the strategic role played by CSR commitments is the complementarity in the second-stage game. This suggests that one role for public policy is to introduce complementarities into firm actions.

Consider, for example, a tragedy-of-the-commons type subgame such as setting an upper bound on CO_2 emissions. One possible public policy design is to introduce a price subsidy that works only if all the firms in the industry reduce their pollution levels. This would lead to a subgame that shares the main features of our setup. The idea is to use firm interaction as an additional course of incentives for individual players to choose a value of t closer to the socially optimal level.

The flip-side of the subsidy instrument is the threat of regulation that affects the variable of interest (say, CO_2 emissions) say by adding costs associated with increased disclosure. The benefit from avoiding the regulation, especially if it is credible that the regulation will be implemented unless *everyone* becomes more CSR friendly, may be a sufficient motivator to induce firms to commit to CSR in a first-stage game. Castroviejo et al. (2021) discuss legislative action pursued in France against airline companies that came into effect in 2022 to ban short-haul domestic flights for which there is a land-transport alternative that connects the same locations in less than two and a half hours. Besides the immediate regulatory effect on air travel and CO_2 emissions, there is a long-term benefit associated with the threat of regulation that may induce this industry and others to move ahead of potentially less efficient and broader regulation.

This discussion notwithstanding, industry-wide policy instruments such as those discussed here are themselves costly say due to the financial cost of the subsidy or the cost associated with monitoring additional disclosure practices. An implementation of these initiatives would have to be confronted with more standard practices.

5.3 | Relation to Reputation Literature

There is an interesting relation between the choice of $\bar{\theta}$ and the game-theory literature on reputation (Kreps et al. 1982). In the so-called "gang-of-four" framework, Player 2 is uncertain about Player 1's type. In certain types of games, a "normal" Player 1 may have an incentive to pool with a "crazy" Player 1 so as to induce a favorable reaction by Player 2. Player 1 does not change its utility function, rather chooses a course of action that induces Player 2 to believe that Player 1 is a "crazy" type.

The correspondence with our framework has Player 1 as firm 1's shareholder/CEO and Player 2 as firm 2's shareholder/CEO. A "normal" player is a Friedman shareholder, that is, one whose utility is profit maximization, whereas a "crazy" player is one whose value function includes other stakeholders' value. The difference with respect to the reputation framework is that we do not consider the possibility of asymmetric information. Rather, we assume that players have the ability to change their utility function. To be more specific, players have the ability to choose a "mission statement," which effectively influences their future actions as if their utility function had changed.

In spite of this difference, there is an interesting parallel between our framework and the pooling equilibrium (reputation equilibrium) in Kreps et al.'s (1982) framework. Specifically, our preferred equilibria have a "pooling" flavor. Consider two different shareholders, one who is a profit maximizer and one who is socially conscious. In equilibrium, both take the same course of action. The socially conscious will push for a mission statement that includes CSR because that's what his or her utility dictates. The Friedman shareholder will push for the same mission statement for a different reason: By doing so, he or she induces more favorable behavior by the rival firm and as such increases financial value.

In other words, empirically, there is no way to distinguish the behavior of an "activist" shareholder who is genuinely concerned with CSR from the behavior of a Friedman shareholder who becomes an "activist" shareholder for strategic reasons. This observational equivalence is similar to a pooling equilibrium in the asymmetric information game of reputation.

5.4 | Shareholder Utility and the Value of θ

In our basic framework, we assume that a financial value maximizer shareholder strategically adopts a CSR utility function. However, it seems reasonable to assume that many firms and shareholders are "genetically" endowed with a $\theta > 0$ utility function. This raises the question of what determines the value of θ we considered in previous sections.

In terms of our framework, the firm's social impact (in the shareholder's eyes) can be measured by θt_i. A further decomposition of θ may be helpful. Let $\theta \equiv \xi\chi$, where χ is the firm's level of CSR-relevant actions (i.e., the portion of t_i that is CSR relevant) and ξ is the firm's ability to induce CSR results by its choice of χ. For example, if Google were to increase its minimum wage from \$10 to \$15, this would likely have no real effect, for the simple reason that most of Google's employees are high-skilled workers. In this sense, we would say that Google's ξ is close to zero (when it comes to minimum wage, one of many components of a CSR policy). Another example is provided by Volvo. In 2020, the company announced that all new cars would have a factory speed limit of 112 miles/h. However, speeding ranks only third in car crashes in the United States, below driving distractions and driving with alcohol and drug impairment (Console 2020). Again, this would be reflected in a low ξ, this time on account of the low-CSR nature of the activity in question.

In sum, the product θt reflects firm-specific and industry-specific considerations that affect the map from firm actions to actual CSR results, besides any other subjective utility by shareholders from CSR.

