(Ir)responsible Takeovers

August 30, 2025

Abstract

We analyze takeover efficiency when socially conscious acquirers and target shareholders respond to externalities. Despite the Grossman-Hart "holdout" problem and free-riding in externality production, takeovers are socially efficient when target shareholders are consequentialist and acquirers are purely profit-driven. More generally, we identify a balanced-preferences condition under which externalities are fully internalized. Both increases and decreases in the strength of externality-preferences disrupt this balance and lead to inefficiency. We apply our framework to pre-takeover trading dynamics, exchange offers, leveraged buyouts, minority shareholder protections, and the strategic use of social responsibility as both a takeover defense and a bidding tactic.

Keywords: Takeovers, Mergers and Acquisitions, ESG, Externalities, Corporate Social Responsibility, Responsible Investment, Corporate Governance
JEL classifications: D62, D74, G34, K22, M14

1 Introduction

Responsible investment aims to balance financial returns with the broader environmental and social (ES) impact of capital allocations. Its effectiveness in shaping corporate policies is a topic of ongoing research and debate,[1] which raises the question of where it is most likely to have meaningful impact. One particularly important setting is the market for corporate control—through mergers, acquisitions, and leveraged buyouts (LBOs). These high-stakes transactions typically require shareholder approval and fundamentally reshape firm operations while generating significant externalities that affect a wide range of stakeholders, including employees, consumers, and the environment.[2] Although a growing body of empirical research and industry surveys suggests that ES considerations are an increasingly important factor in deal-making,[3] a theoretical framework to understand these dynamics has yet to be developed.

In this paper, we take a first step toward analyzing how socially conscious acquirers and targets respond to the externalities generated by takeovers, and whether such considerations enhance or undermine market efficiency. Specifically, we introduce externalities and social preferences into the canonical takeover model of Bagnoli and Lipman (1988). Their model extends Grossman and Hart's (1980) analysis by considering a tender offer with a finite number of target shareholders, thereby incorporating strategic interaction and pivotal decision-making.

[1]Several studies find limited impact: Teoh, Welch, and Wazzan (1999) show minimal valuation effects from the South Africa exclusion campaign; Berk and van Binsbergen (2025) argue ES exclusions barely affect capital costs; Gibson et al. (2022) find U.S. institutional investors following responsible investment principles don't improve portfolio ESG scores; and Heath et al. (2023) show ES funds target but don't enhance strong performers. Conversely, other research demonstrates significant effects: Zerbib (2022) reports substantial return premiums from exclusion; Green and Vallee (2025) find bank divestment reduces coal firms' debt and assets; Hartzmark and Shue (2023) show higher financing costs drive negative impact changes in brown firms; and Gantchev, Giannetti, and Li (2022) demonstrate that exit threats following negative ES incidents motivate performance improvements. Additionally, shareholder activism and engagement effectively influence ES policies (Dimson, Karakas, and Li, 2015; Hoepner et al., 2024; Naaraayanan, Sachdeva, and Sharma, 2021; Akey and Appel, 2020; Chen, Dong, and Lin, 2020).

[2]Takeover-related externalities include employment effects such as layoffs (Dessaint, Golubov and Volpin 2017) or improved workplace safety (Cohn, Nestoriak, and Wardlaw 2021); market impacts including increased concentration and reduced consumer welfare (Eckbo 1983; Borenstein 1990) or innovation changes—both positive (Phillips and Zhdanov 2013) and negative (Cunningham, Ederer, and Ma 2021); environmental consequences such as pollution (Bellon, forthcoming); and broader societal effects on free speech (e.g., Musk's Twitter buyout), journalism (Ewens, Gupta, and Howell 2022), education (Eaton, Howell, and Yannelis 2019), and healthcare (Gupta et al. 2024; Liu 2022). For recent literature reviews of empirical evidence on takeover externalities, see Golubov (2025) and Sorensen and Yasuda (2023).

[3]For recent empirical evidence see Duchin, Gao, and Xu (2025); Li, Peng, and Yu (2023); Berg, Ma, and Streitz (2023). For recent surveys see Deloitte 2024 M&A ESG Survey and PwC Responsible Investment Survey.

Importantly, in our model, a takeover affects not only the firm's value but also the externalities it generates—positive or negative. As a result, a takeover may be privately efficient by increasing firm value, yet socially inefficient due to negative externalities; or vice versa. Our framework is sufficiently flexible to accommodate both consequentialist social preferences and "warm-glow" motivations.

Social preferences over externalities introduce new trade-offs: by accepting a large premium, shareholders sell their cash-flow claims but, in doing so, may facilitate a takeover that generates negative externalities—externalities to which they remain exposed. Similarly, when designing an offer, the bidder considers not only the expected financial returns but also the broader social impact of the takeover.

Despite these additional considerations, the equilibrium characterization remains surprisingly clean: it depends on the total surplus generated by the takeover and the *balance* of social preferences between the bidder and target-shareholders. This sharp characterization delivers novel insights on a wide range of issues, including the trade-offs between socially responsible investing and strict adherence to profit-maximization (Friedman doctrine), the impact of pre-takeover trading with financial investors such as arbitrageurs, the role of payment methods and leverage in acquisitions, legal protections for minority shareholders, and the strategic use of externality choices as takeover defenses or bidding tactics. Our analysis also offers novel predictions about takeover outcomes when investor decisions are shaped by concerns over externalities.

Our first result establishes that when the social preferences of target shareholders and the bidder are *balanced*—meaning the externalities that shareholders ignore upon divestment are fully internalized by the bidder upon acquisition—the market for corporate control is efficient in the sense that, regardless of how dispersed shareholders are, socially inefficient takeovers are always blocked, and socially efficient takeovers succeed with the same probability as a privately efficient takeover would in the absence of social preferences or takeover externalities.

To build intuition, consider a takeover that is privately efficient but socially inefficient due to negative externalities. One might expect such a takeover to succeed due to free-riding: even a socially responsible shareholder may feel too small to prevent external harm and therefore choose to accept a relatively large premium. However, the classic "holdout" problem identified by Grossman and Hart creates opposing incentives—individual shareholders may prefer to retain their shares and become minority owners in the post-takeover firm and thereby capture the full cash flow improvement. When social preferences are exactly balanced, this holdout incentive offsets the public goods free-rider problem, safeguarding against socially harmful takeovers. The intuition for the success of socially beneficial but privately inefficient takeovers follows a symmetric logic.[4] Overall, when social preferences are balanced, the market for corporate control achieves efficiency.

The efficiency result described above breaks down when social preferences are imbalanced. Specifically, if takeover externalities are negative then some socially inefficient takeovers succeed in equilibrium. Conversely, if externalities are positive then socially efficient takeovers may fail with high probability. Social preferences are imbalanced when, for example, target shareholders have warm-glow preferences while the bidder is profit-maximizing. Warm-glow shareholders prefer to hold in their portfolios firms that generate positive externalities and avoid those that cause harm, affecting their willingness to tender their shares. When a takeover creates negative externalities, the bidder can effectively "threaten" shareholders with these harms—becoming a minority shareholder in a post-takeover firm is particularly undesirable. As a result, shareholders may tender their shares for a lower premium, allowing the bidder to earn positive profits and complete a socially inefficient takeover. In contrast, when a takeover generates positive externalities, shareholders may resist tendering—because remaining a minority shareholder is especially attractive. This forces the bidder to offer a higher premium, eroding their profits and preventing a socially efficient takeover.

More broadly, and perhaps surprisingly, greater social responsibility on the part of shareholders or the bidder can lead to inefficient outcomes. The key intuition is that efficiency depends not only on the extent to which externalities are internalized, but also on the *balance* of social responsibility between target shareholders and the bidder. Our analysis therefore suggests that the social responsibility of the financial sector—including the mandates given to asset managers—should be aligned with that of the corporate sector to promote socially efficient outcomes.

A common argument is that the presence of hedge funds in financial markets can dilute, or even nullify, the impact of responsible investment. To examine this in the context of takeovers,

[4] In this case, the force that offsets the public goods free-rider problem—which might lead a shareholder to reject a modest premium despite positive expected externalities from the takeover—is the "pressure to tender" identified by Bebchuk (1987).

we consider a scenario in which target shareholders may sell their shares to purely financial investors before the takeover occurs. Interestingly, such trades arise in equilibrium, and when social preferences are imbalanced, they can actually enhance social efficiency in the market for corporate control. The intuition is as follows: financial investors, who disregard externalities, are less vulnerable to the threats posed by negative externalities. As a result, they may be more willing to block socially inefficient takeovers that rely on such threats to pressure socially responsible shareholders. At the same time, they are also more likely to support takeovers with positive externalities, as they do not require the excessively high premiums that socially responsible investors might demand. In this way, non-social capital can help correct inefficiencies caused by imbalanced social preferences.

Publicly traded companies sometimes use equity rather than cash as payment in acquisitions. Our model reveals a novel role for payment methods when externalities are present. We show that while the payment method is irrelevant under balanced social preferences, it becomes important when preferences are imbalanced. Intuitively, if externalities are negative (positive), shareholders with pure warm-glow preferences dislike (like) holding the target shares and are more (less) willing to accept cash offers, which benefits (harms) the bidder. Equity offers mitigate these effects by preserving shareholders' exposure to externalities through continued ownership in the bidding firm. As a result, bidders prefer cash (equity) offers when the target's externalities are negative (positive). This logic extends to bidder's existing operations: cash (equity) offers are optimal if the bidder's own externalities are negative (positive). Our analysis further demonstrates that payment methods can be used to infer bidders' social preferences: when bidders generate negative externalities (such as established fossil fuel companies), cash offers signal profit motives, while equity offers indicate that reducing environmental impact is the primary acquisition motive. We also note that our extension of Bagnoli and Lipman (1988)'s framework to equity offers is new to the literature, even in the case without externalities.[5]

In practice, bidders often finance acquisitions with debt secured by the target's assets—a common strategy employed by private equity firms in LBOs. Mueller and Panunzi (2004) show that, absent takeover externalities, leverage improves takeover efficiency by mitigating the holdout problem through the dilution of minority shareholders. Building on this insight, we

[5] For existing studies on the method of payments in takeovers, see, for example, Hansen (1987); Fishman (1989); Eckbo, Giammarino, and Heinkel (1990); and Rhodes-Kropf and Viswanathan (2004).

show that when takeovers generate positive externalities, leverage similarly promotes socially efficient outcomes—even when those takeovers are privately inefficient (i.e., reduce firm value). Thus, our analysis provides a normative justification for relaxing legal protections of minority shareholders when bidders create positive externalities, allowing them to employ higher leverage ratios. Conversely, when takeovers generate negative externalities, leverage can *exacerbate* inefficiencies by facilitating socially inefficient takeovers and potentially deterring efficient ones. In such cases, our findings support the use of targeted leverage caps as a means to strengthen minority shareholder protections and hence market efficiency.

An efficient market for corporate control requires that socially efficient takeovers succeed—even when they are privately inefficient. When social preferences are balanced, such efficiency can arise because some shareholders are willing to tender their shares at a discount, anticipating positive externalities from the takeover. However, legal protections that allow minority shareholders to sue the bidder for post-takeover declines in firm value—if such declines occur—undermine this mechanism. We show that in the presence of takeover externalities, these protections may backfire and reduce social efficiency. Intuitively, the prospect of post-takeover litigation discourages socially responsible shareholders from tendering, even when the takeover would yield a socially beneficial outcome.

Finally, post-takeover externalities are influenced by the bidder's production plans, while pre-takeover externalities are shaped by the incumbent's operational choices. In both cases, there is a trade-off between minimizing negative externalities and maximizing firm value. We endogenize these takeover-related externalities and show that when social preferences are balanced, both the bidder and the incumbent choose socially efficient production plans. In contrast, when preferences are imbalanced, they may adopt socially inefficient strategies. Our analysis thus identifies the conditions under which corporate social (ir)responsibility can be strategically employed—either as an effective bidding tool to enhance acquisition prospects or as a defensive mechanism to deter unwanted takeover attempts.

Overall, our analysis demonstrates that externalities in takeovers and social responsibility have significant positive and normative implications for the market for corporate control.

Related Literature

Our paper is related to two main strands of literature. First, we contribute to the theoretical literature on takeovers. In addition to Bagnoli and Lipman (1988), variants of tender offer models with a finite number of shareholders are studied by Holmstrom and Nalebuff (1992), Gromb (1993), Cornelli and Li (2002), Marquez and Yilmaz (2008), Dalkır and Dalkır (2014), Dalkır (2015), Ekmekci and Kos (2016), Dalkır, Dalkır, and Levit (2019), and Voss and Kulms (2022). Unlike these studies, we examine the effects of takeover externalities and social preferences on the takeover dynamics.[6] Related work examines models with a finite numbers of socially responsible agents in non-takeover contexts. Kaufmann, Andre, and Kőszegi (2024) analyze consumer behavior in competitive product markets, while Lee and Wang (2025) study socially responsible depositors during bank runs. Meirowitz, Pi, and Ringgenberg (2023) study voting over corporate policies when investors balance firm profits against social impact.

Second, we contribute to the theoretical literature on the effects of responsible investment on corporate policies. A growing number of papers studies the effects of portfolio allocations and divestment strategies on corporate policies: Heinkel, Kraus, and Zechner (2001), Davies and Van Wesep (2018), Oehmke and Opp (2025), Edmans, Levit, and Schneemeier (2022), Landier and Lovo (2025), Green and Roth (2025), and Chowdhry, Davies, and Waters (2019), Huang and Kopytov (2022), Gupta, Kopytov and Starmans (forthcoming), Piccolo, Schneemeier, and Bisceglia (2022), Pastor, Stambaugh, and Taylor (2021), Pedersen, Fitzgibbons, and Pomorski (2021), Baker, Hollifield, and Osambela (2022), and Goldstein et al. (2022). Broccado, Hart, and Zingales (2022) and Gollier and Pouget (2022) also study engagement and voting as alternative mechanisms to affect firm's externalities. Relative to this burgeoning literature, we study responsible investment in the context of takeovers. The decision of shareholders to tender can be viewed as combination of exit (selling the firm to the bidder) and voice (influencing who controls the target). Moreover, while the existing literature focuses on the classic free-rider problems in public goods, we highlight its interaction with another well-known free-rider problem, namely, the holdout problem of Grossman and Hart (1980).

[6] A larger body of literature followed Grossman and Hart (1980) and studied various implications and variants of the holdout problem in takeovers when shareholders are infinitesimal: Yarrow (1985), Shleifer and Vishny (1986), Hirshleifer and Titman (1990), Kyle and Vila (1991), Burkart, Gromb, and Panunzi (1998, 2000), Mueller and Panunzi (2004), Marquez and Yilmaz (2012), Gomes (2012), At, Burkart and Lee (2011), Levit (2017), Burkart and Lee (2015, 2022), Burkart, Lee and Petri (2023), and Burkart, Lee and Voss (2024).

2 Model

There are $N \geq 2$ shareholders, indexed by i, each of whom owns a single share in a target firm. Each share carries one vote. A bidder is interested in acquiring the firm and changing its operations. The value of the firm is V_0 under its incumbent management, and will change to V_1 if acquired by the bidder. The firm also produces externalities. The externality is Φ_0 under the incumbent, and will change to Φ_1 if the firm is acquired by the bidder. For use throughout, we define the per-share firm analogues of these quantities: $v_0 \equiv \frac{V_0}{N}, v_1 \equiv \frac{V_1}{N}, \phi_0 \equiv \frac{\Phi_0}{N}$, and $\phi_1 \equiv \frac{\Phi_1}{N}$.

The bidder makes a cash tender offer p per share. The takeover is successful—and the bidder gains control of the firm—if at least K shares are tendered, where $K < N$. Define $\kappa = \frac{K}{N} \in (0, 1)$; that is, κ is the majority rule. The bidder's offer is conditional on success; if fewer than K shares are tendered, the bidder doesn't acquire any shares and the takeover fails. If K or more shares are tendered, the bidder buys all tendered shares, the takeover succeeds, and any shareholders who did not tender retain their shares and become minority holders. Conditional offers of this kind are the most common form of tender offer in practice.[7]

Given the offer p, all shareholders simultaneously decide whether to tender or retain their shares. Let $\gamma_i \in [0, 1]$ denote the endogenously-selected probability that shareholder i tenders.

As discussed in the introduction, our goal is to study the consequences of shareholders taking seriously the externalities generated by a firm. Accordingly, we assume that a shareholder's utility from holding a share depends not only on its financial value but also on the associated externalities, weighted by a parameter $\alpha \in [0, 1]$ that captures the extent to which investors internalize these externalities. Specifically, a shareholder's utility from holding a share is $v_0 + \alpha\phi_0$ if the incumbent retains control, and $v_1 + \alpha\phi_1$ if the bidder acquires the firm.

From the perspective of an individual shareholder, a takeover creates surplus

$$s \equiv v_1 + \alpha\phi_1 - v_0 - \alpha\phi_0. \tag{1}$$

Throughout, we label takeovers with $s > 0$ as *socially efficient* and those with $s < 0$ as *socially inefficient*.[8] Similarly, we label takeovers with $v_1 > v_0$ as *privately efficient* and those

[7]Online Appendix C analyzes freeze-out mergers. Online Appendix E compares conditional and unconditional offers, and identifies a large subset of the parameter space under which a bidder prefers conditional offers. The Online Appendix is available here.

[8]In adopting this labeling, we are implicitly assuming that α is sufficiently close to 1 that the sign of s

with $v_1 < v_0$ as *privately inefficient*. We assume $s \neq 0$ in order to avoid this economically insignificant boundary case. Analogous to other notation, define $S = Ns$.

Shareholders may care more about the externalities generated by firms they still own than by those they have divested from. We capture this with the parameter $\eta \in [0, \alpha]$. Specifically: if a takeover succeeds then each tendering shareholder receives utility $p + \eta\phi_1$. That is, if $\eta < \alpha$ then shareholders have what are commonly referred to as *warm-glow* preferences. In contrast, if $\eta = \alpha$ then shareholders' internalization of externalities is unrelated to share ownership, consistent with fully consequentialist preferences.[9]

The bidder (or its shareholders) internalizes both the financial impact of the takeover on the firm's value and any associated externalities. Formally, the bidder's payoff per share acquired in a successful takeover is given by $v_1 - p + \delta\phi_1$, where $\delta \geq 0$ represents the degree of the bidder's social responsibility.[10] Note that the model of Bagnoli and Lipman (1988) is a special case in which $\alpha = \eta = \delta = 0$, or alternatively $\Phi_0 = \Phi_1 = 0$.