For simplicity, our analysis only considers two possible values of θ (0 and $\bar{\theta}$). A more general analysis would consider a range of values of θ, with 0 as a lower bound and $\bar{\theta}$ as an upper bound. The lower bound corresponds to a Friedman firm, that is, a financial value maximizer. The upper bound, in turn, corresponds to a value of θ beyond which the firm is not financially viable, and thus, CSR would be counterproductive (Fairhurst and Greene 2020). Recent trends suggest that firms worldwide are moving away from the lower bound, but also that the effective values of θ are still relatively low (Bolton and Kacperczyk 2021).

Our analysis has focused on values of $\theta > 0$. The reason is that the applications we study all involve positive externalities. Consider however the case of a negative externality: Consumer utility and therefore demand for firms' products increases if the overall level of air pollution decreases. In this case, a preference for CSR would be equivalent to having $\theta < 0$ so that by reducing the quantity produced—and thus reducing air pollution—the firm would trade off the loss in profits with the increase in value in θt.

5.5 | Mission Statement and Agency Issues

In the previous sections, we mentioned the firm's mission statement in reference to the firm's stakeholder value function (1). As Powers (2012) argues, mission statements communicate the company's purpose to the outside world, bringing clarity as to what the firm is and is not doing. Moreover, mission statements can be an effective means of achieving the commitment we assume in our analysis (the Allbirds IPO discussed in the introduction is an example of that). In other words, our assumption that each firm chooses a value of θ in the first stage can be interpreted as modeling the firm's choice of the mission statement it commits to.

Consistent with our analysis, Loderer et al. (2010) report that mission statements often go beyond shareholder value as the sole criterion; that is, mission statements feature positive values of θ. Similarly, King, Case, and Premo (2010) document the recent trend of adopting "green statements."[19]

In our analysis, we largely ignore agency problems involving shareholders and CEOs: Our focus is on the game-theoretic dimensions of CSR policies. However, agency issues are obviously important, also concerning CSR policies. In this regard, we believe the firm's mission statement can be an effective vehicle to align CEO and shareholders' interests. This alignment works in two ways. First, it helps the process of sorting of shareholders and firms: When a shareholder acquires shares in firm i it effectively buys into a specific value of θ. This is related to Hart and Zingales's (2017) effort to "reconcile" Friedman's (1970) "duty toward shareholders" doctrine with CSR concerns. The idea is that a CEO's duty is to follow the firm's mission statement. To the extent that shareholders are properly sorted

across mission statements, by following the firm's mission statement, the CEO is effectively maximizing shareholders' interests (which does not necessarily imply maximizing only the firm's financial value).[20]

The second direction in the shareholders-mission statement connection pertains to the role of active shareholders. Dimson, Karakaş, and Li (2015) and Flammer (2015) suggest that active shareholders play an important role in changing firm behavior. A recent case study is Carl Icahn's activism with McDonald's to better the treatment of pigs.[21] Also, Hsu, Liang, and Matos (2023) provide evidence that state-owned companies around the world are more responsible to environmental issues. In terms of our framework, we can think of these active shareholders as a direct determinant of the firm's mission statement (i.e., the value of θ).

Related to this, we should mention that a simplifying assumption in our analysis is that firms are symmetric, both in terms of their primitive utility functions and in terms of their actions. Clearly, firm heterogeneity is an important feature of most industries, also in terms of their CSR attitude. For example, Bolton and Kacperczyk (2021) show that commitments to reduce carbon emissions vary across firms. Moreover, "companies that choose to make a commitment are the ones with lower carbon emissions to begin with." Their interpretation of this correlation is that "companies making a commitment are the least problematic ones in terms of carbon emissions." However, and following our discussion in Section 5.4, an alternative (or additional) interpretation is that of heterogeneity in θ: Some firms have higher values of θ, which in turn leads them to higher values of t (where we interpret a commitment as a choice of a future value of t).

5.6 | Leadership

For simplicity, our formal analysis was cast in terms of a two-player model. Most real-world settings, however, involve multiple firms. We believe that the qualitative nature of our results extends to this multiplayer setting. This also applies to our model of leadership, which may be interpreted as a model of one single leader or instead a model of a core of leading firms. Consider, for example, the sustainable use of palm oil, a case documented in some detail by Henderson (2020). While Unilever took a particularly important leadership role, the European giant was accompanied by a "core" of large corporations members of the Consumer Goods Forum. The idea was that, "if these companies demanded that the commodities they bought be sustainably grown, entire industries would be forced to move in a more sustainable direction." The evidence discussed above provided in Azar et al. (2021) constitutes yet another example of "core" leadership. Such examples are consistent with the concept of leadership we develop, albeit in a multiplayer context.

6 | Conclusion

This paper proposes the idea that firms may choose to deviate from profit maximization—by adopting a stakeholder model via a CSR policy—and yet yield higher profits because of strategic complementarities in the industry. We illustrate this idea in three different settings. In the first two, the choice of CSR by all firms in the industry results in an equilibrium that is Pareto superior to the absence of CSR. However, there is also an equilibrium where "Friedman" firms operate. These two equilibria introduce a coordination problem that can be solved if one of the firms assumes the industry leadership to become CSR. We call this firm a strategic CSR leader.