Before proceeding, we highlight the two key respects in which a firm's externalities (Φ_0, Φ_1) conceptually differ from its cash flows (V_0, V_1). First, tendering shareholders do not care about post-takeover cash flows V_1, but (provided $\eta > 0$) they do care about post-takeover externalities Φ_1. Second, the bidder's weights on cash flows V_1 and externalities Φ_1 generally differ from target shareholders' weights.

3 Analysis

We focus on symmetric Nash equilibria, as standard in the literature, and denote the equilibrium offer and tendering strategy by (p^*, γ^*).

coincides with the sign of the overall surplus associated with the takeover, $V_1 + \Phi_1 - V_0 - \Phi_0$. We regard this as the right starting point for our analysis, since it corresponds to assuming that if shareholders could perfectly coordinate then they would reach the socially optimal decision. Our analysis characterizes the distortions from this benchmark that are created by decentralized decision-making and by preference shifts associated with transferring share ownership.

[9]If $\eta > \alpha$, shareholders internalize externalities more when selling than when retaining ownership—potentially reflecting a sense of responsibility for outcomes they have actively contributed to. Our framework accommodates such cases, though we do not explore them in detail.

[10]The bidder's social preferences resemble warm-glow preferences, in the sense that the bidder only internalizes externalities if the takeover succeeds and only in proportion to the shares acquired. See Online Appendix D for an alternative formulation in which the bidder exhibits consequentialist preferences.

3.1 Preliminaries

We introduce notation that we use throughout. Consider the decision of an individual shareholder i, taking as given that each of the other $N-1$ shareholders tenders with probability $\gamma \in [0,1]$. If shareholder i retains his/her share then the probability of a successful takeover is

$$q(\gamma) \equiv \sum_{j=K}^{N-1} \binom{N-1}{j} \gamma^j (1-\gamma)^{N-1-j}. \tag{2}$$

Similarly, the probability that shareholder i's tendering decision is pivotal is

$$\Delta(\gamma) \equiv \binom{N-1}{K-1} \gamma^{K-1} (1-\gamma)^{N-K}. \tag{3}$$

Hence $q+\Delta$ is the probability of a successful takeover if shareholder i tenders; and if all shareholders tender with probability γ then the takeover succeeds with probability

$$\Lambda(\gamma) \equiv (1-\gamma)\, q + \gamma\,(q+\Delta) = q + \gamma\Delta, \tag{4}$$

To enhance readability we generally suppress the argument γ in the functions q, Δ, and Λ.

3.2 Benchmark: No externalities, $\phi_0 = \phi_1 = 0$

As a benchmark, consider the case in which the target firm doesn't generate any externalities under either the incumbent or bidder. In this case, the social preferences of both the bidder and the shareholders are irrelevant.

Proposition 1 *Suppose $\phi_0 = \phi_1 = 0$. There is a unique equilibrium. The tendering probability is $\gamma^* = 0$ if $v_1 < v_0$ and is $\gamma^* = \kappa$ if $v_1 > v_0$.*

This benchmark case is covered by Bagnoli and Lipman (1988). Privately inefficient takeovers always fail, while privately efficient takeovers succeed with a probability strictly between 0 and 1—and converging to $1/2$ as the number of shareholders $N \to \infty$. Bagnoli and Lipman also establish that as the target's ownership becomes increasingly dispersed the bidder's profits converge to zero, reflecting the holdout problem in takeovers. In what follows, we examine how social preferences over externalities change these conclusions.

3.3 Tendering decisions

We start by analyzing the tendering subgame given an offer price p. We again consider the utility of an individual shareholder i as a function of that shareholder's tendering decision, taking as given that all $N-1$ other shareholders tender with probability γ. If shareholder i retains, the takeover succeeds with probability q, and shareholder i's expected utility is

$$v_0 + \alpha\phi_0 + q\left(v_1 + \alpha\phi_1 - v_0 - \alpha\phi_0\right), \tag{5}$$

reflecting that if the takeover succeeds then the shareholder benefits from the full post-takeover value of the firm as a minority shareholder, along with the externalities generated by the takeover. If instead shareholder i tenders, the takeover succeeds with probability $q+\Delta$, and shareholder i's expected utility is

$$v_0 + \alpha\phi_0 + \left(q+\Delta\right)\left(p + \eta\phi_1 - v_0 - \alpha\phi_0\right). \tag{6}$$

This expression reflects both the fact that the offer is conditional and so shareholder i receives p only with probability $q+\Delta$; and also that because tendering involves divestment, the weight placed on externalities drops from α to $\eta \leq \alpha$.

Consequently, shareholder i's net gain from tendering is

$$\tau\left(\gamma; p\right) \equiv \Delta s - \left(q+\Delta\right)\left(v_1 + \left(\alpha-\eta\right)\phi_1 - p\right). \tag{7}$$

Equation (7) is simple but marks an important first step in our analysis: the act of tendering is isomorphic to making a public-good contribution. By tendering, a shareholder effectively contributes Δs to overall surplus. The cost of this contribution corresponds to the foregone private value identified by Grossman and Hart, namely $v_1 - p$, adjusted for $\left(\alpha-\eta\right)\phi_1$, the change in the shareholder's concern for externalities resulting from divesting the share.

In particular, if post-takeover externalities are negative ($\phi_1 < 0$) then shareholders with warm-glow preferences ($\eta < \alpha$) are more inclined to tender than otherwise, because doing so relieves them of responsibility for negative externalities. Conversely, if post-takeover externalities are positive ($\phi_1 > 0$), warm-glow shareholders find retention more attractive than otherwise, since tendering prevents them from fully enjoying the takeover's social benefit.

Expression (7) highlights that a shareholder's total utility from a successful takeover, $v_1 + \alpha\phi_1$, *isn't* a sufficient statistic for the gain to tendering τ. The economic reason is that, provided that $\eta > 0$, tendering shareholders care about the externalities ϕ_1 generated by the takeover, but they don't care about the cash flows v_1.

Equilibrium of tendering subgame

In the tendering subgame, $\gamma^* = 0$ is an equilibrium if $\tau(0; p) \leq 0$; $\gamma^* = 1$ is an equilibrium if $\tau(1; p) \geq 0$; and $\gamma^* \in (0, 1)$ is an equilibrium if

$$\tau(\gamma^*; p) = 0. \tag{8}$$

The tendering subgame potentially has multiple equilibria. For example, if $K > 1$ then everyone-retains ($\gamma^* = 0$) is an equilibrium, regardless of the offer p. We impose the following standard stability criterion, which reduces (but doesn't eliminate) equilibrium multiplicity. An equilibrium is stable if a small increase (decrease) in the tendering probability of $N - 1$ shareholders makes tendering less (more) attractive for the remaining shareholder. Graphically, an equilibrium is stable if $\tau(\cdot; p)$ crosses zero from above. Formally:

Stability condition: An equilibrium γ^* of the tendering subgame is stable if for all $\epsilon > 0$ sufficiently small: either $\gamma^* = 0$ or $\tau(\gamma^* - \epsilon; p) > 0$; and either $\gamma^* = 1$ or $\tau(\gamma^* + \epsilon; p) < 0$.

Hereafter, we refer to a stable equilibrium simply as an equilibrium.

Lemma 1 *An equilibrium γ^* of the tendering subgame exists. For socially inefficient takeovers ($s < 0$)*

$$\gamma^* = \begin{cases} 0 & \text{if } p \leq v_1 + (\alpha - \eta)\phi_1 \\ \{0, 1\} & \text{if } p \in (v_1 + (\alpha - \eta)\phi_1, v_1 + (\alpha - \eta)\phi_1 - s) \\ 1 & \text{if } p \geq v_1 + (\alpha - \eta)\phi_1 - s. \end{cases} \tag{9}$$

For socially efficient takeovers ($s > 0$), define

$$\mu(\gamma) \equiv v_1 + (\alpha - \eta)\phi_1 - \frac{\Delta}{q + \Delta}s; \tag{10}$$

then

$$\gamma^* = \begin{cases} 0 & \text{if } p \leq v_1 + (\alpha - \eta)\,\phi_1 - s \\ \mu^{-1}(p) \in (0,1) & \text{if } p \in (v_1 + (\alpha - \eta)\,\phi_1 - s, v_1 + (\alpha - \eta)\,\phi_1) \\ 1 & \text{if } p \geq v_1 + (\alpha - \eta)\,\phi_1. \end{cases} \tag{11}$$

As one would expect, the tendering probability γ^* is increasing in the offer p. In particular, all shareholders tender if the bidder offers p in excess of the post-takeover value of the firm v_1, adjusted by the shift-in-preferences term $(\alpha - \eta)\,\phi_1$.

If the takeover is socially efficient ($s > 0$) then a mixed-strategy equilibrium arises for moderate offers. In this case, shareholders are indifferent between tendering and retaining their shares, i.e., $\tau(\gamma^*; p) = 0$.

In contrast, if the takeover is socially inefficient ($s < 0$) then a mixed-strategy equilibrium doesn't exist. Instead everyone-retaining ($\gamma^* = 0$) and everyone-tendering ($\gamma^* = 1$) coexist as equilibria for moderate offers

$$p \in (v_1 + (\alpha - \eta)\,\phi_1, v_1 + (\alpha - \eta)\,\phi_1 - s)\,. \tag{12}$$

From (7), this case is the reverse of the well-known holdout problem. Specifically, the individual cost of tendering is the increased probability of an undesirable takeover with $s < 0$ occurring; while the individual benefit is that, conditional on takeover success, a shareholder gets p instead of the preference-shift-adjusted post-takeover value $v_1 + (\alpha - \eta)\,\phi_1$. Consequently, if an individual shareholder anticipates a low takeover probability then retention dominates tendering, while the reverse is true if a high takeover probability is anticipated. The everyone-tenders equilibrium is a manifestation of Bebchuk's (1987) "pressure to tender" effect. In our context, it arises precisely because of preferences over social externalities; absent externalities, the case arises only if the offer p exceeds post-takeover value v_1, but bidders never make such an offer.

Looking ahead (Theorem 1), the tendering subgame has multiple equilibria even once the bidder's offer is endogenized. This stands in sharp contrast to the case without externalities ($\phi_0 = \phi_1 = 0$, Proposition 1), in which case the multiplicity condition (12) never holds in equilibrium. Consequently, shareholders' social concerns about externalities lead to variation in takeover outcomes, even after fully controlling for bidder, target and deal characteristics.

3.4 Bidder's payoff

The bidder's expected payoff from making an offer to an individual shareholder—conditional on that shareholder tendering and all other shareholders following strategy γ—is

$$(q+\Delta)(v_1 - p + \delta\phi_1). \tag{13}$$

That is, in the probability $q+\Delta$ event that the takeover succeeds, the bidder makes a profit of $v_1 - p$ per share, along with additional warm-glow utility of $\delta\phi_1$. If instead the takeover fails the bidder's payoff is zero, because the offer is conditional. Given that each shareholder tenders independently with probability $\gamma \in (0,1)$, and there are N shareholders making independent decisions, the bidder's expected total payoff is simply $N\gamma$ times the expected payoff (13), i.e.,

$$N\gamma(q+\Delta)(v_1 - p + \delta\phi_1). \tag{14}$$

Naturally, the bidder's payoff depends on the spread between post-takeover cash flows v_1 and the offer p. From (7), this same spread affects a target shareholder's gain τ from tendering. Consequently, whenever the equilibrium condition (8) holds, the bidder's expected payoff is

$$N\gamma\Delta s + N\gamma(q+\Delta)(\eta+\delta-\alpha)\phi_1. \tag{15}$$

To understand (15) it is helpful to consider first the case of target shareholders with consequentialist preferences ($\eta = \alpha$) and a bidder motivated purely by profit ($\delta = 0$). In this case, (15) reduces to simply its first term $N\gamma\Delta s$. As we noted above, the post-takeover cash flows v_1 and externalities ϕ_1 have different "exclusion" characteristics: tendering shareholders are excluded from v_1, leading to the holdout problem, but aren't excluded from ϕ_1. The important implication of (7) is that, nonetheless, both components of a target shareholder's preferences can be mapped into a general public-good contribution setting, in which a target shareholder compares the benefit from a contribution to the public good, Δs, with the cost, $(q+\Delta)(v_1 - p)$. In particular, for any given tendering probability γ, the takeover surplus s directly determines the spread $v_1 - p$ that the bidder makes on each share acquired.

The second term in (15) can be understood by considering perturbations away from the benchmark just described. Bidder preferences over externalities ($\delta > 0$) change the bidder's payoff exactly as one would expect. Perhaps less immediate, warm-glow preferences for target shareholders ($\alpha > \eta$) force the bidder to increase its offer if post-takeover externalities ϕ_1 are positive, since shareholders have a direct incentive to retain their shares in this case.

The bidder's payoff is given by (15) only if tendering shareholders are indifferent between tendering and retention. More generally, the bidder's expected total payoff is

$$\Pi(\gamma; p) = \begin{cases} \gamma \Delta S + \gamma (q + \Delta)(\eta + \delta - \alpha) \Phi_1 & \text{if } \gamma \in [0, 1) \\ V_1 - p + \delta \Phi_1 & \text{if } \gamma = 1. \end{cases} \tag{16}$$

We let Π^* be the bidder's expected profit in equilibrium.

4 Equilibrium and takeover efficiency

The equilibrium of the overall game follows from (16)'s characterization of the bidder's payoff.

Theorem 1

Socially inefficient takeovers, $s < 0$: If $s \leq (\alpha - \eta - \delta) \phi_1$ then $\gamma^* = 0$ is an equilibrium. If $(\alpha - \eta - \delta) \phi_1 < 0$, then $\gamma^* = 1$ is an equilibrium. No other equilibrium exists.

Socially efficient takeovers, $s > 0$: There is a unique equilibrium:

(a) If $(\alpha - \eta - \delta) \phi_1 < 0$ then $\gamma^* > \kappa$, and $\Lambda^* \to 1$ as $N \to \infty$.

(b) If $(\alpha - \eta - \delta) \phi_1 = 0$ then $\gamma^* = \kappa$, and $\Lambda^* \to (0, 1)$ as $N \to \infty$.

(c) If $(\alpha - \eta - \delta) \phi_1 > 0$ then $\gamma^* < \kappa$, and $\Lambda^* \to 0$ as $N \to \infty$.

Theorem 1 has several interesting implications, which we present as a series of corollaries—each effectively a special case.

4.1 Balanced preferences: $\eta + \delta = \alpha$

We first consider the case in which shareholders' and the bidder's social preferences exactly balance out, $\eta + \delta = \alpha$. That is, any externalities that shareholders ignore upon divestment (because $\eta \leq \alpha$) are picked up by the bidder (since $\delta = \alpha - \eta$). This case serves as an important benchmark, and elucidates economic forces that shape outcomes more generally. A leading case in which balanced preferences arise is that of target shareholders with fully consequentialist preferences ($\eta = \alpha$) and a purely profit-motivated bidder ($\delta = 0$).

Corollary 1 *If $\eta + \delta = \alpha$ then socially inefficient takeovers always fail ($\gamma^* = \Lambda^* = 0$) while socially efficient takeovers frequently succeed ($\gamma^* = \kappa$ and $\Lambda^* \to 1/2$ as $N \to \infty$).*

For intuition, consider the leading case just noted of consequentialist shareholders and a profit motivated bidder ($\eta - \alpha = \delta = 0$). Corollary 1 first says that, no matter how dispersed shareholders are, a socially inefficient takeover is always blocked. To better understand this result, consider a takeover that is privately efficient ($v_1 > v_0$) but sufficiently socially costly ($\phi_1 < \phi_0$) that $s < 0$. One might initially expect successful bids in such cases, reasoning that shareholders face a free-rider problem: even socially responsible shareholders might reason that individually they have little power to prevent the negative externality and thus prefer to accept the a premium offer $p > v_0$. However, tendering a share is subject to the well-known holdout problem—itself a free-rider problem—in which an individual shareholder is tempted to keep their share, become a minority shareholder in the acquired firm, and benefit from the increase in private value $v_1 - v_0$ rather than accept the smaller bid premium $p - v_0$. Corollary 1 thus establishes that the holdout problem in takeovers safeguards against the free-rider problem in social externalities (public good provision).

Corollary 1 further says that socially efficient takeovers succeed with exactly the same probability as a privately efficient takeover would in the absence of social preferences over externalities. To better understand this result, consider the opposite scenario from that discussed above: a privately inefficient takeover ($v_1 < v_0$) that nonetheless generates sufficient social benefits ($\phi_1 > \phi_0$) so that overall surplus is positive ($s > 0$). Because the bidder is profit-motivated, certainly the offer p is below v_1, which is in turn below v_0. Consequently, one might initially expect that the takeover would fail, on the grounds that even socially responsible shareholders might individually reason that they have little ability to affect the takeover's success, and hence no reason to bear the individual cost of accepting an offer $p < v_0$ in order to contribute to the public good. But this reasoning is incorrect, and the takeover has significant probability of success. The reason lies in the flip side of the classic holdout problem—what Bebchuk (1987) describes as the "pressure to tender." Individual shareholders fear that if they do not tender and the takeover succeeds then they will be left holding a share in a less valuable company (valued at $v_1 < v_0$). This creates strong incentives to tender; in particular, it means that shareholders tender even when the offered premium is minimal or negative.

These arguments generalize to any case in which the warm-glow preferences of the bidder and shareholders are balanced in the sense $\eta + \delta = \alpha$. Corollary 1 can be summarized as saying that externalities are fully internalized; the market for corporate control operates as efficiently as it would have absent any externalities. Specifically, the market for corporate control facilitates socially efficient takeovers even if they are privately inefficient, and preventing socially inefficient takeovers even if they are privately efficient.[11]

A final point to note is that, precisely because social externalities are effectively internalized, the bidder's expected profit approaches zero as shareholder dispersion grows large:

$$\Pi^* \to 0 \text{ as } N \to \infty \tag{17}$$

This is immediate from (16); as N grows large, the probability Δ that an individual shareholder is pivotal converges to 0. Economically, the bidder's limited ability to profit from a takeover is a manifestation of the holdout problem. Our contribution is to show that this result extends to the case of social preferences over externalities.

[11] When $\eta+\delta = \alpha$, it turns out that there is an easy way to map the standard setting without social externalities to the case of social externalities. Consider two sets of parameters: $(\bar{v}_0, \bar{v}_1, \bar{\phi}_0, \bar{\phi}_1)$ and $(\tilde{v}_0, \tilde{v}_1, \tilde{\phi}_0, \tilde{\phi}_1)$ where $\bar{\phi}_0 = \bar{\phi}_1 = 0$, $\tilde{v}_0 + \alpha\tilde{\phi}_0 = \bar{v}_0$ and $\tilde{v}_1 + \alpha\tilde{\phi}_1 = \bar{v}_1$. That is: the "bar" parameters correspond to the standard case without social externalities, and the "tilde" parameters introduce social externalities while leaving the combination of pecuniary and social value unchanged. Consider an arbitrary offer by the bidder, $\bar{p}$, made under the bar parameters. From (10), an offer $\tilde{p} = \bar{p} - \eta\tilde{\phi}_1$ made under the the tilde parameters induces exactly the same tendering behavior as the offer $\bar{p}$ under the bar parameters. Moreover, the bidder's payoff is also exactly the same in the two cases: if the offer is rejected, its payoff is 0 in both cases, while if the offer is accepted, the offer $\tilde{p}$ entails paying $\eta\tilde{\phi}_1 = \alpha\tilde{\phi}_1 - \delta\tilde{\phi}_1$ less for a firm that generates $\alpha\tilde{\phi}_1$ less of pecuniary value but $\delta\tilde{\phi}_1$ more of warm-glow utility.