We view mission statements, like, the hiring of board members or a CEO with a CSR reputation, as ways to assert the intended specific stakeholder model to peer firms and other constituents, such as supplier firms or investors. For this reason, we propose that mission statements be voted by shareholders so as to grant them greater fiduciary bite (see, also, Mayer 2018).

The paper's main result suggests that the presence of green-activist investors, mission statements (and of green statements), or pay practices that favor the adoption of CSR policies, are more likely in industries where strategic complementarities such as those highlighted in the paper are more prominent. CSR, however, is not in our model a large, indiscriminate umbrella covering all the firm's operations but rather those activities that involve such strategic complementarities.

One of the many critics of departures from profit maximization writes that

> *Purpose cannot solve the problem of shareholder primacy because shareholder capitalism is inherently corrupting of purpose. When purpose and shareholder value get into a boxing ring, I will bet on shareholder value every time.*
> (Davis 2021)

Our analysis suggests that the dichotomy between purpose and shareholder value is not clear-cut. Importantly, we move away from the partial equilibrium setting of firm decision making, where traditionally CSR has been studied, and consider the industry equilibrium setting. We point out that the highlighted dichotomy may not exist in the presence of strategic complementarities in an industry.

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Albuquerque: Professor of Finance and Seidner Family Faculty Fellow, Carroll School of Management, Boston College; Research Associate, ECGI; and Research Fellow, CEPR; rui.albuquerque@bc.edu. Cabral: Paganelli-Bull Professor of Economics, Stern School of Business, New York University; and Research Fellow, CEPR; luis.cabral@nyu.edu. The usual disclaimer applies.

Endnotes

[1]The traditional view considers the adoption of CSR policies in the context of partial equilibrium or ignoring strategic interactions, say by increasing customer awareness (Servaes and Tamayo 2013; Albuquerque, Koskinen, and Zhang 2019), via a longer-term planning horizon (Bénabou and Tirole 2010), a more resilient supply chain (Hoepner et al. 2021), or better-addressed employee concerns (Edmans 2011).

[2]See Castroviejo et al. (2021) for other examples of common benefits.

[3]This can result from various factors, including learning-by-doing cost savings (solar panel manufacturing provides a recent example), network benefits from a collective switch to electric vehicles (due to a dense network of charging stations or improved battery technology), or network benefits from the development of a liquid market for carbon credits.

[4]See https://www.ishares.com/ch/professionals/en/themes/megatrends/thematic-investing?switchLocale=y&siteEntryPassthrough=true

[5]A positive 1999 ruling allowed for a horizontal agreement among washing machine manufacturers whereby they committed to discontinue the production of low-efficiency models. This effectively amounted to a reduction in industry capacity by agreement, a practice that would otherwise violate European competition law.

[6]In a similar vein, Hart and Zingales (2017) suggest that founders can guide current and future managers and boards through the company's mission statement, though they question the fiduciary strength of mission statements in light of the business judgment rule. On the issue of fiduciary strength, we argue that mission statements should be voted by shareholders to help guide management in the pursuit of the desired goals. In its U.S. Proxy Voting Guidelines, Institutional Shareholder Services (2020) recognizes some commitment value to mission statements when it states "[e]ndorsing a set of principles may require a company to take a stand on an issue that is beyond its own control and may limit its flexibility with respect to future developments." (p. 57).

[7]We should mention that in the Bebchuk and Tallarita (2022) sample the firms using ESG metrics in compensation packages assign relatively small weights—from about 1% to 12.5%—to these pay components. However, as we show below, too large of a weight on ESG is not necessarily a good thing.

[8]Notwithstanding this discussion, Bebchuk and Tallarita (2020) found that commitments made by CEOs of major US corporations at the Business Roundtable had little effect. We note that there is a significant difference between a collective commitment and the commitment made by one individual firm. The former is inevitably limited to a somewhat vague common denominator, whereas the latter can be very specific—in fact, it can be a quantitative commitment, as in the GM example considered above. Moreover, the reputation pledge mentioned by Schelling (1960) has considerably more bite at the individual corporation level rather than at the level of a "roundtable" of multiple corporations.

[9]Dimson, Karakaş, and Li (2015) show that investor engagements tend to be relatively more successful when the firm itself has reputational concerns, which suggests that a mission statement that pledges the firm's reputation and activist shareholders may be complementary rather than substitute factors in providing commitment power.

[10]More recently, Albuquerque, Cabral, and Guedes (2019) also consider the possibility of shareholder–CEO contracts that differ from value maximization, and Morgan and Tumlinson (2019) provide an application to the provision of public goods by corporations motivated by managerial contracts that reflect investor preferences for these public goods.