4.2 Weak warm-glow preferences, $\eta + \delta < \alpha$

In contrast to the generally positive outcomes that emerge when shareholder and bidder social preferences are balanced, equilibrium outcomes are much less desirable when preferences are imbalanced. We consider first the case in which shareholders' and the bidder's warm glow preferences are weak:

Corollary 2 *If $\eta + \delta < \alpha$, then as $N \to \infty$ takeovers with positive externalities $\phi_1 > 0$ fail, $\Lambda^* \to 0$; and takeovers with negative externalities $\phi_1 < 0$ potentially succeed: there is a sequence of equilibria in which $\Lambda^* \to 1$, and this sequence is unique if $s > 0$.*

Corollary 2 highlights the outsized role of post-takeover externalities ϕ_1 in determining the success of an takeover, along with the perverse consequences that follow. Some socially inefficient takeovers ($s < 0$) potentially succeed with high probability, while some socially efficient takeovers ($s > 0$) always fail as shareholder dispersion grows large. This is especially clear when the status quo is associated with zero social externalities ($\phi_0 = 0$). In this case, takeovers that are socially destructive ($\phi_1 < 0$) occur, while takeovers that are socially beneficial ($\phi_1 > 0$) are blocked, independent of either the private ($v_1 - v_0$) or social (s) value created. Indeed, Corollary 2 predicts that firms that produce negative externalities will be acquired even absent any change in either pecuniary value or in social externalities (i.e., $v_1 = v_0$ and $\phi_1 = \phi_0 < 0$).

To understand these observations, notice that the relative weakness of combined warm-glow preferences ($\delta + \eta < \alpha$) means that a takeover reduces the aggregate extent to which externalities are internalized. If $\phi_1 < 0$, then socially-minded shareholders dislike holding the share; and importantly, if $\eta < \alpha$, this dislike is alleviated by getting rid of the share. This effect gives shareholders a direct motive to tender, in turn allowing the bidder to reduce its bid. If the bidder's own aversion to negative externalities is small, that is, $\delta < \alpha - \eta$, then the discount the bidder can extract is enough to compensate for the exposure to the target's negative externalities, thereby facilitating the takeover even if it's socially inefficient.

Importantly, the direct motive to tender that arises from warm-glow preferences and negative post-takeover externalities operates regardless of whether or not an individual shareholder is pivotal. Hence, the bidder can extract a discount from shareholders even when shareholders are arbitrarily dispersed, i.e., $N \to \infty$. At the same time, the holdout and public-good free-rider problems prevent the bidder from benefiting significantly from any social value (s)

created. Consequently, the discount that the bidder obtains from warm-glow shareholders' direct motive to tender dominates when shareholders are sufficiently dispersed. In particular, the equilibrium payoff Π^* approaches $\max\{0, (\delta+\eta-\alpha)\,\Phi_1\}$ as $N \to \infty$. That is, if $\phi_1 < 0$ then the bidder's payoff is strictly positive even when the target's ownership is widely dispersed. Note that this result is not driven by the bidder's social preferences per se; even if the bidder is purely profit-maximizing ($\delta = 0$), its payoff remains strictly positive in the limit.

The case of positive post-takeover externalities ($\phi_1 > 0$) is directly analogous. In this case, warm-glow preferences induce a direct motive for shareholders to *retain* shares. To overcome this, a bidder would have to offer a large premium. But when shareholders are dispersed, the holdout and public-goods free-riding problems imply that the bidder derives little benefit from the value created by the takeover. If the bidder's own warm-glow utility from positive externalities is small, $\delta < \alpha - \eta$, the bidder lacks the incentive to offer the premium required to overcome warm-glow shareholders' desire to retain shares, thereby preventing the takeover.

4.3 Strong warm-glow preferences, $\eta + \delta > \alpha$

If the combination of shareholders' and the bidder's warm-glow preferences are strong, the conclusions of Corollary 2 are reversed:

Corollary 3 *If $\eta + \delta > \alpha$, then as $N \to \infty$ takeovers with negative externalities $\phi_1 < 0$ fail, $\Lambda^* \to 0$; and takeovers with positive externalities $\phi_1 > 0$ potentially succeed: there is a sequence of equilibria in which $\Lambda^* \to 1$, and this sequence is unique if $s > 0$.*

The economic forces underlying Corollary 3 are analogous to those underlying Corollary 2. The most transparent case to consider is that of target shareholders with consequentialist preferences ($\eta = \alpha$) and a bidder with a positive weight on externalities ($\delta > 0$). In this case, and unlike the case of warm-glow preferences ($\eta < \alpha$), shareholders don't derive any direct benefit from offloading shares with negative externalities; nor do they experience any direct reluctance to surrender shares with positive externalities. When shareholders are sufficiently dispersed the decisive factor becomes the bidder's preference for positive externalities. Consequently, takeovers yielding negative externalities ($\phi_1 < 0$) fail while those yielding positive externalities ($\phi_1 > 0$) potentially succeed. These observations extend to the case in which target shareholders have warm-glow preferences $\eta < \alpha$, but the bidder's own preferences more than offset that gap between η and α.

4.4 Bidder's choice of takeover characteristics

So far we have taken the takeover's effect on the target as given, by specifying v_1 and ϕ_1 exogenously. What if instead a bidder has some ability to commit to post-takeover policies when making an offer—specifically, to the trade-off between maximizing cash flows v_1 and maximizing broader social value ϕ_1?

Formally, the bidder faces a technologically determined choice set

$$\left\{ (v_1(\tilde{\phi}_1), \tilde{\phi}_1) \right\} \tag{18}$$

of feasible combinations of cash flows and externalities. Define

$$\phi_1^{**} \equiv \arg\max_{\tilde{\phi}_1} v_1(\tilde{\phi}_1) + \alpha \tilde{\phi}_1$$

as the choice that maximizes the social value of the target under the bidder's control.[12]

The following result extends Theorem 1, demonstrating how the choice of externalities can serve as an effective bidding tactic.[13]

Proposition 2 *If $\eta + \delta = \alpha$, then the bidder chooses ϕ_1^{**}, and if $\eta + \delta < \alpha$ ($\eta + \delta > \alpha$), the bidder's choice is smaller (larger) than ϕ_1^{**}.*

Consistent with intuitions from Corollaries 1-3, under balanced social preferences the bidder pledges the socially efficient level of externalities. In contrast, if combined warm-glow preferences are weak ($\eta + \delta < \alpha$) the bidder tilts its post-takeover plans towards worse externalities than the socially efficient level. In particular, the bidder can raise its profits by pledging negative post-takeover externalities $\phi_1 < 0$, for the reasons covered by Corollary 2.

---

[12] We assume that the bidder's choice set (18) includes at least one option with negative externalities, $\tilde{\phi}_1 < 0$, that ϕ_1^{**} is well-defined, and that $v_1(\cdot)$ is differentiable at ϕ_1^{**}.

[13] We adopt the mild assumption that if ϕ_1' leads to a unique equilibrium where the takeover fails, while ϕ_1'' generates multiple equilibria with at least one yielding strictly positive bidder payoff, then the bidder prefers ϕ_1'' to ϕ_1'.

5 Broader effects of social responsibility in takeovers

Our analysis offers novel insights for the desirability of social responsibility in the context of the market for corporate control. We begin by exploring the potential downsides (the "dark side") of social responsibility. We then extend the framework to allow socially responsible shareholders to trade their shares with financial investors prior to the takeover, shedding light on how such market interactions influence takeover outcomes.

5.1 When social responsibility backfires

The comparison between Corollaries 1 and 2 implies that stronger social responsibility can, under certain conditions, undermine efficiency in the market for corporate control.

This result can be illustrated in several ways. Consider the case in which $s < 0$ and $\delta + \eta = \alpha$. From Corollary 1, socially inefficient takeovers are blocked. Relative to this starting point, consider an increase either to the extent to which shareholders care about externalities associated with shares they've sold (η), or to the extent that the bidder weights social factors (δ). From Corollary 2, these stronger social preferences lead to the possibility that takeovers with $\phi_1 > 0$ succeed—*even if such takeovers are socially inefficient* ($s < 0$). In this scenario, greater social responsibility—via an increase in either δ or η—paradoxically facilitates socially undesirable takeovers. Similarly, if $\delta + \eta < \alpha$ then Corollary 2 predicts that a socially efficient takeover succeeds if $\phi_1 < 0$. In contrast, if either shareholders or the bidder grow sufficiently more concerned about externalities that $\delta + \eta$ rises above α then such takeovers fail (Corollary 3). Here, too, heightened social responsibility can prove counterproductive by obstructing socially efficient transactions.[14]

Moreover, even an increase in the baseline level of shareholder social responsibility α can lead to worse outcomes—specifically, if α rises but shareholders' weight on externalities associated with shares that they've sold, η, remains unchanged. Consider the case of a socially efficient takeover with positive post-takeover externalities ($\phi_1 > 0$). If preferences are balanced ($\eta + \delta = \alpha$) then the takeover succeeds with strictly positive probability even as $N \to \infty$. However, if the social preference α increases then (by Corollary 2) the takeover fails, a socially

[14] Related, in Online Appendix D, we show that if $\phi_1 < \phi_0$, then the introduction of consequentialist preferences for the bidder reduces the likelihood of socially efficient takeovers ($s > 0$).

inferior outcome. The economic reason is that the increase in α, unaccompanied by an increase in η, increases the utility cost to target shareholders of tendering their shares.

In sum, greater social responsibility on the part of shareholders (higher η or α) or the bidder (higher δ) can, in some instances, lead to inefficient outcomes. The underlying intuition is that efficiency depends not only on the degree to which externalities are internalized, but also on the *balance* of social responsibility between shareholders and the bidder.

In practice, the majority of public firms' shares are held by institutional investors. It is often argued that, when these investors do exhibit social preferences, these tend to be of the warm-glow type. That is, institutional investors typically do not internalize externalities generated by firms outside their investment portfolios (i.e., $\eta = 0$). Our analysis suggests that the social responsibility of the financial sector—including the mandates given to asset managers (captured by α), should be aligned with that of the corporate sector (captured by δ). In particular, concerns have been raised that the growing dominance of private equity funds in acquiring publicly held "dirty assets" may be socially inefficient. If this is the case, our model indicates that the market for corporate control would function more efficiently if sell-side asset managers similarly prioritized financial returns over environmental considerations.[15]

5.2 Trade with financial investors

A common argument is that the presence of non-social capital in financial markets—such as hedge funds or risk arbitrageurs—dilutes or even nullifies the impact of responsible investment. We show that this argument is incorrect in important cases.

Specifically, we consider a scenario in which target shareholders may first sell their shares to purely financial investors (i.e., those for whom $\alpha = \eta = 0$). We assume decentralized and frictionless financial markets, with trades occurring whenever they generate mutual gains.[16] Once trading concludes, the tender offer proceeds as in the baseline model, with a newly-formed shareholder base that is purely financially motivated. In order to keep our discussion focused we assume the bidder has no social responsibility.

[15]For example, if $\delta = \eta = 0$, $v_1 + \phi_1 < v_0 + \phi_0$, and $\phi_1 < 0$, then social efficiency is higher when $\alpha = 0$ than when $\alpha = 1$.

[16]Financial markets may or may not be subject to the same frictions that affect the market for corporate control. Our analysis should therefore be interpreted as an *upper bound* on the impact of trade with financial investors.

Proposition 3 *Suppose $\delta = 0$. (a) If $\eta = \alpha$ then no trade occurs. If $\eta < \alpha$ then (b) trade weakly enhances social efficiency if ϕ_1, $v_1 - v_0$, and s all have the same sign; while (c) trade weakly harms social efficiency of ϕ_1 and s have opposite signs.*[17]

Part (a) of Proposition 3 establishes that there are gains from trade between social and financial investors only if social investors have warm-glow preferences ($\eta < \alpha$). Intuitively, if social investors have consequentialist preferences ($\eta = \alpha$) then takeover outcomes are sufficiently close to social efficiency (Corollary 1) that there is no scope for gains from trade.

Part (b) of Proposition 3 highlights instances in which trades with financial investors can arise in equilibrium, and when they do, they increase social efficiency. From Corollary 2, if $\eta < \alpha$, then a socially efficient takeover ($s > 0$) that generates positive externalities ($\phi_1 > 0$) is likely to fail when the target firm's shares are held by social investors. This is because warm-glow investors tend to resist selling their shares under such circumstances. Moreover, if the takeover is both privately and socially efficient ($v_1 > v_0$), the takeover succeeds with higher probability when the target shares are instead held by financial investors. In this case, whenever trade occurs,[18] it enhances social efficiency.[19]

Part (c) of Proposition 3 covers cases in which trade with financial investors harms social efficiency. For example, if a takeover is socially efficient ($s > 0$) and results in negative externalities ($\phi_1 < 0$), then it succeeds with high probability if target shares are held by social investors; because of warm-glow preferences, such investors benefit from divesting their shares in a tender offer. If shares are instead held by financial investors then, even if the takeover is also privately efficient ($v_1 > v_0$), the holdout problem leads to a lower probability of takeover success; and *a fortiori* a privately inefficient takeover has even less probability of success. Trade occurs in these cases even despite harming social efficiency because social investors' warm-glow preferences generate a direct trade surplus to selling shares with negative externalities.[20]

[17]Note that the cases described aren't exhaustive; the proof covers all cases.

[18]Trade occurs whenever the product of the social surplus s and the change in takeover probability associated with transferring shares from social to financial investors is sufficiently large.

[19]The case of socially inefficient takeovers ($s < 0$) with negative externalities ($\phi_1 < 0$) that are also privately inefficient ($v_1 < v_0$) is analogous: any trade that occurs in this setting enhances socially efficiency because there is an equilibrium in which the takeover succeeds if target shares are held by social investors but it is always blocked when held by financial investors.

[20]Analogously, a socially inefficient takeover that results in positive externalities is blocked by social investors, but succeeds with significant probability if it is privately efficient and shares are held by financial investors; again, trade reduces social efficiency, and again, trade nonetheless occurs if negative externalities generated

6 Governance and legal implications

In this section, we extend the analysis to incorporate equity offers, leveraged offers, minority shareholder protections, and social responsibility as a takeover defense.

6.1 Equity offers

If the bidding firm is publicly traded it can use its own equity as payment. Unlike a cash offer, an equity offer grants tendering shareholders ownership, thereby exposing them to externalities generated by the combined entity—an effect relevant when shareholders have warm-glow social preferences. We analyze how this effect determines a bidder's preferences over cash versus equity offers, generating novel insights for this choice-of-payment-method question.[21]

Specifically, consider a bidder with stand-alone value V_B, externalities Φ_B, and N_B shares outstanding. The bidder offers each tendering target shareholder e newly-issued shares in itself, conditional on at least K shareholders tendering. Hence if $j \geq K$ target shareholders tender, the financial value of each share in the post-takeover bidder is $\frac{V_B + jv_1}{N_B + ej}$; notably, this value varies with the number of tendering shareholders. Similarly, the externalities associated with each share in the post-takeover bidder are $\frac{\Phi_B + j\phi_1}{N_B + ej}$.[22] In order to focus on core economic mechanisms we set $\eta = 0$, and so in particular abstract from the question of how much target shareholders internalize the bidder's externalities absent a takeover. We make the mild assumption that all relevant valuations are positive even after accounting for externalities (e.g., $V_B + \alpha\phi_B > 0$ etc.; see formal statement in the appendix). Finally, for conciseness, and for this subsection only, we assume that if multiple stable equilibria exist then the one with the highest tendering probability is played.

Proposition 4 *Suppose $\eta = 0$. (a) If $\delta = \alpha$ then the bidder is indifferent between cash and equity offers. (b) Otherwise, if $\delta < (>)\alpha$ then the bidder strictly prefers a cash (equity) offer if $\Phi_B + \max\{\kappa\Phi_1, \Phi_1\} < 0$ and strictly prefers an equity (cash) offer if $\Phi_B + \min\{\kappa\Phi_1, \Phi_1\} > 0$.*

under incumbent management ($\phi_0 < 0$) make share ownership costly for social investors with warm-glow preferences.

[21] Transaction costs and deferred capital gains taxes may discourage tendering shareholders from immediately selling the bidder's shares they receive.

[22] A successful tender offer does not automatically result in a full merger of the two firms. In such cases, we assume that a post-takeover share in the bidder reflects the target's externalities in proportion to the bidding firm's ownership share in the target.

Part (a) of Proposition 4 establishes that if preferences are balanced then the payment method is irrelevant: the bidder's payoff (and also tendering probabilities) under the most profitable cash offer matches the payoff under the most profitable equity offer. However, if preferences are imbalanced then the choice of payment method matters.

Part (b) deals with the case in which the bidder cares differently about externalities than do target shareholders. Consider the case $\delta < \alpha$. Recall from Corollary 2 that cash offers in a takeover that results in negative externalities ($\Phi_1 < 0$) benefit from the fact that target shareholders are eager to divest their shares in this case. In contrast, an equity-offer surrenders some of this advantage, since target shareholders who tender still have equity stakes, and hence continue to care about externalities. As Proposition 4 makes clear, the relevant externalities in an equity offer are those of the post-takeover firm, stemming from both the bidder's stand-alone externalities and post-takeover target, and which lie between $\Phi_B + \kappa\Phi_1$ and $\Phi_B + \Phi_1$. Similarly, a bidder benefits from making an equity offer rather than a cash offer if the combined externalities of the post-takeover externality are positive.

Proposition 4 implies that the method of payments in takeovers signals the bidder's social preferences. Specifically, if $\Phi_B < -\min\{\kappa\Phi_1, \Phi_1\}$ then the bidder uses cash offers if $\delta < \alpha$ and equity offers if $\delta > \alpha$. Thus, when an established fossil fuel company (i.e., firms with sufficiently negative Φ_B) acquires an emerging renewable energy firm (with $\Phi_1 > 0$) using equity the primary motivation is likely a desire to reduce environmental impact ($\delta > \alpha$, due to regulatory pressure or shareholder green preferences). Conversely, when it uses cash the primary motivation is likely profit maximization ($\delta < \alpha$).