[11]Tirole (2017) discusses the existence (and choice) of multiple organization types in modern economies within the context of CSR, arguing that the shareholder-primacy model is the most likely to succeed in promoting CSR changes.

[12]In this regard, this section is related to Acemoglu et al. (2016), who study the transition to clean technology. They develop a competitive model and estimate the impact of taxes and subsidies to induce the transition to clean technology. Our approach differs in that we focus on the strategic interaction between industry players.

[13]The analysis does not depend on the assumption of linear demand. Other demand specifications can be used requiring only that we appropriately modify the assumptions below.

[14]A better network of charging stations would primarily affect consumer willingness to pay, not cost. However, the qualitative nature of the results would be similar to the cost reduction case.

[15]Note that the second inequality is equivalent to $(1 + c)/2 < \bar{c}$.

[16]Note that the inequalities in Assumption 2 induce a nonempty set. For example, suppose that $(1 - c)^2 = \frac{1}{2}, (1 - \underline{c})^2 = \frac{3}{4}$, and $\bar{\theta} \in [\frac{1}{24}, \frac{1}{18}]$ satisfy Assumption 2.

[17]Unilateral signals such as irreversible investment à la Dixit (1980) cannot help in this model since they would not affect firm's objective function. Thus, the firm doing the investment would lose the investment and the duopoly profits.

[18]In real life though, the leader will not adopt the clean technology until the follower expresses the same CSR interest, otherwise the leader will be out of the market in the second stage.

[19]The literature on mission statements (Pearce and David 1987) has long established a correlation between the existence of a mission statement with firm performance.

[20]This is our interpretation of Hart and Zingales's (2017) interpretation of Friedman (1970).

[21]Schiller (2018) and Dai, Liang, and Ng (2021) focus on other firms in the supply chain.

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Appendix A

Appendix for Clean-Energy Technology-Adoption Model

Proof of Proposition 1. As usual, we solve the game backwards, thus ensuring the Nash equilibria we select are subgame perfect. Consider first the case when firm i chooses $\theta_i = 0$, that is, firm i is a financial value maximizer. Suppose that $t_j = 0$. Assumption 1 implies that choosing $t_i = 1$ yields zero profits, whereas choosing $t_i = 0$ yields positive profits. Suppose instead that $t_j = 1$. Assumption 1 implies that choosing $t_i = 0$ leads to monopoly profits. The first inequality in Assumption 2 implies that such monopoly profits are higher than the duopoly profits earned from choosing $t_i = 1$. Together, the above calculations imply that, for a $\theta_i = 0$ firm, $t_i = 0$ is a dominant strategy in the second stage.

Consider now the case when firm i chooses $\theta_i = \bar{\theta}$, that is, firm i maximizes a value function comprising financial value and value from choosing a green technology. The second and third inequalities in Assumption 2 imply that firm i's best response in the second stage is $R_i(t_j) = t_j$, that is, firm i is better off by choosing the same technology as firm j. To see why, suppose that $t_j = 1$. Then $t_i = 1$ is better than $t_i = 0$ if and only if

$$\frac{1}{9}(1 - \underline{c})^2 + \bar{\theta} > \frac{1}{4}(1 - c)^2,$$

which is equivalent to the second inequality in Assumption 2. Suppose instead that $t_j = 0$. Then $t_i = 0$ is better than $t_i = 1$ if and only if

$$\frac{1}{9}(1 - c)^2 > \bar{\theta},$$

which is equivalent to the third inequality in Assumption 2. This discussion illustrates that committing to $\bar{\theta}$ does not preclude future adoption of the legacy technology if that is what the other firm is also doing.

Finally, we show the three equilibria in the proposition are indeed Nash equilibria in the meta-game played by financial value maximizers who have the ability to commit to a value of θ. Consider firm equilibrium (a). Along the equilibrium path, firm i obtains (financial) value $\frac{1}{9}(1 - c)^2$. By deviating and choosing $\theta = \bar{\theta}$, firm i is unable to induce a different t_j in the second stage, since $t_j = 0$ is a dominant strategy for a $\theta_j = 0$ firm. Since the best response to $t_j = 0$ is $t_i = 0$, regardless of the value of θ_i, we conclude that a change in θ_i does not improve firm i's financial value.

Consider now equilibrium (b). Along the equilibrium path, firm i receives a financial payoff of $\frac{1}{9}(1 - \underline{c})^2$. By switching to $\theta_i = 0$, firm i effectively commits to $t_i = 0$, which in terms leads firm j to choose $t_j = 0$, which eventually leads to a financial payoff of $\frac{1}{9}(1 - c)^2$, which is lower than the equilibrium payoff, by the first inequality in Assumption 1.

Consider now equilibrium (c). Along the equilibrium path, firm i receives a financial payoff of $\frac{1}{9}(1 - c)^2$. By switching to $\theta_i = 0$, firm i effectively commits to $t_i = 0$, which in turn leads firm j to choose $t_j = 0$, which eventually leads to a financial payoff of $\frac{1}{9}(1 - c)^2$, the same as the equilibrium payoff.

Finally, since by Assumption 3, $\underline{c} < c$, equilibrium (b) yields the highest financial value of all three equilibria. □

The next result deals with consumer surplus and welfare.

Proposition 4. *In the clean-energy technology game, consumer surplus and social welfare are higher in the CSR equilibrium.*

Proof of Proposition 4. For marginal cost c, in symmetric equilibria,

$$\hat{p} = \tfrac{1}{3}(1 + 2c),$$
$$\hat{Q} = \tfrac{2}{3}(1 - c),$$
$$\hat{\pi} = \tfrac{1}{9}(1 - c)^2$$

and social welfare equals

$$S = \tfrac{1}{2}(1 - \hat{p})\hat{Q} + (\hat{p} - c)\hat{Q}$$
$$= 2\hat{\pi}.$$

The lower marginal cost of the clean-energy technology is unambiguously welfare increasing. □

Appendix B

Appendix With Details on Other Applications

B.1 | Labor Conditions Model

This model assumes that shareholders can commit to the objective function

$$v_i(w_i, w_j; \theta_i) = \pi_i(w_i, w_j) + \theta_i w_i. \tag{B1}$$

This expression follows from (1) and is analogous to it, with two differences. First, the second-stage variable is now firm i's wage rate. Second, the reduced-form profit function is now different. To construct the profit function for each firm, we first write the inverse demand curve corresponding to (5):

$$p = 1 - Q/\min\{w_i, w_j\} = 1 - (q_1 + q_2)/\min\{w_i, w_j\}.$$

Firm i's profit, in turn, is given by

$$\pi_i(w_i, w_j) = q_i(1 - (q_1 + q_2)/\min\{w_i, w_j\} - w_i).$$

Firm i's best response is given by

$$q_i^* = \frac{1}{2}\min\{w_i, w_j\}(1 - w_i) - \frac{1}{2}q_j.$$

Solving the system of best responses, we get

$$q_i = \frac{1}{3}\min\{w_i, w_j\}(1 + 2w_j - w_i), \tag{B2}$$

$$p = \frac{1}{3}(1 + w_i + w_j), \tag{B3}$$

$$\pi_i(w_i, w_j) = \frac{1}{9}\min\{w_i, w_j\}(1 + w_j - 2w_i)^2. \tag{B4}$$

We make a series of assumptions regarding key parameter values:

Assumption 3. The values of $\underline{w}$, $\overline{w}$, and $\bar{\theta}$ are such that

$$\underline{w}(1 + \overline{w} - 2\underline{w})^2 \geq \overline{w}(1 - \overline{w})^2 \geq \underline{w}(1 - \underline{w})^2, \tag{B5}$$

$$\overline{w}(1 - \overline{w})^2 + \bar{\theta}\,\overline{w} \geq \underline{w}(1 + \overline{w} - 2\underline{w})^2 + \bar{\theta}\,\underline{w}, \tag{B6}$$

$$\underline{w}(1 - \underline{w})^2 + \bar{\theta}\,\underline{w} \geq \underline{w}(1 + \underline{w} - 2\overline{w})^2 + \bar{\theta}\,\overline{w}. \tag{B7}$$

Considering the reduced-form profit function (B4), inequalities (B5) imply that a Friedman firm prefers to cut wages when its rival sets a high wage but is better off when both firms set a high wage. Considering the reduced-form profit function (B4) and the stakeholder value function (B1), inequalities (B6) and (B7) imply that, by contrast with Friedman firms, a socially responsible firm prefers to set a high wage if and only if its rival sets a high wage as well.

Such a profusion of conditions raises the questions of whether the set of values defined by Assumption 3 is nonempty. We answer this question in the affirmative. Proposition 2 establishes the result and also describes the equilibria of the model.

Proof of Proposition 2. As usual, we solve the game backwards, thus ensuring the Nash equilibria we select are subgame perfect. Consider first the case when $\theta_1 = \theta_2 = 0$, that is, both firms are (or remain) "Friedman" firms, that is, financial value maximizers. This case corresponds to simple Cournot competition (though with a different-than-normal demand curve). Suppose that $w_j = \underline{w}$. Then firm i's payoff function is strictly decreasing in w_i, thus $R_i(\underline{w}) = \underline{w}$, where R_i denotes firm i's best response. Suppose instead that $w_j = \overline{w}$. The first inequality in (B5) implies that $R_i(\overline{w}) = \underline{w}$. It follows that $w_i = \underline{w}$ is a dominant strategy, and so the subgame where $\theta_1 = \theta_2 = 0$ leads to $w_1 = w_2 = \underline{w}$.