6.2 Leveraged offers

In practice, bidders often finance acquisitions with debt that is collateralized against the target's assets—a common strategy in leveraged buyouts (LBOs), particularly among private equity firms. To examine the effects of such leverage offers in the presence of externalities, suppose the bidder issues debt totaling $Nd > 0$, which becomes the obligation of the target if the takeover succeeds. The bidder chooses both leverage level d and the offer price p to maximize its payoff, which is given by

$$Nd\left(\gamma\left(q+\Delta\right)+\left(1-\gamma\right)q\right)+N\gamma\left(q+\Delta\right)\left(v_1-d-p+\delta\phi_1\right). \qquad (19)$$

The first term is the bidder's expected proceeds from debt issuance;[23] the second term is simply (14), adjusted for the fact that the target is now encumbered with debt. Expression (19) simplifies to

$$N(1-\gamma)qd + N\gamma(q+\Delta)(v_1 - p + \delta\phi_1). \tag{20}$$

Legal protections for minority shareholders are typically interpreted to require

$$v_1 - d \geq v_0, \tag{21}$$

a point that we return to below. By requirement (21), leverage is viable only if $v_1 > v_0$.

Leverage generates three significant effects, as detailed in the following result. For conciseness, we state the result for just the case of balanced preferences, which exhibits all three effects; but Online Appendix B fully characterizes equilibrium outcomes for all parameter values.

Proposition 5 *Suppose $\eta + \delta = \alpha$ and $v_1 > v_0$.*

(a) *If $s > 0$ and $\phi_1 > \phi_0$ then leverage increases the probability of a successful takeover and increases social efficiency.*

(b) *If $s > 0$ and $\phi_1 < \phi_0$ then under some conditions leverage decreases the probability of a successful takeover and decreases social efficiency.*

(c) *If $s < 0$ then leverage increases the probability of a successful takeover and decreases social efficiency.*

In part (a), leverage increases the probability that socially efficient takeovers succeed. Leverage enables the bidder to "tunnel" resources out of the firm at the expense of minority shareholders: conditional on a successful takeover, the bidder obtains the entire leverage proceeds d, which are paid back by the target, yet shares the liability with minority shareholders. Consequently, and consistent with Mueller and Panunzi (2004), leverage allows a bidder to capture a greater share of a takeover's value-creation, mitigating the holdout problem and facilitating socially efficient takeovers.[24]

[23] If the takeover fails then the bidder immediately repays the debt (or equivalently, simply never issues the loan), and in this case debt has no effect on the bidder's payoff.

[24] Online Appendix C characterizes the effect of freeze-out mergers. Absent social externalities, leverage and

In part (a), the condition $\phi_1 > \phi_0$ and the legal protection (21) together rule out "coercive" tender offers in which there is an equilibrium in which a takeover succeeds for sure even though shareholders would prefer to coordinate to play the distinct equilibrium in which the takeover fails for sure. If instead, $\phi_1 < \phi_0$, as in part (b), then a second effect of leverage arises. Now, the bidder trades off two alternatives: (i) low leverage ($d \approx s$) and a high offer, and a unique equilibrium in the tendering subgame, versus (ii) high leverage ($d = v_1 - v_0 > s$) and a low offer, with everyone-retaining and everyone-tendering both equilibria in the tendering subgame. There are parameter values under which the latter strategy dominates, due to the bidder's large profits if the takeover succeeds; but in which the takeover success probability is lower than in the no-leverage baseline.

Finally, part (c) establishes that leverage can increase the probability of a socially inefficient takeover succeeding. The ability to take leverage and dilute shareholders enables the bidder to profit even from socially inefficient takeovers, albeit at the expense of target shareholders.

The negative consequences of leverage in parts (b) and (c) of Proposition 5 are both consequences of the legal protection (21) failing to account for social externalities. If the legal standard (21) were replaced with the alternative standard

$$d < s \tag{22}$$

then full social efficiency is achieved; this standard prevents the use of leverage in part (c) and the use of coercive offers in part (b), while still allowing (and indeed enhancing) the value-creation role of leverage in part (a). Indeed, this conclusion extends beyond the case of balanced preferences:

Corollary 4 *Under the legal standard (22) the possibility of leverage uniformly improves the social efficiency of takeover outcomes.*

freeze-out mergers operate broadly similarly as ways for a bidder to capture a greater share of a takeover's value-creation and thereby mitigate the holdout problem. In contrast, with social externalities there are significant differences between the two mechanisms. First, with freeze-out mergers, greater dilution requires a lower initial offer price, which increases tendering probability but reduces offer attractiveness. Leveraged offers provide bidders more flexibility to maximize profits at social efficiency's expense. Second, the effectiveness of each mechanism depends critically on the alignment between private and social efficiency. When takeovers are privately inefficient but socially beneficial, legal protections render leveraged offers ineffective while freeze-out mergers remain viable. Conversely, when takeovers are privately efficient but socially harmful, freeze-out mergers lose dilutive power (as shown in Proposition A-1 in Online Appendix C) while leveraged offers retain effectiveness.

As such, our analysis delivers a normative argument for reconsidering the appropriate protections for minority shareholders. It is worth highlighting that replacing legal standard (21) with (22) represents *neither* a uniform strengthening nor a uniform weakening of legal restrictions.

Overlapping with this last point: If $\phi_1 = \phi_0 = 0$ then leverage has only positive consequences; value-creating takeovers succeed more often, while value-destroying takeovers always fail regardless of whether leverage is possible. It is only in combination with negative takeover externalities ($\phi_1 < \phi_0$) that leverage is a source of social inefficiency in takeovers.

6.3 Legal protections for minority shareholders

Proposition 1 and Theorem 1 together establish that privately inefficient takeovers ($v_1 < v_0$) succeed only if either target shareholders or the bidder have social preferences. In many such cases, takeover success requires that shareholders sell their shares for less than the stand-alone financial value v_0, either because of positive externalities from the takeover, or because of the fear that the takeover will succeed regardless, leaving any minority shareholders with ownership in a firm with a lower valuation and/or negative externalities ("pressure to tender"). Corollary 1 shows that, under balanced social preferences, takeovers that are privately inefficient but socially efficient regularly succeed. However, following a successful privately inefficient takeover, minority shareholders who refused to sell for the offered price may be tempted to sue the bidder, seeking compensation for the post-takeover decline in firm value from v_0 to v_1. Here, we analyze the effect of such post-takeover litigation.

Specifically, suppose that following a successful takeover non-tendering shareholders litigate and demand that the bidder "make them whole" by purchasing their shares at a price equal to the pre-takeover financial value v_0.[25] Such litigation occurs if and only if

$$v_0 + \eta\phi_1 > v_1 + \alpha\phi_1. \tag{23}$$

Litigation is successful with probability σ. Since distortions already arise under imbalanced social preferences, we focus on the case of balanced preferences, $\eta + \delta = \alpha$.

[25] Alternatively, litigation might take the form of non-tendering shareholders litigating for a cash payout of $v_0 - v_1$ while retaining their shares. An analogous version of Proposition 6 holds (see proof in appendix).

Proposition 6 *Suppose $\eta + \delta = \alpha$. If the litigation condition (23) holds then as $N \to \infty$ the takeover fails for sure ($\Lambda^* \to 0$).*

In combination with Corollary 1, Proposition 6 establishes that minority protections that give target shareholders the ability to litigate ex post prevent socially efficient takeovers from succeeding, thereby harming shareholder welfare. The possibility of post-takeover litigation makes shareholders more reluctant to tender, reducing the probability of takeover success. And even when a takeover does succeed litigation harms the bidder. The inability of minority shareholders to commit not to sue following a successful takeover represents a further instance of miscoordination—one that ultimately harms both shareholder value and social welfare.

A final point is that, as in our discussion of legal standards aimed at protecting target shareholders from leveraged takeovers, the problem here is that the litigation standard (23) fails to incorporate social concerns. An alternative litigation standard under which minority shareholders sue only if $v_0 + \alpha\phi_0 > v_1 + \alpha\phi_1$ straightforwardly (weakly) increases social welfare.

6.4 Social responsibility as a takeover defense

Finally, we study how the target's incumbent management can best use social (ir)responsibility as an effective takeover defense.[26]

Parallel to our discussion in subsection 4.4, the target's incumbent management selects pecuniary value and social externalities from a technologically determined choice set

$$\left\{(v_0(\tilde{\phi}_0), \tilde{\phi}_0)\right\} \tag{24}$$

prior to the bidder making an offer. Define

$$\phi_0^{**} \equiv \arg\max_{\tilde{\phi}_0} v_0(\tilde{\phi}_0) + \alpha\tilde{\phi}_0$$

as the choice that maximizes the social value of the target under the incumbent's control. In order to focus on cases in which the incumbent faces the greatest threat of a takeover, we assume that the bidder adds social value under all possible choices by the incumbent, $s\left(\phi_0^{**}\right) > 0$.

[26] See Karpoff and Wittry (2024) for a literature review of takeover defenses.

We consider two types of incumbents: a shareholder-oriented incumbent, whose objective is to maximize the welfare of target shareholders, and an entrenched incumbent, whose objective is to retain control by minimizing the likelihood of a successful takeover.

Corollary 5 *Suppose $s\left(\phi_0^{**}\right) > 0$. (a) If $\eta + \delta = \alpha$ then both shareholder-oriented and entrenched incumbents pick ϕ_0^{**}. If instead $\eta+\delta < \alpha$ then (b) if $\phi_1 < 0$ then a shareholder-oriented incumbent picks ϕ_0^{**} while an entrenched incumbent does not, and (c) if $\phi_1 > 0$ then an entrenched incumbent picks ϕ_0^{**} while a shareholder-oriented incumbent does not.*

Corollary 5 follows directly from our earlier baseline characterization of takeover outcomes—and in particular from the fact that in equilibrium the bidder's per-shareholder payoff is

$$\gamma \Delta s\left(\phi_0\right) + \gamma\left(q + \Delta\right)\left(\eta + \delta - \alpha\right)\phi_1 \tag{25}$$

while target shareholders are indifferent between retention and tendering, and hence benefit from an increase in their retention (reservation) utility, which is given by

$$v_0 + \alpha\phi_0 + qs\left(\phi_0\right). \tag{26}$$

Consistent with the rest of our analysis, part (a) shows that balanced preferences lead to socially desirable outcomes. In this case, the incumbent's choice of ϕ_0 doesn't affect the takeover's probability; but socially better choices raise target shareholders' reservation utility (26), forcing the bidder to improve its offer. The reason that the incumbent's choice of ϕ_0 doesn't affect the takeover's probability is that, in this case, the bidder's payoff stems entirely from its share of the social surplus created by the takeover; and this share is in turn determined by the probability that an individual shareholder is pivotal, which is independent of $s\left(\phi_0\right)$.

If preferences are imbalanced, however, with $\eta + \delta < \alpha$ and the bidder creating negative externalities as in part (b), then the bidder's payoff stems both from a share in the surplus created and from the utility benefit of warm-glow target shareholders divesting their shares. As (25) highlights, the bidder faces a trade-off between the two sources of profit. An entrenched incumbent can exploit this trade-off to reduce the takeover probability. Specifically, an entrenched incumbent chooses a socially suboptimal ϕ_0 because by doing so it raises the social surplus created by a takeover, thereby inducing the bidder to put more weight on this part of its payoff, which it does by reducing its offer. In this case, social *irresponsibility* acts as a takeover defense, albeit at the expense of shareholder welfare.

In contrast, a shareholder-oriented incumbent cares both about the social value of the target and raising the takeover's success probability (see (26)). The two objectives are aligned: by picking ϕ_0^{**}, the incumbent maximizes the stand-alone value and, by minimizing the social surplus created by the takeover, induces the bidder to focus on maximizing takeover success.

7 Conclusion

This paper develops a tractable theoretical framework to study the effects of responsible investment on the market for corporate control. By incorporating social preferences and takeover-generated externalities into a canonical tender offer model, we highlight how the alignment—or misalignment—of social responsibility between acquirers and target shareholders shapes both the efficiency and outcomes of takeovers. A central insight is that market efficiency is not determined solely by the presence of socially responsible investors or bidders, but by the *balance* of their social preferences. When this balance is achieved, the market supports socially desirable outcomes: takeovers that generate positive externalities proceed, while those that cause harm are blocked—even when they are privately profitable.

However, when social preferences are imbalanced—such as when warm-glow shareholders face a profit-maximizing bidder—market outcomes are generally inefficient. In such cases, negative externalities can be strategically deployed to pressure responsible shareholders into tendering, while positive externalities may deter takeovers that would otherwise benefit society.

Our analysis yields several important implications. First, the participation of purely financial investors—often seen as undermining responsible investment—can, in fact, improve the social efficiency of takeover outcomes. Second, equity offers are optimal when target firms generate positive externalities. Third, debt financing can either mitigate or exacerbate inefficiencies depending on the nature of externalities involved. Fourth, the relaxation of legal protections for minority shareholders, which might seem to weaken governance, can support efficient takeovers. Finally, firms can strategically manipulate externalities—either to resist takeovers or as a means to facilitate acquisition—highlighting a novel role for social responsibility in takeover defenses.

More broadly, our results suggest that fostering socially efficient outcomes in corporate control markets requires more than promoting responsible investing in isolation. It calls for better alignment between the mandates of financial intermediaries and the objectives of corporate acquirers. By identifying when and how social responsibility can promote or undermine efficiency, our framework contributes to ongoing debates about the role of ESG in capital markets and offers policy-relevant insights into how corporate takeovers might be shaped to better serve societal goals.

In taking this first step toward integrating social preferences into models of corporate control, we deliberately abstract from several real-world complexities, including shareholder heterogeneity, negotiated transactions, bidder competition, information asymmetries, and regulatory intervention. Incorporating these elements into the analysis of takeovers with externalities presents promising directions for future research.

References

[1] Akey, P., and I. Appel, 2020. Environmental externalities of hedge funds, *Working paper.*

[2] Amihud, Y., M. Kahan, and R. Sundaram, 2004. The foundations of freeze-out laws in takeovers. *Journal of Finance* 59:1325–44.

[3] At, C., M. Burkart, and S. Lee, 2011. Security-voting structure and bidder screening. *Journal of Financial Intermediation* 20:458–76.

[4] Bagnoli, M., and B. L. Lipman, 1988. Successful Takeovers Without Exclusion. *Review of Financial Studies* 1, 89–110.

[5] Baker S. D., B. Hollifield, and E. Osambela, 2022. Asset Prices and Portfolios with Externalities*, Review of Finance,* 26(6):1433–1468,

[6] Bebchuk, L. A., 1987. The Pressure to Tender: An Analysis and a Proposed Remedy, *Delaware Journal of Corporate Law*, Vol. 12, pp. 911–949

[7] Bellon A., forthcoming. Does private equity ownership make firms cleaner? The role of environmental liability risks. *Review of Financial Studies.*

[8] Berg, T., L. Ma, and D. Streitz, 2023. Climate Risk and Strategic Asset Reallocation, *Working paper.*

[9] Berk, Jonathan and Jules H. van Binsbergen, 2025. The Impact of Impact Investing, *Journal of Financial Economics.*

[10] Broccado, E., O. Hart, and L. Zingales, 2022. Exit versus Voice, *Journal of Political Economy* 130, 3101–3145.

[11] Borenstein, S., 1990. Airline Mergers, Airport Dominance, and Market Power, *American Economic Review*, 80, 400-404

[12] Burkart, M., D. Gromb, and F. Panunzi, 1998. Why higher takeover premia protect minority shareholders. *Journal of Political Economy* 106:172–204.

[13] Burkart, M., D. Gromb, and F. Panunzi, 2000. Agency conflicts in public and negotiated transfers of corporate control. *Journal of Finance* 55, 647-677

[14] Burkart, M., D. Gromb, H. M. Mueller, and F. Panunzi, 2014. Legal investor protection and takeovers. *Journal of Finance* 69 (3), 1129–1165

[15] Burkart, M. and S. Lee, 2015. Signaling to Dispersed Shareholders and Corporate Control, *Review of Economic Studies*, 82(3), 922-62.

[16] Burkart, M. and S. Lee, 2022. Activism and Takeovers, *Review of Financial Studies*, 35(4), 1868-96.

[17] Burkart, M. and S. Lee, and H. Petri, 2023. LBO Financing, *Working paper.*

[18] Burkart, M. and S. Lee, and P. Voss, 2024. The Evolution of the Market for Corporate Control, *Working paper.*

[19] Chen, Tao, Hui Dong and Chen Lin, 2020. Institutional shareholders and corporate social responsibility, *Journal of Financial Economics* 135, 483–504.

[20] Chowdhry, B., S. W. Davies, and B. Waters, 2019. Investing for Impact. *Review of Financial Studies* 32 (3):864-904.

[21] Cohn, J., N. Nestoriak, and M. Wardlaw, 2021. Private Equity Buyouts and Workplace Safety, *Review of Financial Studies* ,34(10): 4832–4875,

[22] Cornelli, F., and D. Li, 2002. Risk arbitrage in takeovers. *Review of Financial Studies* 15:837–68.

[23] Cunningham C, Ederer F, and Ma S, 2021. Killer acquisitions, *Journal of Political Economy* 129(3):649–702

[24] Dalkır, E. 2015. Shareholder information and partial tender offers. *Economics Letters* 136:64–66.

[25] Dalkır, E., and M. Dalkır, 2014. On the optimality of partial tender offers. *Journal of Economic Theory* 151:561-70.

[26] Dalkır, E., M. Dalkır, and D. Levit, 2019. Freeze-out Mergers, *Review of Financial Studies*, 32(8), 3266-3297.

[27] Davies, S. W. and E. D. Van Wesep, 2018. The Unintended Consequences of Divestment. *Journal of Financial Economics* 128, 558–575.

[28] Dessaint, O., Golubov, A., and Volpin, P, 2017. Employment protection and takeovers, *Journal of Financial Economics* 125(2), 369-388.

[29] Dimson, Elroy, Oguzhan Karakas, and Xi Li, 2015. Active ownership, *Review of Financial Studie*s 28, 3225–3268.

[30] Duchin, R., J. Gao, and Q. Xu, 2025. Sustainability or greenwashing: Evidence from the asset market for industrial pollution, *Journal of finance*.

[31] Eaton, C., S. Howell, and C. Yannelis, 2019. When investor incentives and consumer interests diverge: Private equity in higher education, *The Review of Financial Studies*, 22(9):4024–406.

[32] Eckbo, E., 1983. Horizontal mergers, collusion, and stockholder wealth, *Journal of Financial Economics*, 11(1-4), 241-273

[33] Eckbo, B. E., R. M. Giammarino, and R. L. Heinkel, 1990. Asymmetric Information and the Medium of Exchange in Takeovers: Theory and Tests. *Review of Financial Studies*, 3, 651-675

[34] Edmans, A,, D. Levit, and J. Schneemeier, 2022. Socially Responsible Divestment. *Working Paper*

[35] Ekmekci, M., and N. Kos, 2016. Information in tender offers with a large shareholder. *Econometrica* 84:87–139.

[36] Ewens, M., A. Gupta, and S. Howell, 2022. Local journalism under private equity ownership. *Working paper.*

[37] Fishman, M. J., 1989. Preemptive Bidding and the Role of the Medium of Exchange in Acquisitions. *Journal of Finance*, 44, 41-57.

[38] Gantchev, N., M. Giannetti, and R. Li, 2022. Does Money Talk? Divestitures and Corporate Environmental and Social Policies. *Review of Finance* 26, 1469-1508.

[39] Gibson, R., S. Glossner, P. Krueger, P. Matos, and T. Steffen, 2022. Do Responsible Investors Invest Responsibly?" *Review of Finance* 26, 1389–1432.

[40] Goldstein, I., A. Kopytov, L. Shen, and H. Xiang, 2022. On ESG Investing: Heterogeneous Preferences, Information, and Asset Prices, *Working Paper*

[41] Gollier, C. and S. Pouget, 2022. Investment Strategies and Corporate Behaviour with Socially Responsible Investors: A Theory of Active Ownership. *Economica* 89, 997–1023.

[42] Golubov, A., 2025. Beyond the shareholders: The impact of M&A on other stakeholders, *Working paper.*

[43] Gomes, A., 2001. Takeovers, freeze-outs, and risk arbitrage. *Working Paper.*

[44] Green, D. and B. Roth, 2025. The Allocation of Socially Responsible Capital, *Journal of Finance.*

[45] Green, D. and B. Vallee, 2025. Measurement and Effects of Bank Coal Exit Policies, *Journal of Financial Economics.*

[46] Gromb, D., 1993. Is one share—one vote optimal? *Working Paper.*

[47] Grossman, S., and O. Hart, 1980. Takeover bids, the free rider problem, and the theory of the corporation. *Bell Journal of Economics* 11:42-64.

[48] Gupta, A., Howell, S. T., Yannelis, C., & Gupta, A. (2024). Owner incentives and performance in healthcare: Private equity investment in nursing homes. *Review of Financial Studies, 37*(4), 1029-1077.

[49] Gupta, D., A. Kopytov, and J. Starmans, forthcoming. The Pace of Change: Socially Responsible Investing in Private Markets, *Review of Financial Studies.*

[50] Hansen, R., 1987. A Theory for the Choice of Exchange Medium in Mergers and Acquisitions. *Journal of Business,* 60, 75-95

[51] Hartzmark, S. M. and K. Shue, 2023. Counterproductive Sustainable Investing: The Impact Elasticity of Brown and Green Firms, *Working paper.*

[52] Heath, D., D. Macciocchi, R. Michaely, and M. C. Ringgenberg, 2023. Does Socially Responsible Investing Change Firm Behavior? *Review of Finance* 27, 2057-2083.

[53] Heinkel, R., A. Kraus and J. Zechner, 2001. The Effect of Green Investment on Corporate Behavior, *Journal of Financial and Quantitative Analysis* 36, 431-449.

[54] Hirshleifer, D., and S. Titman, 1990. Share tendering strategies and the success of hostile takeover bids. *Journal of Political Economy* 98:295-324.

[55] Hoepner, A. G.F., I. Oikonomou, Z. Sautner, L. T. Starks, and X. Y. Zhou, 2024. ESG shareholder engagement and downside risk, *Review of Finance*, Volume 28, Issue 2, March 2024, Pages 483–510

[56] Holmstrom, B., and B. Nalebuff, 1992. To the raider goes the surplus? A reexamination of the free-rider problem. *Journal of Economics and Management Strategy* 1:37–62.

[57] Huang, S. and A. Kopytov, 2022. Sustainable finance under regulation, *Working paper.*

[58] Karpoff, J. M., and M. D. Wittry, 2024. Chapter 11: Corporate Takeover Defenses. In Handbook of Corporate Finance. Cheltenham: Edward Elgar Publishing, pp. 410-54.

[59] Kaufmann, M., P. Andre, and B. Kőszegi, 2024. Understanding Markets with Socially Responsible Consumers, *Quarterly Journal of Economics* 139, 1989-2035.

[60] Kyle, A., and J. Vila, 1991. Noise trading and takeovers. *Rand Journal of Economics* 22: 54-71.

[61] Landier, A. and S. Lovo, 2025, Socially Responsible Finance: How to Optimize Impact? *Review of Financial Studies.*

[62] Lee T., and C. Wang, 2025. Running Responsibly, *Working paper.*

[63] Levit, D., 2017. Advising Shareholders in Takeovers, *Journal of Financial Economics* 126 (3): 614–34.

[64] Li, T., Q. Peng, and L. Yu. 2023. ESG Considerations in Acquisitions and Divestitures: Corporate Responses to Mandatory ESG Disclosure, *Working paper.*

[65] Liu, T., 2022, Bargaining with private equity: implications for hospital prices and patient welfare, *Working paper.*

[66] Marquez, R. and Yilmaz, B., 2008. Information and Efficiency in Tender Offers. *Econometrica* 76, 1075-1101.

[67] Marquez, R. and Yilmaz, B., 2012. Takeover bidding and shareholder information. *Review of Corporate Finance Studies* 1, 1-27.

[68] Meirowitz, A., S. Pi, and M. C. Ringgenberg, 2023, Voting for Socially Responsible Corporate Policies, *Working paper.*

[69] Mueller, H. M., and F. Panunzi, 2004. Tender offers and leverage. *Quarterly Journal of Economics* 119:1217-48.

[70] Naaraayanan, S. L., K. Sachdeva, and V. Sharma, 2021. The real effects of environmental activist investing, *Working paper.*

[71] Oehmke, Martin and Marcus Opp, 2025. A Theory of Socially Responsible Investment. *Review of Economic Studies.*

[72] Pastor, L., R. F. Stambaugh, and L. A. Taylor, 2021. Sustainable Investing in Equilibrium. *Journal of Financial Economics* 142, 550-571.

[73] Pedersen, L.H., S. Fitzgibbons, and L. Pomorski, 2021. Responsible Investing: The ESG-Efficient Frontier. *Journal of Financial Economics* 142, 572-597.

[74] Phillips G. M, Zhdanov A. 2013. R&D and the incentives from merger and acquisition activity. *Review of Financial Studies.* 26(1):34–78

[75] Piccolo, A., J. Schneemeier, and M. Bisceglia, 2022. Externalities of Responsible Investments, *Working paper.*

[76] Rhodes-Kropf, M., and S. Viswanathan, 2004. Market Valuation and Merger Waves. *Journal of Finance*, 59, 2685-2718.

[77] Rossi, S., Volpin, P.F., 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics* 74, 277-304.

[78] Shleifer, A., and R. W. Vishny, 1986. Large shareholders and corporate control. *Journal of Political Economy* 94:461-488.

[79] Sorensen, M., and A. Yasuda. Chapter 7 - Stakeholder impact of private equity investments. In Private Equity and Entrepreneurial Finance, Handbook of the Economics of Corporate Finance, vol.1, edited by B. Espen Eckbo, Gordon M. Phillips, and Morten Sorensen. North-Holland, 2023: 299-341.

[80] Voss, P. and Kulms, M., 2022. Separating ownership and information, *American Economic Review* 112(9), 3039-62.

[81] Yarrow, G. K., 1985. Shareholder protection, compulsory acquisition and the efficiency of the takeover process. *Journal of Industrial Economics* 34 (September):3-16.

[82] Zerbib, O. D., 2022, A Sustainable Capital Asset Pricing Model (S-CAPM): Evidence from Environmental Integration and Sin Stock Exclusion., *Review of Finance* 26, 1345-1388.

A Proofs of main results

Throughout the appendix we use the following notation:

$$\hat{v}_1 \equiv v_1 + (\alpha - \eta)\,\phi_1. \tag{A-1}$$

The term $\hat{v}_1$ represents the post-takeover value adjusted for the shift in preferences associated with moving a share from a target shareholder to the bidder. We also make repeated use of the following pair of results, the proofs of which follow by straightforward manipulation, and are relegated to the Online Appendix, which is available here.

Lemma A-1 *The following identities hold:*

$$\frac{\partial \Delta}{\partial \gamma} = \left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma}\right)\Delta \tag{A-2}$$

$$\frac{\partial q}{\partial \gamma} = \frac{N-K}{1-\gamma}\Delta \tag{A-3}$$

Lemma A-2 *The ratio* $\frac{q}{\Delta}$ *strictly increases from* 0 *to* ∞ *as* γ *increases from* 0 *to* 1*.*

Proof of Lemma 1. Suppose the bidder makes a conditional tender offer p. Rearranging (7), and given the definition of s and $\hat{v}_1$, we can write

$$\tau(\gamma; p) = (p - \hat{v}_1 + s)(q + \Delta) - sq. \tag{A-4}$$

Lemma A-1 implies

$$\frac{\partial \tau(\gamma; p)}{\partial \gamma} = \left[(p - \hat{v}_1 + s)\frac{K-1}{\gamma} - s\frac{N-K}{1-\gamma}\right]\Delta. \tag{A-5}$$

Note that

$$\begin{aligned}\tau(0; p) &= 0 \\ \tau(1; p) &= p - \hat{v}_1.\end{aligned}$$

Since $\tau(0; p) = 0$, non-tendering ($\gamma^* = 0$) is always an equilibrium. Similarly, tendering ($\gamma^* = 1$) is an equilibrium if and only if $p \geq \hat{v}_1$. Finally, a mixed strategy equilibrium with tendering probability $\gamma^* \in (0,1)$ exists if and only if $\tau(\gamma^*; p) = 0$. From (A-5), the shape of τ is determined by the following four cases:

(i) τ is increasing then decreasing if $p > \hat{v}_1 - s$ and $s > 0$

(ii) τ is monotonically increasing if $p \geq \hat{v}_1 - s$ and $s < 0$

(iii) τ is decreasing then increasing if $p < \hat{v}_1 - s$ and $s < 0$

(iv) τ is monotonically decreasing if $p \leq \hat{v}_1 - s$ and $s > 0$

Moreover, in the non-monotone cases (i) and (iii) the interior extremum occurs at $\hat{\gamma}(p)$, defined in

$$\hat{\gamma}(p) \equiv \frac{1}{1 + \frac{s}{p - \hat{v}_1 + s}\frac{N-K}{K-1}}. \tag{A-6}$$

Hence:

$\gamma^* = 0$ is an equilibrium if and only if one of cases (iii) and (iv) holds.

$\gamma^* = 1$ is an equilibrium if and only if $p > \hat{v}_1$, or if $p = \hat{v}_1$ and case (i) holds. Note that if $p = \hat{v}_1$ and $s > 0$ then $p > \hat{v}_1 - s$.

$\gamma^* \in (0,1)$ is a equilibrium if and only if both case (i) holds and $p < \hat{v}_1$. In this case, γ^* is the unique solution to $\tau(\gamma^*; p) = 0$, or equivalently, $\mu(\gamma^*) = p$ where $\gamma^* \in (\hat{\gamma}(p), 1)$.

From the above characterization: if $\gamma^* \in (0,1)$ is an equilibrium then it is unique. Hence the only case in which multiple equilibria exist is if both $\gamma^* = 0$ and $\gamma^* = 1$ are equilibria. Note that if $p = \hat{v}_1 - s$ and $s > 0$ then $p < \hat{v}_1$, and $\gamma^* = 1$ isn't an equilibrium. Similarly, if $p = \hat{v}_1$ and $s > 0$ then $p > \hat{v}_1 - s$ and $\gamma^* = 0$ isn't an equilibrium. Hence $\gamma^* = 0$ and $\gamma^* = 1$ coexist as equilibria if and only if $p \in (\hat{v}_1, \hat{v}_1 - s)$.

Finally, since τ is continuous and increasing in p it follows that γ^* is continuous and increasing in p. Moreover, $\gamma^* \to 0$ as $p \to \hat{v}_1 - s$ and $\gamma^* \to 1$ as $p \to \hat{v}_1$. ■

Proof of Theorem 1. If $s < 0$ then Lemma 1 implies that γ^* is given by (9). In this case, $\Pi(0) = 0$ and $\Pi(1) = N(v_1 - p + \delta\phi_1)$. Hence if $v_1 - \hat{v}_1 + \delta\phi_1 \leq 0$, or equivalently $(\alpha - \delta - \eta)\phi_1 \geq 0$, then the bidder's payoff is strictly negative in any equilibrium with $\gamma^* = 1$. In this case, $\gamma^* = 0$ is the unique equilibrium. Conversely, if $(\alpha - \delta - \eta)\phi_1 < 0$ then for any $p \in (\hat{v}_1, \hat{v}_1 - s]$ there is an equilibrium in which the bidder offers p and $\gamma^* = 1$. The bid $p = \hat{v}_1 - s$ guarantees both $\gamma^* = 1$ and a positive payoff for the bidder if $v_1 - (\hat{v}_1 - s) + \delta\phi_1 > 0$, or equivalently $s > (\alpha - \eta - \delta)\phi_1$. Hence an equilibrium with $\gamma^* = 0$ exists if and only if $s \leq (\alpha - \eta - \delta)\phi_1$.

Second, if $s > 0$ then Lemma 1 implies that γ^* is given by (11). An offer $p \in (\hat{v}_1 - s, \hat{v}_1)$ delivers tendering probability γ satisfying $\mu(\gamma) = p$ and an associated per-shareholder bidder-payoff of

$$\frac{\Pi(\gamma)}{N} = \gamma\Delta s + \gamma(q + \Delta)(\eta + \delta - \alpha)\phi_1. \tag{A-7}$$

The offer $p = \hat{v}_1$ delivers a shareholder acceptance probability of $\gamma = 1$ and a per-share bidder payoff of $(\eta + \delta - \alpha)\phi_1$. Recall from Lemma 1 that as p increases over the interval $(\hat{v}_1 - s, \hat{v}_1)$ the shareholder acceptance probability increases continuously from 0 to 1. Hence the bidder effectively picks γ (via choice of offer p) to maximize (A-7). By Lemma A-1, the derivative of the bidder's payoff (A-7) with respect to γ equals

$$\left(1 + \gamma\left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma}\right)\right)\Delta s + \left(\frac{q}{\Delta} + 1 + \gamma\frac{K-1}{\gamma}\right)\Delta(\eta + \delta - \alpha)\phi_1,$$

i.e., equals $N\Delta$ times

$$\frac{\kappa - \gamma}{1-\gamma}s + \left(\frac{q}{N\Delta} + \kappa\right)(\eta + \delta - \alpha)\phi_1. \tag{A-8}$$

There are three subcases to consider:

- Subcase $(\alpha - \eta - \delta)\phi_1 < 0$: There exists $\epsilon > 0$ (independent of N) such that (A-8) is strictly positive if $\gamma \leq \kappa + \epsilon$. So the bidder chooses $\gamma^* \in (\kappa + \epsilon, 1)$. The success probability approaches 1 as N grows large, while $\Delta \to 0$. From Lemma 1, if the bidder offers $p = \hat{v}_1$ then all shareholders tender with probability 1, and the bidder's per-shareholder payoff is $(v_1 + \delta - p) = -(\alpha - \eta - \delta)\phi_1$, which is a lower bound for the bidder's payoff. Hence the bidder's payoff approaches $-(\alpha - \eta - \delta)\Phi_1$ as N grows large (which also establishes that $\gamma^* \to 1$).

- Subcase $(\alpha - \eta - \delta)\phi_1 = 0$: The bidder chooses $\gamma^* = \kappa$. Therefore, $p^* = \mu(\kappa)$. The takeover success probability is bounded away from both 0 and 1. As N grows large the bidder's payoff Π^* approaches 0.

- Subcase $(\alpha - \eta - \delta)\,\phi_1 > 0$: There exists $\epsilon > 0$ (independent of N) such that (A-8) is strictly negative if $\gamma \geq \kappa - \epsilon$. So the bidder chooses $\gamma^* < \kappa - \epsilon$. The success probability approaches 0 as N grows large, and the bidder's payoff approaches 0.

■

Proof of Proposition 2. Let ϕ_1^* be the externality level chosen by the bidder in equilibrium. If $\eta + \delta = \alpha$ then by Corollary 1, if the bidder chooses ϕ_1 such that $s(\phi_1) < 0$ then the bidder's payoff is 0. If instead the bidder chooses ϕ_1 such that $s(\phi_1) > 0$ then the bidder's per-shareholder payoff is $\kappa\Delta(\kappa)\,s(\phi_1)$. Hence the bidder chooses $\phi_1 = \phi_1^{**}$. If $s(\phi_1^{**}) < 0$ then choosing ϕ_1^{**} is weakly optimal.

Next consider the case $\eta + \delta < \alpha$ (the case $\eta + \delta > \alpha$ follows from parallel arguments). From Theorem 1, if the bidder pledges ϕ_1^{**} and $s(\phi_1^{**}) > 0$ then it implies that shareholders tender with probability $\gamma^{**} \in [0, 1)$, and the bidder's per-shareholder payoff is (writing $\Delta^{**} = \Delta(\gamma^{**})$ and $q^{**} = q(\gamma^{**})$)

$$\gamma^{**}\Delta^{**}s(\phi_1^{**}) + \gamma^{**}(q^{**} + \Delta^{**})(\eta + \delta - \alpha)\,\phi_1^{**}.$$

First note that there is a $\phi_1^* < \phi_1^{**}$ yielding a higher payoff for the bidder. If $\gamma^{**} > 0$ this follows by envelope arguments: because $\frac{\partial s(\phi_1)}{\partial \phi_1}|_{\phi_1^{**}} = 0$, one can find a ϕ_1 marginally below ϕ_1^{**} such that, holding the acceptance probability unchanged at γ^{**} (by adjusting the offer p), the bidder's payoff is strictly higher. If instead $\gamma^{**} = 0$ then the bidder's payoff from ϕ_1^{**} is zero; moreover, by (16) a necessary condition for this case is $\phi_1^{**} > 0$. If the bidder instead chooses $\phi_1 < 0$, then either $s(\phi_1) > 0$ and from (16) the bidder's maximized payoff is strictly positive; or else $s(\phi_1) < 0$, and if the bidder offers p just above $v_1 + (\alpha - \eta)\,\phi_1$ there is an equilibrium of the tendering subgame in which shareholders accept the offer with probability 1 and the bidder's payoff is strictly positive.