Consider next the case when $\theta_1 = \theta_2 = \bar{\theta}$, that is, both firms are socially responsible firms that maximize the augmented "stakeholder" value function when choosing w. Inequalities (B6) imply that $R_i(w_j) = w_j$, that is, firm i's best response is to set the same wage level as firm j. We thus have two subgame equilibria.

Finally, suppose that $\theta_1 = 0$, whereas $\theta_2 = \bar{\theta}$. Firm 1's best response is the same as in the $\theta_1 = \theta_2 = 0$ subgame, that is, $w_1 = \underline{w}$ is a dominant strategy. In fact, θ_2 does not enter firm 1's value function, only w_2. Similarly, based on our analysis of the $\theta_1 = \theta_2 = 0$ subgame, we conclude that $R_2(w_1) = w_1$. It follows that the only equilibrium of the subgame is $w_1 = w_2 = \underline{w}$.

The three equilibria in the proposition can be derived from the discussion in the paragraphs.

The statement that firms prefer the equilibrium yielding the path $\theta_i = \bar{\theta}$ and $w_i = \overline{w}$ is equivalent to the second inequality in (B5). Finally, we prove the claim that the conditions in Assumption 3 imply a positive-measure subset of $\mathbb{R}^3$. The function $x(1 - x)^2$ has zeros as $x = 0$ and 1 and is strictly positive and strictly concave for $x \in (0, 1)$. It follows that there exist values $1 > x_1 > x_2 > 0$ such that Condition (B5) is satisfied as an equality, that is, $\overline{w}(1 - \overline{w})^2 = \underline{w}(1 - \underline{w})^2 = \bar{\pi}$. For these specific values of $\overline{w}$, $\underline{w}$, Condition (B5) is strictly satisfied, for

$$\underline{w}(1 + \bar{w} - 2\underline{w})^2 > \underline{w}(1 + \underline{w} - 2\underline{w})^2 = \bar{w}(1 - \bar{w})^2,$$

where the inequality follows from $\overline{w} > \underline{w}$ and the equality follows from our choice of $\overline{w}, \underline{w}$, such that $\overline{w}(1 - \overline{w})^2 = \underline{w}(1 - \underline{w})^2$. Next we rewrite (B6) as

$$\bar{\theta}(\bar{w} - \underline{w}) \geq \underline{w}(1 + \bar{w} - 2\underline{w})^2 - \bar{w}(1 - \bar{w})^2.$$

Notice that the right-hand side is strictly positive:

$$\underline{w}(1 + \bar{w} - 2\underline{w})^2 - \bar{w}(1 - \bar{w})^2 > \underline{w}(1 + \underline{w} - 2\underline{w})^2 - \bar{w}(1 - \bar{w})^2 = 0,$$

where the inequality follows from $\overline{w} > \underline{w}$ and the equality follows from our choice of $\overline{w}, \underline{w}$, such that $\overline{w}(1 - \overline{w})^2 = \underline{w}(1 - \underline{w})^2$. It follows that we can choose $\bar{\theta}$ such that (B6) holds as an equality, that is,

$$\bar{\theta}(\bar{w} - \underline{w}) = \underline{w}(1 + \bar{w} - 2\underline{w})^2 - \bar{w}(1 - \bar{w})^2. \tag{B8}$$

Condition (B7) can be rewritten as

$$\bar{\theta}(\underline{w} - \bar{w}) > \underline{w}(1 + \underline{w} - 2\bar{w})^2 - \underline{w}(1 - \underline{w})^2.$$

Substituting (B8) as well as $\overline{w}(1 - \overline{w})^2 = \underline{w}(1 - \underline{w})^2$, we get

$$\underline{w}(1+\bar{w}-2\underline{w})^2 > \underline{w}(1+\underline{w}-2\bar{w})^2,$$

which, considering that $\underline{w}, \overline{w} \in (0,1)$, is equivalent to $\overline{w} > \underline{w}$, which is true by construction.

To summarize, we chose values of $\underline{w}, \overline{w}, \bar{\theta}$ such that two of the conditions hold as equalities and two other ones hold strictly. By slightly increasing the value of $\bar{\theta}$, Condition (B6) holds as a strict inequality; and by slightly increasing the value of $\underline{w}$ (or decreasing $\overline{w}$, Condition (B5) holds an equality. The result follows. □

We next turn to consumer surplus and welfare in the labor conditions model.

Proposition 5. *In the wage-setting game, consumer surplus is higher in the CSR equilibrium. If firm profits are higher when wages are high, social welfare is also higher.*

Proof of Proposition 5. The proof consists of two parts. First, we show that social welfare increases as w increases from $\underline{w}$ to $\overline{w}$ if and only if $\overline{w} + \underline{w} < 1$. Second, we show that, if profits increase, then it must be that $\overline{w} + \underline{w} < 1$.