If $s(\phi_1^{**}) < 0$ then, as noted above, the bidder can offer p just above $v_1 + (\alpha - \eta)\,\phi_1$ and make a profit of $(\delta + \eta - \alpha)\phi_1$. Thus, choosing the smallest $\phi_1 < 0$ in the choice set, and in particular $\phi_1 < \phi_1^{**}$, is optimal.

Conversely, suppose $s(\phi_1^{**}) > 0$ and consider any pledge $\tilde{\phi}_1 > \phi_1^{**}$, with $\tilde{v}_1 = v(\tilde{\phi}_1)$. If this pledge yields a zero payoff for the bidder then it is dominated by ϕ_1^* above. Otherwise, let $\tilde{\gamma}, \tilde{\Delta}, \tilde{q}$ be the associated probabilities. From Lemma 1, a necessary condition for $\tilde{\gamma} > 0$ is that the bidder's offer is at least $\tilde{v}_1 + (\alpha - \eta)\,\tilde{\phi}_1$. From (14) it follows that, regardless of whether

$\tilde{\gamma} \in (0,1)$ or $\tilde{\gamma} = 1$, the bidder's per-shareholder payoff is bounded above by

$$\begin{aligned} & \tilde{\gamma}\tilde{\Delta}s(\tilde{\phi}_1) + \tilde{\gamma}\left(\tilde{q} + \tilde{\Delta}\right)(\eta + \delta - \alpha)\,\tilde{\phi}_1 \\ < \;& \tilde{\gamma}\tilde{\Delta}s(\phi_1^{**}) + \tilde{\gamma}\left(\tilde{q} + \tilde{\Delta}\right)(\eta + \delta - \alpha)\,\phi_1^{**} \\ \leq \;& \gamma^{**}\Delta^{**}s(\phi_1^{**}) + \gamma^{**}\left(q^{**} + \Delta^{**}\right)(\eta + \delta - \alpha)\,\phi_1^{**}, \end{aligned}$$

so that $\tilde{\phi}_1$ is dominated by ϕ_1^{**}, which is in turn dominated by ϕ_1^* (the first inequality follows from the fact that ϕ_1^{**} maximizes $s(\phi_1)$ and $\phi_1^{**} < \tilde{\phi}_1$, while the second inequality follows because, by definition, γ^{**} maximizes the bidder's payoff given the choice ϕ_1^{**}.) ■

Proof of Proposition 3. The proof repeatedly uses the equilibrium characterization of Theorem 1. Let u_{ss} denote the expected utility of a target shareholder with social preferences if all target shares are held by social investors. Let u_{sf} denote the expected utility of a target shareholder with social preferences if all target shares are held by financial investors. Let u_f denote the expected utility of a target shareholder who is a financial investor if all target shares are held by financial investors. We define u_{sf} and u_f so that they don't include any transfers associated with trade between social and financial investors. Let Λ_s and Λ_f be the takeover-success probabilities if shares are held by social and financial investors, respectively. Hence

$$\begin{aligned} u_{ss} &= v_0 + \alpha\phi_0 + \Lambda_s s \\ u_{sf} &= \eta\phi_0 + \Lambda_f \eta\,(\phi_1 - \phi_0) \\ u_f &= v_0 + \Lambda_f\,(v_1 - v_0)\,. \end{aligned}$$

(Note that in writing u_{ss} we make use of the equilibrium condition that a target shareholder is indifferent between tendering and retention.) Trade surplus is

$$\begin{aligned} u_{sf} + u_f - u_{ss} &= \Lambda_f\,(v_1 - v_0 + \eta\,(\phi_1 - \phi_0)) + (\eta - \alpha)\,\phi_0 - \Lambda_s s \\ &= \Lambda_f s + \Lambda_f\,(\eta - \alpha)\,\phi_1 + (1 - \Lambda_f)\,(\eta - \alpha)\,\phi_0 - \Lambda_s s. \end{aligned}$$

Hence the trade surplus is positive if

$$(\Lambda_f - \Lambda_s)\,s > (\alpha - \eta)\,(\Lambda_f\phi_1 + (1 - \Lambda_f)\,\phi_0)\,. \tag{A-9}$$

As discussed in the main text, we characterize outcomes under the assumption that trade occurs if and only trade surplus $u_{sf} + u_f - u_{ss}$ is strictly positive.

First, we show that no trade occurs if $\eta = \alpha$. Specifically, we show that the trade surplus is weakly negative for all combinations of v_0, v_1, ϕ_0 and ϕ_1.

- Case, $v_1 < v_0$ and $s < 0$: $\Lambda_s = \Lambda_f = 0$.
- Case, $v_1 > v_0$ and $s < 0$: $\Lambda_s = 0 < \Lambda_f$.
- Case, $v_1 < v_0$ and $s > 0$: $\Lambda_s > 0 = \Lambda_f$.
- Case, $v_1 > v_0$ and $s > 0$: $\Lambda_s = \Lambda_f > 0$.

In all cases, the LHS of (A-9) is either zero or negative, while the RHS of (A-9) is simply 0. Next, consider the case of warm-glow preferences, $\eta < \alpha$.

- Case, $\phi_1 < 0$, $v_1 < v_0$ and $s > 0$: $\Lambda_s > \Lambda_f = 0$. The trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it harms social efficiency.
- Case, $\phi_1 < 0$, $v_1 > v_0$ and $s > 0$: $\Lambda_s > \Lambda_f > 0$. The trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it harms social efficiency.
- Case, $\phi_1 > 0$, $v_1 < v_0$ and $s > 0$: $\Lambda_s > \Lambda_f = 0$. The trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it harms social efficiency.
- Case, $\phi_1 > 0$, $v_1 > v_0$ and $s > 0$: $\Lambda_s < \Lambda_f$. The trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it enhances social efficiency.
- Case, $\phi_1 < 0$, $v_1 < v_0$ and $s < 0$: $\Lambda_f = 0$. $\Lambda_s = 1$ is an equilibrium; and $\Lambda_s = 0$ is an equilibrium if s is sufficiently negative. If $\Lambda_s = 0$ then trade (if it occurs) has no impact on social efficiency. If $\Lambda_s = 1$ then the trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it enhances social efficiency.
- Case, $\phi_1 < 0$, $v_1 > v_0$ and $s < 0$: $\Lambda_f \in (0, 1)$. $\Lambda_s = 1$ is an equilibrium; and $\Lambda_s = 0$ is an equilibrium if s is sufficiently negative. If $\Lambda_s = 0$ then the trade condition holds for some parameters;[27] and when trade occurs it harms social efficiency. If $\Lambda_s = 1$ then the trade condition holds for some parameters (e.g., ϕ_1

[27]Specifically: the trade condition is $\Lambda_f s > (\alpha - \eta)(\Lambda_f \phi_1 + (1 - \Lambda_f)\phi_0)$; we know $\phi_0 > \phi_1$, and so trade occurs only if $\Lambda_f s > (\alpha - \eta)\phi_1$; while the $\Lambda_s = 0$ condition is $s \leq (\alpha - \eta)\phi_1$. Since $s < 0$ it is possible to satisfy both inequalities.

- Case, $\phi_1 > 0$, $v_1 < v_0$ and $s < 0$: $\Lambda_s = \Lambda_f = 0$. Trade (if it occurs) has no impact on social efficiency.
- Case, $\phi_1 > 0$, $v_1 > v_0$ and $s < 0$: $\Lambda_s = 0 < \Lambda_f$. The trade condition holds for some parameters (e.g., ϕ_0 sufficiently negative); and when trade occurs it harms social efficiency.

■

Proof of Proposition 4. Let $v_B \equiv \frac{V_B}{N_B}$ and $v_B \equiv \frac{\Phi_B}{N_B}$. As noted in the main text, we assume that all relevant valuations are positive even after accounting for externalities:

$$V_0 + \alpha\Phi_0 > 0 \quad \text{(A-10)}$$

$$V_B + \alpha\Phi_B + \min\{0, \kappa(V_1 + \alpha\Phi_1), V_1 + \alpha\Phi_1\} > 0 \quad \text{(A-11)}$$

$$V_1 + \alpha\Phi_1 > 0. \quad \text{(A-12)}$$

That is, the target has a positive market value (inequality (A-10)) and the bidder has a positive market value both pre- and post-takeover (inequality (A-11)). Inequality (A-12) is marginally stronger, and is imposed only to avoid the degenerate case in which the bidder is indifferent between cash and equity offers because in both cases it acquires the target at zero cost.[28]

Also, let $\Gamma_{j,N}(\gamma) \equiv \binom{N}{j}\gamma^j(1-\gamma)^{N-j}$, with the convention that $\Gamma_{j,N} \equiv 0$ if $j > N$. To ease exposition, we omit γ whenever possible. For use below note that

$$\Gamma_{j,N} = \gamma\Gamma_{j-1,N-1} + (1-\gamma)\Gamma_{j,N-1} \quad \text{(A-13)}$$

$$(j+1)\Gamma_{j+1,N} = N\gamma\Gamma_{j,N-1}. \quad \text{(A-14)}$$

Given exchange offer e, a shareholder's expected payoff from retaining is

$$\sum_{j=0}^{K-1}\Gamma_{j,N-1}(v_0 + \alpha\phi_0) + \sum_{j=K}^{N-1}\Gamma_{j,N-1}(v_1 + \alpha\phi_1)$$

$$= \sum_{j=0}^{K-2}\Gamma_{j,N-1}(v_0 + \alpha\phi_0) + \sum_{j=K-1}^{N-1}\Gamma_{j,N-1}(v_1 + \alpha\phi_1) - \Gamma_{K-1,N-1}s,$$

[28]The case $V_1 + \alpha\Phi_1 \leq 0$ is relevant if $V_1 + \delta\Phi_1 > 0$. In this case, then for both cash and equity offers there is an equilibrium in which shareholders accept a coercive offer that is infinitesimally small, yielding the bidder the full payoff $V_1 + \delta\Phi_1$ in both cases. (If instead $V_1 + \delta\Phi_1 \leq 0$ then the takeover always fails, for the simple reason that the bidder loses from acquiring the target even at a price of zero.)

while the expected payoff from tendering is

$$\sum_{j=0}^{K-2}\Gamma_{j,N-1}\left(v_0+\alpha\phi_0\right)+\sum_{j=K-1}^{N-1}\Gamma_{j,N-1}e\frac{N_B\left(v_B+\alpha\phi_B\right)+\left(j+1\right)\left(v_1+\alpha\phi_1\right)}{N_B+e\left(j+1\right)}.$$

Hence, the net benefit from tendering is

$$\begin{aligned}\tau_{eq}\left(\gamma;e\right) &\equiv \Gamma_{K-1,N-1}s+\sum_{j=K-1}^{N-1}\Gamma_{j,N-1}\left(e\frac{N_B\left(v_B+\alpha\phi_B\right)+\left(j+1\right)\left(v_1+\alpha\phi_1\right)}{N_B+e\left(j+1\right)}-\left(v_1+\alpha\phi_1\right)\right)\\ &= \Gamma_{K-1,N-1}s+\sum_{j=K-1}^{N-1}\Gamma_{j,N-1}\frac{N_B\left(v_B+\alpha\phi_B\right)}{N_B+e\left(j+1\right)}\left(e-\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}\right). \qquad \text{(A-15)}\end{aligned}$$

Observe that $\tau_{eq}\left(\gamma;e\right)$ is strictly increasing in e for any $\gamma>0$.

If $s>0$ then for any $\gamma\in(0,1)$ there exists an offer $e<\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}$ such that $\tau_{eq}\left(\gamma;e\right)=0$; this follows from the fact that $\tau_{eq}\left(\gamma;0\right)<0<\tau_{eq}\left(\gamma;\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}\right)$. Moreover, if $e=\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}$ then $\tau_{eq}\left(1;e\right)=0$ and $\gamma=1$ is the unique stable tendering probability in the subgame.

If instead $s<0$ then if $e\leq\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}$ the unique stable tendering probability is $\gamma=0$; while if $e>\frac{v_1+\alpha\phi_1}{v_B+\alpha\phi_B}$ then $\gamma=1$ is a stable tendering probability.

The bidder's payoff (net of status quo) is

$$\begin{aligned}\Pi_{eq}\left(\gamma;e\right) &\equiv \gamma\sum_{j=K-1}^{N-1}\Gamma_{j,N-1}\left(N_B\frac{N_B\left(v_B+\delta\phi_B\right)+\left(j+1\right)\left(v_1+\delta\phi_1\right)}{N_B+e\left(j+1\right)}-N_B\left(v_B+\delta\phi_B\right)\right)\\ &+ \left(1-\gamma\right)\sum_{j=K}^{N-1}\Gamma_{j,N-1}\left(N_B\frac{N_B\left(v_B+\delta\phi_B\right)+j\left(v_1+\delta\phi_1\right)}{N_B+ej}-N_B\left(v_B+\delta\phi_B\right)\right) \qquad \text{(A-16)}\\ &= \gamma\sum_{j=K-1}^{N-1}\Gamma_{j,N-1}\frac{N_B\left(j+1\right)\left(v_B+\delta\phi_B\right)}{N_B+e\left(j+1\right)}\left(\frac{v_1+\delta\phi_1}{v_B+\delta\phi_B}-e\right)\\ &+ \left(1-\gamma\right)\sum_{j=K-1}^{N-2}\Gamma_{j+1,N-1}\frac{N_B\left(j+1\right)\left(v_B+\delta\phi_B\right)}{N_B+e\left(j+1\right)}\left(\frac{v_1+\delta\phi_1}{v_B+\delta\phi_B}-e\right). \qquad \text{(A-17)}\end{aligned}$$

For use below, we establish:

Claim: If $\Pi_{eq}\left(\gamma;e\right)>0$ then $\frac{\partial}{\partial\gamma}\Pi_{eq}\left(\gamma;e\right)>0$.

Proof of Claim: The condition $\Pi_{eq}\left(\gamma;e\right)>0$ implies $\left(v_B+\delta\phi_B\right)\left(\frac{v_1+\delta\phi_1}{v_B+\delta\phi_B}-e\right)>0$; this can be seen from (A-17). It then further follows that

$$\frac{N_B (j+1)(v_B + \delta\phi_B)}{N_B + e(j+1)} \left(\frac{v_1 + \delta\phi_1}{v_B + \delta\phi_B} - e \right) > \frac{N_B j (v_B + \delta\phi_B)}{N_B + ej} \left(\frac{v_1 + \delta\phi_1}{v_B + \delta\phi_B} - e \right). \tag{A-18}$$

Inequality (A-18) in turn implies that the first summation in (A-16) exceeds the second summation. Moreover, an increase in γ induces a first-order stochastic dominance shift in the distribution of j; consequently, (A-18) also implies that each of the two summations in (A-16) is increasing in γ. The claim then follows from the combination of these two observations.

From (A-13) and (A-14), $\gamma\Gamma_{j,N-1}(j+1) + (1-\gamma)\Gamma_{j+1,N-1}(j+1) = N\gamma\Gamma_{j,N-1}$, and so

$$\Pi_{eq}(\gamma; e) = N\gamma \sum_{j=K-1}^{N-1} \Gamma_{j,N-1} \frac{N_B (j+1)(v_B + \delta\phi_B)}{N_B + e(j+1)} \left(\frac{v_1 + \delta\phi_1}{v_B + \delta\phi_B} - e \right).$$

If $s > 0$ then in equilibrium $\tau_{eq}(\gamma; e) = 0$; using (A-15) it follows that

$$\Pi_{eq}(\gamma; e) = N\gamma\Gamma_{K-1,N-1}s + (\delta - \alpha) N\gamma \sum_{j=K-1}^{N-1} \Gamma_{j,N-1} \frac{N_B}{N_B + e(j+1)} (\phi_1 - e\phi_B). \tag{A-19}$$

If instead $s < 0$ then an equity offer infinitesimally above $e = \frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}$ leads all shareholders to tender, and delivers a bidder payoff infinitesimally below

$$\begin{aligned} N_B \frac{V_B + \delta\Phi_B + V_1 + \delta\Phi_1}{N_B + N\frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}} - (V_B + \delta\Phi_B) &= \frac{(V_B + \alpha\Phi_B)(V_1 + \delta\Phi_1) - (V_1 + \alpha\Phi_1)(V_B + \delta\Phi_B)}{V_B + \alpha\Phi_B + V_1 + \alpha\Phi_1} \\ &= (\delta - \alpha) \frac{V_B\Phi_1 - V_1\Phi_B}{V_B + \alpha\Phi_B + V_1 + \alpha\Phi_1}. \end{aligned} \tag{A-20}$$

Recall that if $s > 0$ then the bidder's payoff from a cash offer is (see (16), recalling the definitions of q and Δ and using $\eta = 0$)

$$\Pi(\gamma) = N\gamma\Gamma_{K-1,N-1}s + (\delta - \alpha) N\gamma \sum_{j=K-1}^{N-1} \Gamma_{j,N-1}\phi_1. \tag{A-21}$$

If instead $s < 0$ then a cash offer infinitesimally above $p = v_1 + \alpha\phi_1$ leads all shareholders to tender, and hence the bidder can approach the payoff

$$(\delta - \alpha)\Phi_1. \tag{A-22}$$

Part (a), $\delta = \alpha$: If $s \leq 0$ then from (A-20) and (A-22) the bidder's payoff is zero under both equity and cash offers. If instead $s > 0$, then recall that the bidder makes a cash offer that induces $\gamma = \kappa$. From (A-19) and (A-21), it is immediate that the bidder cannot do better with an equity offer than with a cash offer. It remains to establish that there is an equity offer that matches the bidder's payoff from the best cash offer. Let $e_\kappa < \frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}$ be the equity offer such that $\tau_{eq}(\kappa; e_\kappa) = 0$. Observe that there cannot exist $\gamma > \kappa$ such that $\tau_{eq}(\gamma; e_\kappa) = 0$, because by the Claim above, the bidder's payoff would be strictly higher at this γ, but by (A-19) and the fact that $\gamma\Gamma_{K-1,N-1}$ is maximized at κ the bidder's payoff would be strictly lower, a contradiction. It then follows from $\tau_{eq}(1; e_\kappa) < 0$ that $\gamma = \kappa$ is the highest stable subgame equilibrium under offer e_κ, thereby establishing bidder indifference.