In a symmetric equilibrium—that is, one where both firms choose the same wage rate—market demand, generally given by (5), becomes $Q = w(1-p)$, whereas marginal cost is given by w (for both firms). From (B2)–(B3), we conclude that equilibrium price, total output, and firm profit are given by

$$\begin{aligned}\hat{p} &= \tfrac{1}{3}(1+2w),\\ \hat{Q} &= \tfrac{2}{3}w(1-w),\\ \hat{\pi} &= \tfrac{1}{9}w(1-w)^2.\end{aligned}$$

Social welfare is the sum of the consumer surplus, firms' profits, and the excess wage bill relative to the competitive wage

$$\begin{aligned}S &= \frac{1}{2}(1-\hat{p})\hat{Q} + (\hat{p}-w)\hat{Q} + (w-\underline{w})\hat{Q}\\ &= \hat{Q}\left(\frac{1}{2}(1+\hat{p}) - \underline{w}\right).\end{aligned}$$

The change in consumer surplus is

$$\Delta CS \equiv CS|_{w=\overline{w}} - CS|_{w=\underline{w}} = \frac{2}{9}(1-\overline{w})^2\overline{w} - \frac{2}{9}(1-\underline{w})^2\underline{w},$$

which is nonnegative under the first of the assumptions in Assumption 3.

Substituting $\overline{w}$ and $\underline{w}$ for w in $\hat{p}$ and $\hat{Q}$ and simplifying we get

$$\Delta S \equiv S|_{w=\bar{w}} - S|_{w=\underline{w}} = \frac{4}{9}(\bar{w}-\underline{w})(1-\bar{w}-\underline{w})(1-\underline{w}).$$

Since $\overline{w} > \underline{w}$ and $\underline{w} \in (0,1)$, $\Delta S > 0$ if and only if $\overline{w} + \underline{w} < 1$. This concludes the first part of the proof.

The function $\hat{\pi}$ is quasiconcave in $[0,1]$, as illustrated by Figure B1. It follows that, for a given $\underline{w}$, Condition (B5), $\overline{w}(1-\overline{w})^2 \geq \underline{w}(1-\underline{w})^2$, implies that $\overline{w} \in (\underline{w}, w^*)$. In other words, for a given $\underline{w}$, the value of $\overline{w}$ must be greater than $\underline{w}$ and lower than an upper bound w^* such that $w^* > \overline{w}$ and $\hat{\pi}$ is declining at w^*.

We next show that $w^* < 1 - \underline{w}$. Consider the function

$$f(x) = \frac{x(1-x)^2}{\underline{w}(1-\underline{w})^2}.$$

By construction, $f(w^*) = 1$. Moreover,

$$f(1-\underline{w}) = \frac{(1-\underline{w})\underline{w}^2}{\underline{w}(1-\underline{w})^2} = \frac{\underline{w}}{1-\underline{w}} < 1.$$

Since $f(\cdot)$ is decreasing in the relevant range, this implies that $w^* < 1 - \underline{w}$. This concludes the second part of the proof. □

B.2 | Supply-Chain Model

The firm's stakeholder value function is

$$v_i(x_i, x_j; \theta_i) = \pi_i(x_i, x_j) + \theta_i x_i. \tag{B9}$$

As before, $\theta_i \in \{0, \bar{\theta}\}$ measures the firm i's weight on outcomes that go beyond straightforward value maximization (i.e., firm i's concern for the "common good"). In the present context, θ_i measures how much firm i values a well-functioning supply chain (beyond what is valued by a financial optimizer). We next describe the profit functions of both firms. Given that firm j makes an x_j investment in resilience, firm i's profit is given by

$$\pi_i(x_i, x_j) = \left(1 - \alpha + \frac{1}{2}\alpha(1-\phi)(x_i + x_j) + \alpha\phi x_i x_j\right)p - \frac{1}{2}x_i^2. \tag{B10}$$

The expression in large brackets corresponds to the probability that production will take place, an outcome that requires both sectors of the supply chain to operate. If there is no disruption to the process—which happens with probability $1-\alpha$—then it is business as usual and resilience investments have no effect. If an idiosyncratic shock hits the sector where firm i operates—which happens with probability $\alpha(1-\phi)/2$—then firm i may still operate with conditional probability x_i. If instead an idiosyncratic

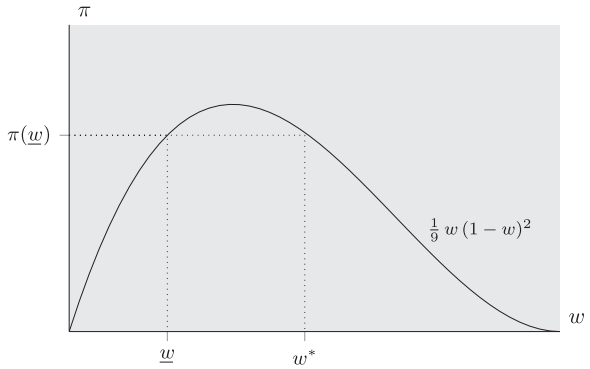

FIGURE B1 | Relation between $\overline{w}$ and $\underline{w}$.

shock hits the sector where firm j operates—which happens with probability $\alpha(1-\phi)/2$—then firm j may still operate with conditional probability x_j. Following an aggregate shock—which occurs with probability $\alpha\phi$—firms i and j are in operation with conditional probability $x_i x_j$, since both firms must remain active. The value obtained from operation is $p > 0$. The underlying assumption is that a proper operation of the supply chain is beneficial to stakeholders (consumers, workers, and so on) beyond shareholder value.

We make the following assumption:

Assumption 4. $\alpha\phi p < 1$.

This assumption guarantees an interior solution for the optimization problem by Friedman firms. We can now prove proposition 3 in the paper.

Proof of Proposition 3. To focus on subgame-perfect equilibria, we solve the game backwards, beginning with the x stage. Consider first the subgame when $\theta_1 = \theta_2 = 0$. Firm i's best response (optimal resilience choice x_i given that the firm j chooses x_j) is given by

$$R_i(x_j; 0) = \alpha\left(\frac{1}{2}(1-\phi) + \phi x_j\right)p,$$

where $R_i(x_j; 0)$ denotes the x_i best-response mapping of a firm with $\theta_i = 0$. It follows that the (symmetric) equilibrium of the resilience-investment subgame is given by

$$x^{00} = \frac{1}{2}\frac{\alpha(1-\phi)p}{1-\alpha\phi p},$$

where the 00 superscript denotes that neither firm engages in CSR (i.e., neither firm has CSR in their mission statement). Consider next the subgame when $\theta_1 = \theta_2 = \bar{\theta}$. Firm i's best-response mapping is now

$$R_i(x_j; \bar{\theta}) = \left(\frac{1}{2}\alpha(1-\phi) + \alpha\phi x_j\right)p + \bar{\theta}, \tag{B11}$$

where $R_i(x_j; \bar{\theta})$ denotes the x_i best-response mapping of a firm with $\theta_i = \bar{\theta}$. The resulting equilibrium of the resilience-investment subgame is given by

$$x^{11} = \frac{\frac{1}{2}\alpha(1-\phi)p + \bar{\theta}}{1-\alpha\phi p},$$

where the 11 superscript denotes that both firms engage in CSR (i.e., both firms have CSR in their mission statement). Finally, consider the case when (without loss of generality) $\theta_1 = \bar{\theta}$ and $\theta_2 = 0$. The best-response functions are now given by

$$R(x_2; \bar{\theta}) = \left(\tfrac{1}{2}\alpha(1-\phi) + \alpha\phi x_2\right)p + \bar{\theta},$$
$$R(x_1; 0) = \left(\tfrac{1}{2}\alpha(1-\phi) + \alpha\phi x_1\right)p.$$

This results in equilibrium values

$$x^{10} = \frac{(1+\mu)\alpha(1-\phi)p + 2\bar{\theta}}{2(1-\mu^2)},$$
$$x^{01} = \frac{(1+\mu)\alpha(1-\phi)p + 2\mu\bar{\theta}}{2(1-\mu^2)},$$

where we define

$$\mu \equiv \alpha\phi p$$

to simplify notation. Finally, the above equilibrium values lead to equilibrium profit values

$$\pi^{00} \equiv \pi(x^{00}, x^{00}),$$
$$\pi^{11} \equiv \pi(x^{11}, x^{11}),$$
$$\pi^{10} \equiv \pi(x^{10}, x^{01}),$$
$$\pi^{01} \equiv \pi(x^{01}, x^{10}).$$

We now consider the first stage of the game, the stage when firms choose their mission statement θ_i. Setting a high value of θ is a dominant strategy if and only if $\pi^{11} > \pi^{01}$ and $\pi^{10} > \pi^{00}$. Trivially,

$$\lim_{\theta\to 0}\pi^{11} = \lim_{\theta\to 0}\pi^{01} = \lim_{\theta\to 0}\pi^{00} = \lim_{\theta\to 0}\pi^{10}.$$

Computation establishes that

$$\left.\frac{\partial(\pi^{11}-\pi^{01})}{\partial\theta}\right|_{\theta=0} = \frac{\mu\alpha(1-\phi)p}{2(1-\mu)^2(1+\mu)} > 0,$$
$$\left.\frac{\partial(\pi^{10}-\pi^{00})}{\partial\theta}\right|_{\theta=0} = \frac{\mu\alpha(1-\phi)p}{2(1-\mu)^2(1+\mu)} > 0,$$
$$\left.\frac{\partial(\pi^{11}-\pi^{00})}{\partial\theta}\right|_{\theta=0} = \frac{\alpha(1-\phi)p}{2(1-\mu)^2} > 0.$$

Finally, the result then follows from Taylor's theorem. □