Part (b), $\delta < \alpha$: We first consider the case of $s > 0$. Since any tendering probability can be induced as a stable equilibrium under a cash offer, from (A-19) and (A-21) a sufficient condition for the bidder to strictly prefer cash to equity is that

$$\phi_1 < \frac{N_B}{N_B + e(j+1)}(\phi_1 - e\phi_B) \text{ for all } j = K-1, \ldots, N-1$$

or equivalently,

$$\max\{\Phi_B + \kappa\Phi_1, \Phi_B + \Phi_1\} < 0.$$

Similarly, we next show that a sufficient condition for the bidder to strictly prefer equity to cash is

$$\min\{\Phi_B + \kappa\Phi_1, \Phi_B + \Phi_1\} > 0. \tag{A-23}$$

To see this, let γ_{ca} be the tendering probability under the bidder's payoff-maximizing cash offer. Let $e_{ca} \leq \frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}$ be the equity offer that induces tendering probability γ_{ca}. From (A-19), (A-21) and (A-23) it follows that $\Pi_{eq}(\gamma_{ca}; e_{ca}) > \Pi(\gamma_{ca})$. If γ_{ca} is the largest stable subgame equilibrium under offer e_{ca} then the result follows. If instead γ_{ca} is not the largest stable equilibrium or it is unstable then the fact that[29] $e_{ca} < \frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}$ implies $\tau_{eq}(1; e_{ca}) < 0$, and hence there must exist a stable subgame equilibrium $\tilde{\gamma} > \gamma_{ca}$. By the Claim, $\Pi_{eq}(\tilde{\gamma}; e_{ca}) > \Pi_{eq}(\gamma_{ca}; e_{ca})$, and hence $\Pi_{eq}(\tilde{\gamma}; e_{ca}) > \Pi(\gamma_{ca})$, establishing the result for $s > 0$.

Second, we consider the case of $s < 0$. From (A-20) and (A-22) cash offers dominate equity offers if and only if

$$\Phi_1(V_B + \alpha\Phi_B + V_1 + \alpha\Phi_1) - (V_B\Phi_1 - V_1\Phi_B) = (\Phi_1 + \Phi_B)(V_1 + \alpha\Phi_1) < 0,$$

thereby establishing the result for the case $\delta < \alpha$.

[29] If $e_{ca} = \frac{v_1 + \alpha\phi_1}{v_B + \alpha\phi_B}$ then $\gamma_{ca} = 1$, and is stable.

Part (b), $\delta > \alpha$: The analysis parallels the case $\delta < \alpha$, completing the proof. ■

Proof of Proposition 5. Special case of the equilibrium analysis of Online Appendix B. ■

Proof of Corollary 4. Straightforward adaption of the equilibrium analysis of Online Appendix B. ■

Proof of Proposition 6. If the bidder offers p then the gain from tendering is

$$\begin{aligned} & (q+\Delta)(p+\eta\phi_1-v_0-\alpha\phi_0)-q(s+\sigma(v_0+\eta\phi_1-v_1-\alpha\phi_1)) \\ = \;& \Delta s-(q+\Delta)(v_1+(\alpha-\eta)\phi_1-p)-\sigma q(v_0+\eta\phi_1-v_1-\alpha\phi_1). \end{aligned} \tag{A-24}$$

The bidder's per-shareholder payoff is

$$\gamma(q+\Delta)(v_1+\delta\phi_1-p)-(1-\gamma)\sigma q(v_0-v_1-\delta\phi_1), \tag{A-25}$$

where the second term reflects the bidder's litigation-induced acquisition of a share it values at $v_1+\delta\phi_1$ for a price v_0.

Note first that there is no equilibrium with $\gamma = 1$, since from (A-24) such an equilibrium would require (using (23))

$$v_1+(\alpha-\eta)\phi_1-p \leq -\sigma(v_0+\eta\phi_1-v_1-\alpha\phi_1) < 0,$$

which by balanced preferences implies that the bidder's payoff is strictly negative.

Hence the only possibility of $\gamma^* > 0$ is if the tendering probability in the tendering subgame is interior. In this case, balanced preferences imply that the bidder's payoff is

$$\gamma\Delta s-\sigma q(v_0+\eta\phi_1-v_1-\alpha\phi_1). \tag{A-26}$$

Recall that $\gamma\Delta$ is is single-peaked in γ, obtaining its maximum at $\gamma = \kappa$.[30] By condition (23), it follows that (A-26) obtains its maximum at $\gamma < \kappa$. Since the optimizing value is independent of N the result follows, completing the proof.

Finally: In footnote 25 we state that an analogous version of Proposition 6 holds if non-tendering shareholders litigate for cash compensation $v_1 - v_0$ while retaining their shares. In this case, the litigation condition (23) becomes $v_0 > v_1$; the gain from tendering (A-24)

[30]Formally: By the same arguments as in the proof of Lemma 1, the gain from tendering (A-24) is either monotone, single-peaked, or single-troughed in γ. Suppose that, contrary to the claimed result, the bidder's optimal offer p induces an equilibrium $\gamma \geq \kappa$. Then the bidder would strictly increase its profits by marginally reducing p, leading to a marginally lower γ in the tendering subgame.

becomes $\Delta s-(q+\Delta)(v_1+(\alpha-\eta)\phi_1-p)-\sigma q(v_0-v_1)$; the bidder's payoff (A-25) becomes $\gamma(q+\Delta)(v_1+\delta\phi_1-p)-(1-\gamma)\sigma q(v_0-v_1)$ and (A-26) becomes $\gamma\Delta s-\sigma q(v_0-v_1)$; and all steps in the argument are unchanged. ■

Online Appendix for
"(Ir)responsible Takeovers"

A Proofs of Lemmas A-1 and A-2

Proof of Lemma A-1. Here, adopt the convention that if $j > N$ then $\binom{N}{j} = 0$. We prove identity (A-2):

$$\begin{aligned}
\frac{\partial \Delta}{\partial \gamma} &= \frac{\partial}{\partial \gamma} \binom{N-1}{K-1} \gamma^{K-1} (1-\gamma)^{N-K} \\
&= \left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma} \right) \binom{N-1}{K-1} \gamma^{K-1} (1-\gamma)^{N-K} \\
&= \left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma} \right) \Delta.
\end{aligned}$$

We prove identity (A-3):

$$\begin{aligned}
\frac{\partial q}{\partial \gamma} &= \frac{\partial}{\partial \gamma} \sum_{j=K}^{N-1} \binom{N-1}{j} \gamma^j (1-\gamma)^{N-1-j} \\
&= \sum_{j=K}^{N-1} \binom{N-1}{j} j \gamma^{j-1} (1-\gamma)^{N-1-j} - \sum_{j=K}^{N-1} \binom{N-1}{j} (N-1-j) \gamma^j (1-\gamma)^{N-2-j} \\
&= (N-1) \sum_{j=K}^{N-1} \binom{N-2}{j-1} \gamma^{j-1} (1-\gamma)^{N-1-j} - (N-1) \sum_{j=K}^{N-2} \binom{N-2}{j} \gamma^j (1-\gamma)^{N-2-j} \\
&= (N-1) \sum_{j=K-1}^{N-2} \binom{N-2}{j} \gamma^j (1-\gamma)^{N-2-j} - (N-1) \sum_{j=K}^{N-2} \binom{N-2}{j} \gamma^j (1-\gamma)^{N-2-j} \\
&= (N-1) \binom{N-2}{K-1} \gamma^{K-1} (1-\gamma)^{N-1-K} \\
&= \frac{N-K}{1-\gamma} \binom{N-1}{K-1} \gamma^{K-1} (1-\gamma)^{N-K} \\
&= \frac{N-K}{1-\gamma} \Delta.
\end{aligned}$$

■

Proof of Lemma A-2. We need to show

$$\frac{\partial q}{\partial \gamma} \Delta > q \frac{\partial \Delta}{\partial \gamma}.$$

From Lemma A-1, this inequality is equivalent to

$$\frac{N-K}{1-\gamma}\Delta > \left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma}\right) q,$$

which is in turn equivalent to

$$\begin{aligned}
\frac{N-K}{1-\gamma}(q+\Delta) &> \frac{K-1}{\gamma} q \Leftrightarrow \\
\frac{N-K}{1-\gamma}\sum_{j=K-1}^{N-1}\binom{N-1}{j}\gamma^j(1-\gamma)^{N-1-j} &> \frac{K-1}{\gamma}\sum_{j=K}^{N-1}\binom{N-1}{j}\gamma^j(1-\gamma)^{N-1-j} \Leftrightarrow \\
(N-K)\sum_{j=K-1}^{N-1}\binom{N-1}{j}\gamma^j(1-\gamma)^{N-1-(j+1)} &> (K-1)\sum_{j=K}^{N-1}\binom{N-1}{j}\gamma^{j-1}(1-\gamma)^{N-1-j} \Leftrightarrow \\
(N-K)\sum_{j=K-1}^{N-1}\binom{N-1}{j}\gamma^j(1-\gamma)^{N-1-(j+1)} &> (K-1)\sum_{j=K-1}^{N-2}\binom{N-1}{j+1}\gamma^{j}(1-\gamma)^{N-1-(j+1)}.
\end{aligned}$$

Hence it is sufficient to establish that, for any $j = K-1,\ldots,N-2$,

$$(N-K)\binom{N-1}{j} > (K-1)\binom{N-1}{j+1},$$

i.e.,

$$\frac{N-K}{K-1} > \frac{N-1-j}{j+1}.$$

At $j = K-1$ this inequality is equivalent to $\frac{1}{K-1} > \frac{1}{K}$, which indeed holds. Since the RHS is decreasing in j, this completes the proof. ■

B Leveraged offers

A shareholder's payoff from retaining is

$$v_0 + \alpha\phi_0 + q\left(v_1 - d + \alpha\phi_1 - v_0 - \alpha\phi_0\right) = v_0 + \alpha\phi_0 + q\left(s-d\right), \tag{IA1}$$

while the payoff from tendering is given by (6). Hence the gain from tendering is

$$\tau_d\left(\gamma; p, d\right) \equiv \Delta\left(s-d\right) - \left(q+\Delta\right)\left(v_1 - d + \left(\alpha-\eta\right)\phi_1 - p\right). \tag{IA2}$$

Consequently, the equilibrium of the tendering subgame is fully characterized by Lemma 1, where v_1 is replaced by $v_1 - d$ and s is replaced by $s - d$.[31] The bidder's expected profit is given by (20).

We first characterize the bidder's profit-maximizing behavior conditional on some choice of d; and then optimize over d. There are three cases to consider. Analogously to the definition of $\hat{v}_1$, define $\hat{v}_1(d) \equiv v_1 - d + (\alpha - \eta)\phi_1$.

1. If $s > d$ then $\tau_d(\gamma; p, d) = 0$ in equilibrium, and hence from (20) the bidder's per-shareholder payoff is

$$\begin{aligned} & (1-\gamma) qd + \gamma\Delta(s-d) + \gamma(q+\Delta)d + \gamma(q+\Delta)(\eta+\delta-\alpha)\phi_1 \\ = \; & qd + \gamma\Delta s + \gamma(q+\Delta)(\eta+\delta-\alpha)\phi_1 \end{aligned} \tag{IA3}$$

2. If $s < d$ then $\gamma = 1$ is an equilibrium if $p > \hat{v}_1(d)$. Moreover, $\gamma = 0$ is also an equilibrium if $p < \hat{v}_1(d) - (s-d) = v_0 + \alpha\phi_0 - \eta\phi_1$.

3. If $s = d$ then if $p = \hat{v}_1(d)$, any $\gamma \in [0,1]$ is a tendering probability in the subgame, and the bidder's per-shareholder payoff is, from (IA3),

$$(q + \gamma\Delta) d + \gamma(q+\Delta)(\eta+\delta-\alpha)\phi_1.$$

If $p > (<) \hat{v}_1(d)$ then the unique equilibrium of the tendering subgame is $\gamma = 1$ ($\gamma = 0$).

Next, we analyze the bidder's choice of d.

Case: $s < 0$: Bidding $p = \hat{v}_1(d) - (s-d) = \hat{v}_1 - s$ induces tendering probability $\gamma = 1$ and per-shareholder bidder profits

$$s + (\eta+\delta-\alpha)\phi_1.$$

Note that leverage d is irrelevant.

Alternatively, by lowering the bid to $p = \hat{v}_1 + \epsilon$ (where $\epsilon > 0$) the bidder induces both $\gamma = 0, 1$ as equilibria of the tendering subgame. In this case, the bidder's per-shareholder payoff if $\gamma = 1$ is played is

$$d - \epsilon + (\eta+\delta-\alpha)\phi_1. \tag{IA4}$$

So in this case, the bidder chooses the maximal allowable leverage $d = v_1 - v_0$.

Hence:

- If $v_1 - v_0 < -(\eta+\delta-\alpha)\phi_1 < 0$ then the takeover always fails.

[31] In the knife edge case in which (p, d) are such that $s - d = 0$ and $p = v_1 - d + (\alpha - \eta)\phi_1$ then $\gamma^* = [0, 1]$.

- If $-(\eta+\delta-\alpha)\phi_1 \leq v_1 - v_0 < \alpha\phi_0 - (\eta+\delta)\phi_1$ then the bidder chooses leverage $d = v_1 - v_0$ and there is an equilibrium in which the takeover succeeds.

- If $v_1 - v_0 \geq \alpha\phi_0 - (\eta+\delta)\phi_1$ then the bidder chooses between $p = \hat{v}_1 - s$ and indeterminate leverage, and $p = \hat{v}_1 + \epsilon$ and leverage $d = v_1 - v_0$, with the choice depending on the probability that the $\gamma = 1$ equilibrium is selected in the latter case.

Case: $s > 0$ and $\phi_1 > \phi_0$: The condition $s > d$ holds for any $d \in [0, v_1 - v_0]$, and so the bidder's per-shareholder payoff is given by (IA3). It immediately follows that the bidder sets d to its maximal value of $d = v_1 - v_0$. It remains to characterize the bidder's choice of γ. Substituting in for d, the derivative of (IA3) with respect to γ is $N\Delta$ times

$$\begin{aligned} & \frac{1-\kappa}{1-\gamma}(v_1 - v_0) + \frac{\kappa-\gamma}{1-\gamma}s + \left(\frac{q}{N\Delta} + \kappa\right)(\eta+\delta-\alpha)\phi_1 \\ = \ & \frac{\kappa-\gamma}{1-\gamma}(\alpha\phi_1 - \alpha\phi_0) + v_1 - v_0 + \left(\frac{q}{N\Delta} + \kappa\right)(\eta+\delta-\alpha)\phi_1. \end{aligned} \tag{IA5}$$

Hence:

- If $v_1 - v_0 < -\kappa(\eta+\delta-\alpha)\phi_1$ then $(\eta+\delta-\alpha)\phi_1 < 0$ and so there exists $\epsilon > 0$ such that (IA5) is strictly negative for all $\gamma > \kappa - \epsilon$ and all N. Hence $\gamma^* \leq \kappa - \epsilon$.

- If $v_1 - v_0 > -\kappa(\eta+\delta-\alpha)\phi_1$ then there exists $\epsilon > 0$ such that (IA5) is strictly positive for all $\gamma < \kappa + \epsilon$ and all N. Hence $\gamma^* \geq \kappa + \epsilon$.

Case: $s > 0$ and $\phi_1 < \phi_0$: If $d \in [0, s)$ then the bidder's per-shareholder payoff is given by (IA3), which is increasing in d. Hence by choosing d sufficiently close to s, the bidder can approach a payoff of

$$qs + \gamma\Delta s + \gamma(q+\Delta)(\eta+\delta-\alpha)\phi_1. \tag{IA6}$$

Parallel to (IA5), the derivative of (IA6) with respect to γ is $N\Delta$ times

$$s + \left(\frac{q}{N\Delta} + \kappa\right)(\eta+\delta-\alpha)\phi_1. \tag{IA7}$$

If $(\eta+\delta-\alpha)\phi_1 \geq 0$ then (IA6) is strictly increasing in γ, while if $(\eta+\delta-\alpha)\phi_1 < 0$ then, by Lemma A-2, (IA6) is concave in γ, with an interior maximum if and only if $s + \kappa(\eta+\delta-\alpha)\phi_1 > 0$.

Alternatively, the bidder can choose leverage $d \in (s, v_1 - v_0]$. As in the case of $s < 0$ above: The bidder can ensure acceptance in the tendering subgame by offering $p = v_0 + \alpha\phi_0 - \eta\phi_1$ and obtain a per-shareholder payoff of (IA6) evaluated at $\gamma = 1$; or can lower the offer to $p = \hat{v}_1(d)$

and obtain both $\gamma = 0$ and $\gamma = 1$ as equilibria of the subgame, with payoff of (IA4) in the latter case.

Hence:

- If $(\eta + \delta - \alpha)\,\phi_1 \geq 0$ then the bidder chooses leverage $d = v_1 - v_0$ and chooses between a high offer that obtains certain acceptance and a per-shareholder bidder payoff of $s + (\eta + \delta - \alpha)\,\phi_1$, and a low offer that results in both $\gamma = 0$ and $\gamma = 1$ being tendering probabilities, and a payoff of $v_1 - v_0 + (\eta + \delta - \alpha)\,\phi_1$ if the latter is played.

- If $(\eta + \delta - \alpha)\,\phi_1 < 0$:

  – If $v_1 - v_0 < -(\eta + \delta - \alpha)\,\phi_1 < 0$ then the takeover always fails.

  – If $-(\eta + \delta - \alpha)\,\phi_1 \leq v_1 - v_0 < -\alpha\,(\phi_1 - \phi_0) - \kappa\,(\eta + \delta - \alpha)\,\phi_1$ then the bidder chooses leverage $d = v_1 - v_0$ and there is an equilibrium in which the takeover succeeds.

  – If $v_1 - v_0 \geq -\alpha\,(\phi_1 - \phi_0) - \kappa\,(\eta + \delta - \alpha)\,\phi_1$ then the bidder chooses between leverage $d = s - \epsilon$ and an offer $p \approx \hat{v}_1$ that is accepted with interior probability; and leverage $d = v_1 - v_0$ and an offer $p < \hat{v}_1$ that results in both $\gamma = 0$ and $\gamma = 1$ being tendering probabilities.

C Freeze-out mergers

In practice, freeze-out mergers allow bidders who acquire a controlling stake in the target firm to force the sale of all remaining non-tendered shares at the original offer price p, effectively eliminating the ability of target shareholders to retain minority stakes and benefit from the full post-takeover value appreciation, v_1. Importantly, however, freeze-out mergers cannot exclude non-tendering shareholders from the externalities generated by the takeover. Does this mean that freeze-out mergers change the conclusions of our analysis? Perhaps surprisingly, the answer is no, at least qualitatively.

Specifically, and as in Mueller and Panunzi (2004), suppose that following a successful takeover, the bidder is able to execute a successful freeze-out merger with (exogenous) probability $\theta \in [0, 1)$; our baseline model is the special case $\theta = 0$.[32] Following the discussion in

[32] See Dalkır at al. (2019) for the analysis of tender offers without externalities in which freeze-out mergers succeed if and only if the number of tendered shares is at least $F \in \{K + 1, ..., N - 1\}$. In this model, the analog of $q\theta$ is $\sum_{j=F}^{N-1} \binom{N-1}{j} \gamma^j (1 - \gamma)^{N-1-j}$, which is endogenous.

Amihud et al (2004) and Mueller and Panunzi (2004), we assume that legal restrictions ensure that minority shareholders receive the original offer p in a freeze-out.[33]

Proposition A-1. *If $s < 0$ then the equilibrium is invariant to the freeze-out probability θ. If $s > 0$, then:*

(i) If $(\alpha - \eta - \delta)\,\phi_1 < (>)\,0$ then $\Lambda^* \to 1$ ($\Lambda^* \to 0$) as $N \to \infty$.

(ii) If $(\alpha - \eta - \delta)\,\phi_1 = 0$ and $\kappa \geq 0.5$, then $\gamma^* > \kappa$, it is strictly increasing in θ, and $\gamma^* \to \kappa$ as $N \to \infty$.

Proposition A-1 establishes that freeze-outs do not affect the success rate of socially inefficient takeovers, or of any takeovers in the limit when social preferences are imbalanced. The reason is that, in these cases, shareholders either reject the offer with certainty ($\gamma = 0$) or accept it with certainty ($\gamma = 1$). In both scenarios, no minority shareholders remain after the transaction, rendering freeze-outs irrelevant.

However, when social preferences are balanced, the possibility of freeze-outs increases the success rate of socially efficient takeovers. To understand this result, note that with freeze-outs, the contribution of each shareholder (by tendering) remains the same, Δs, but the cost of contribution is effectively lower: If a shareholder retains his share, then with probability $q\theta$ both the takeover and the freeze-out succeed, and in those cases, the shareholder can no longer hold onto his share; he is forced to tender.[34] Since freeze-outs ameliorate non-excludability, they increase the bidder's probability of acquiring a share for a given offer, or alternatively, reduce the offer needed to induce a given tendering probability γ. In principle it is possible that the bidder responds by aggressively reducing the bid, so that the equilibrium success probability falls. But Proposition A-1 establishes that this doesn't happen, and that the success probability rises; a rough intuition is that the value of freeze-outs rises in the probability of takeover success, which raises the value that the bidder attaches to takeover success.

Proof of Proposition A-1. With freeze-outs, a shareholder's expected utility from retaining a share is

$$v_0 + \alpha\phi_0 + q\,(1-\theta)\,(v_1 + \alpha\phi_1 - v_0 - \alpha\phi_0) + q\theta\,(p + \eta\phi_1 - v_0 - \alpha\phi_0)\,. \tag{IA8}$$

[33] Dalkır et al. (2019) show that freeze-out mergers do not fully resolve the holdout problem as long as shareholders can be pivotal for the takeover, even if the probability of being pivotal is arbitrarily small. Mueller and Panunzi (2004) also highlight the limitations of freeze-out mergers, noting their vulnerability to legal challenges when shareholders are infinitesimal. Additionally, Bates, Becher, and Lemmon (2006) provide empirical evidence suggesting that minority shareholders retain some bargaining power in freeze-out mergers, further indicating that these mergers are not a complete solution to the holdout problem.

[34] The cost is reduced to $(q + \Delta - q\theta)\,(\hat{v}_1 - p)$.

That is: with probability $q(1-\theta)$ the takeover succeeds but the freeze-out fails, and a retaining-shareholder's payoff is exactly as in the non-freeze-out case; but with probability $q\theta$ the takeover succeeds and the freeze-out succeeds, and in this case a retaining shareholder receives p for the share and values the externalities associated with the takeover at $\eta\phi_1$.

A shareholder's expected utility from tendering does not depend on the success of the freeze-out, and so is the same as in the no-freeze-out baseline, see (6). Hence the marginal benefit of tendering is

$$\tau_\theta(\gamma; p) \equiv \Delta s - (q(1-\theta) + \Delta)(\hat{v}_1 - p), \tag{IA9}$$

which takes the same form as its no-freeze-out analogue (7), with the sole difference being that the probability q of holding out and benefiting from a takeover is reduced to $(1-\theta)q$.

Next, the bidder's expected payoff per shareholder is

$$(\gamma(q+\Delta) + (1-\gamma)\theta q)(v_1 - p + \delta\phi_1). \tag{IA10}$$

That is: Fix a representative shareholder. With probability γ the shareholder tenders; conditional on this, the takeover succeeds with probability $q+\Delta$, and the bidder gains $v_1 - p + \delta\phi_1$ from the tendered share. With probability $1-\gamma$ the shareholder retains the share; conditional on this, the takeover succeeds with probability q; and conditional on this, a freeze-out succeeds with probability θ, and the bidder again gains $v_1 - p + \delta\phi_1$ from the share acquired in the freeze-out.

It is straightforward to replace τ with τ_θ in the proof of Lemma 1, where $\theta \in [0, 1)$. If $s < 0$, the equilibrium of the tendering subgame exactly coincides with the no-freeze-out baseline ($\theta = 0$). Moreover, in this case the only possible equilibria are $\gamma = 0$ and $\gamma = 1$, and freeze-outs don't affect the bidder's profits in these cases. Consequently, in this case both the bidder's equilibrium offer and shareholders' equilibrium response coincide with the no-freeze-out baseline.

The remainder of the proof deals with the case of $s > 0$. The bidder's profit in a mixed-strategy equilibrium is N times

$$\begin{aligned}
& (\gamma (q+\Delta) + (1-\gamma) q\theta) (v_1 - \mu_\theta (\gamma) + \delta\phi_1) \\
= \ & (\gamma (q(1-\theta)+\Delta) + q\theta) \left(v_1 - \hat{v}_1 + \frac{\Delta}{q(1-\theta)+\Delta} s + \delta\phi_1 \right) \\
= \ & (\gamma (q(1-\theta)+\Delta) + q\theta) \left(\frac{\Delta}{q(1-\theta)+\Delta} s + (\delta+\eta-\alpha)\phi_1 \right) \\
= \ & \left(\Delta\gamma + \theta \frac{\Delta q}{q(1-\theta)+\Delta} \right) s + (\gamma (q(1-\theta)+\Delta) + q\theta)(\delta+\eta-\alpha)\phi_1. \qquad \text{(IA11)}
\end{aligned}$$

Moreover, the minimum offer that generates $\gamma = 1$ as an equilibrium for the tendering subgame is $p = \hat{v}_1$, which gives profits of $N(\delta+\eta-\alpha)\phi_1$, coinciding with the expression above as $\gamma \to 1$. Consequently the bidder effectively chooses $\gamma \in [0,1]$ to maximize (IA11).

Suppose $\delta + \eta \neq \alpha$. We show that large N the outcome is same as for non-freezeout case. The bidder's profit in (IA11) can be rewritten as

$$(\gamma (q+\Delta) + q\theta (1-\gamma)) \left[\frac{\Delta}{q(1-\theta)+\Delta} S + (\delta+\eta-\alpha)\Phi_1 \right]$$

Suppose $(\delta+\eta-\alpha)\Phi_1 < 0$. Notice $\Delta \to 0$ regardless of γ^*. If on the contrary $\lim_{N\to\infty} q > 0$, then it must be $\lim_{N\to\infty} \gamma^* > 0$. Bidder's payoff converges to $(\delta+\eta-\alpha)\Phi_1 \times \lim_{N\to\infty} (\gamma q + q\theta(1-\gamma)) < 0$, a contradiction. Therefore, it must be $\Lambda^* \to 0$.

Suppose $(\delta+\eta-\alpha)\Phi_1 > 0$. The bidder's profit from $\gamma = 1$ is $(\delta+\eta-\alpha)\Phi_1 > 0$. If on the contrary $\lim_{N\to\infty} q < 1$ then

$$\begin{aligned}
& (\delta+\eta-\alpha)\Phi_1 \lim_{N\to\infty} (\gamma q + q\theta(1-\gamma)) \\
< \ & (\delta+\eta-\alpha)\Phi_1 \lim_{N\to\infty} (\gamma + \theta(1-\gamma)) \\
\leq \ & (\delta+\eta-\alpha)\Phi_1,
\end{aligned}$$

a contradiction. Therefore, it must be $\Lambda^* \to 1$.

Suppose $\delta + \eta = \alpha$. From (IA11), the bidder's problem reduces to choosing γ to maximize

$$\Delta\gamma + \theta \frac{\Delta q}{q(1-\theta)+\Delta}. \qquad \text{(IA12)}$$

The term $\Delta\gamma$ is single-peaked and obtains its maximum at $\gamma = \frac{K}{N}$. Differentiating the second term in (IA12) gives

$$\begin{aligned}\frac{\partial}{\partial\gamma}\left(\frac{\Delta q}{q\left(1-\theta\right)+\Delta}\right) &= \frac{\left(\left(1-\theta\right)q+\Delta\right)\left(q\frac{\partial\Delta}{\partial\gamma}+\Delta\frac{\partial q}{\partial\gamma}\right)-\Delta q\left(\left(1-\theta\right)\frac{\partial q}{\partial\gamma}+\frac{\partial\Delta}{\partial\gamma}\right)}{\left(\left(1-\theta\right)q+\Delta\right)^2} \\ &= \frac{\left(1-\theta\right)q^2\frac{\partial\Delta}{\partial\gamma}+\left(1-\theta\right)q\Delta\frac{\partial q}{\partial\gamma}+\Delta q\frac{\partial\Delta}{\partial\gamma}+\Delta^2\frac{\partial q}{\partial\gamma}-\Delta q\left(1-\theta\right)\frac{\partial q}{\partial\gamma}-\Delta q\frac{\partial\Delta}{\partial\gamma}}{\left(\left(1-\theta\right)q+\Delta\right)^2} \\ &= \frac{\left(1-\theta\right)q^2\frac{\partial\Delta}{\partial\gamma}+\Delta^2\frac{\partial q}{\partial\gamma}}{\left(\left(1-\theta\right)q+\Delta\right)^2}. \qquad \text{(IA13)}\end{aligned}$$

To establish that the bidder selects $\gamma > \frac{K}{N}$ we show that (IA13) is strictly positive for all $\theta > 0$ and $\gamma \leq \frac{K}{N}$. Note that $\frac{\partial\Delta}{\partial\gamma} > 0$ if and only $\gamma < \frac{K-1}{N-1}$,[35] while $\frac{\partial q}{\partial\gamma} > 0$ for all $\gamma \in (0,1)$. Hence (IA13) is strictly positive for all $\gamma \leq \frac{K-1}{N-1}$. So it remains to show that (IA13) is strictly positive for $\gamma \in \left(\frac{K-1}{N-1}, \frac{K}{N}\right]$; and it suffices to establish this statement at $\theta = 0$.

Expanding (using Lemma A-1), we must show

$$\left(\frac{K-1}{\gamma}-\frac{N-K}{1-\gamma}\right)\Delta q^2+\Delta^2\frac{N-K}{1-\gamma}\Delta > 0 \text{ for } \gamma \in \left(\frac{K-1}{N-1}, \frac{K}{N}\right],$$

or equivalently,

$$\frac{1-\gamma}{\gamma}\left(K-1\right)-\left(N-K\right)+\left(\frac{\Delta}{q}\right)^2\left(N-K\right) > 0 \text{ for } \gamma \in \left(\frac{K-1}{N-1}, \frac{K}{N}\right].$$

From Lemma A-2, the ratio $\frac{\Delta}{q}$ is decreasing in γ, and so it suffices to establish the inequality at $\gamma = \frac{K}{N}$. By straightforward manipulation, this is equivalent to

$$\sqrt{K}\Delta > q \text{ at } \gamma = \frac{K}{N}. \qquad \text{(IA14)}$$

We establish inequality (IA14) in two steps. First, we fix $K \geq 2$, and establish the inequality for $N = 2K$. Second, we show that if (IA14) holds for $N = 2K$ then it also holds for any $N < 2K$.

For the first step, consider $N = 2K$. Note that there are K binomial terms from $\binom{N-1}{0}$ to $\binom{N-1}{K-1}$, and likewise $N-K = K$ binomial terms from $\binom{N-1}{K}$ to $\binom{N-1}{N-1}$. So by symmetry, it

[35] $\frac{\partial\Delta}{\partial\gamma} > 0$ is equivalent to $\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma} > 0$, i.e., to $(1-\gamma)K - (1-\gamma) - \gamma N + \gamma K > 0$, and hence to $K - 1 > \gamma(N-1)$.

follows that if $\gamma = \frac{K}{N} = \frac{1}{2}$ then $q = \frac{1}{2}$. Hence we need to show

$$\sqrt{K}\tbinom{2K-1}{K-1}\left(\frac{1}{2}\right)^{2K-1} > \frac{1}{2}.$$

We establish this by induction in K. At $K = 1$ the LHS evaluates to $\frac{1}{2}$. Hence it suffices to show that for any $K \geq 1$,

$$\sqrt{K+1}\tbinom{2(K+1)-1}{(K+1)-1}\left(\frac{1}{2}\right)^{2(K+1)-1} > \sqrt{K}\tbinom{2K-1}{K-1}\left(\frac{1}{2}\right)^{2K-1},$$

i.e.,

$$\sqrt{\frac{K+1}{K}}\left(\frac{1}{2}\right)^2 > \frac{(2K-1)!}{(2K+1)!}\frac{K!}{(K-1)!}\frac{(K+1)!}{K!} = \frac{(K+1)\,K}{(2K+1)\,2K},$$

i.e.,

$$K + \frac{1}{2} > \sqrt{K}\sqrt{K+1},$$

which indeed holds by the concavity of the log function.

For the second step, we show that if (IA14) holds for $N = 2K$ then it also holds for any $N < 2K$. It suffices to show that $\frac{q(\frac{K}{N})}{\Delta(\frac{K}{N})}$ is increasing in N (holding K fixed). Note

$$\frac{q}{\Delta} = \frac{\sum_{j=K}^{N-1}\binom{N-1}{j}\gamma^j(1-\gamma)^{N-1-j}}{\binom{N-1}{K-1}\gamma^{K-1}(1-\gamma)^{N-1-(K-1)}} = \sum_{j=K}^{N-1}\frac{(K-1)!\,(N-K)!}{j!\,(N-1-j)!}\gamma^{j-K+1}(1-\gamma)^{K-1-j}.$$

Defining $\tilde{j} = j - K + 1$ and substituting in $\gamma = \frac{K}{N}$,

$$\frac{q}{\Delta} = \sum_{\tilde{j}=1}^{N-K}\frac{(K-1)!\,(N-K)!}{(\tilde{j}+K-1)!\,(N-K-\tilde{j})!}\left(\frac{K}{N-K}\right)^{\tilde{j}}.$$

Expanding,

$$\frac{q}{\Delta} = \sum_{j=1}^{N-K}\frac{(N-K)\cdot\ldots\cdot(N-K-j+1)}{K\cdot\ldots\cdot(j+K-1)}\left(\frac{K}{N-K}\right)^j = \sum_{j=1}^{N-K}\frac{1\cdot\left(1-\frac{1}{N-K}\right)\cdot\ldots\cdot\left(1-\frac{j-1}{N-K}\right)}{1\cdot\left(1+\frac{1}{K}\right)\cdot\ldots\cdot\left(1+\frac{j-1}{K}\right)},$$

which is indeed increasing in N, thereby establishing (IA14).

Finally, we establish that the bidder's profit-maximizing choice of γ is strictly increasing in the freeze-out probability θ. Recall that the bidder sets γ to

$$\arg\max_{\gamma\in[0,1]} \left(\Delta\gamma + \theta \frac{\Delta q}{q\,(1-\theta)+\Delta} \right). \tag{IA15}$$

Note that both $\gamma = 0, 1$ give zero bidder profits, and so certainly the bidder's choice of γ is interior. From (IA13) we know that if

$$\frac{\partial}{\partial\gamma} \left(\frac{\Delta q}{q\,(1-\theta)+\Delta} \right) \geq 0$$

for some γ and θ, then this inequality holds strictly for any $\tilde{\theta} > \theta$: this follows trivially if $\frac{\partial\Delta}{\partial\gamma} \geq 0$, and follows easily if $\frac{\partial\Delta}{\partial\gamma} < 0$. Consequently, (IA15) is strictly increasing in θ over any neighborhood of θ -values in which it is unique. Finally, suppose there is some θ at which both γ_1 and $\gamma_2 > \gamma_1$ maximize the bidder's objective (IA12). Let $q_1, \Delta_1, q_2, \Delta_2$ denote q and Δ evaluated at γ_1 and γ_2. Note that

$$\Delta_1\gamma_1 + \theta \frac{\Delta_1 q_1}{q_1\,(1-\theta)+\Delta_1} = \Delta_2\gamma_2 + \theta \frac{\Delta_2 q_2}{q_2\,(1-\theta)+\Delta_2}.$$

We know $\gamma_2 > \gamma_1 > \kappa$ and hence both $\Delta_1 > \Delta_2$ and $\Delta_1\gamma_1 > \Delta_2\gamma_2$, and hence

$$\frac{\Delta_1 q_1}{q_1\,(1-\theta)+\Delta_1} < \frac{\Delta_2 q_2}{q_2\,(1-\theta)+\Delta_2}.$$

Note that

$$\frac{\partial}{\partial\theta} \frac{\Delta q}{q\,(1-\theta)+\Delta} = \frac{1}{\Delta} \left(\frac{\Delta q}{q\,(1-\theta)+\Delta} \right)^2,$$

implying that for $\tilde{\theta} > \theta$

$$\Delta_1\gamma_1 + \tilde{\theta} \frac{\Delta_1 q_1}{q_1 \left(1-\tilde{\theta}\right)+\Delta_1} < \Delta_2\gamma_2 + \tilde{\theta} \frac{\Delta_2 q_2}{q_2 \left(1-\tilde{\theta}\right)+\Delta_2}.$$

It again follows that the bidder's profit-maximizing choice γ is increasing in θ.

Next, we show $\gamma^* \to \kappa$. The derivative of the bidder's profit with respect to γ is

$$\begin{aligned}
&\Delta + \gamma \frac{\partial \Delta}{\partial \gamma} + \theta \frac{(1-\theta)\, q^2 \frac{\partial \Delta}{\partial \gamma} + \Delta^2 \frac{\partial q}{\partial \gamma}}{((1-\theta)\, q + \Delta)^2} \\
= \;& \Delta \left(K - \frac{\gamma}{1-\gamma} (N-K) + \theta \frac{(1-\theta)\, q^2 \left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma} \right) + \Delta^2 \frac{N-K}{1-\gamma}}{((1-\theta)\, q + \Delta)^2} \right) \\
= \;& \frac{N\Delta}{1-\gamma} \left(\kappa - \gamma + \theta \frac{(1-\theta)\, q^2 \left(\frac{1-\gamma}{\gamma} \left(\kappa - \frac{1}{N} \right) - (1-\kappa) \right) + \Delta^2 (1-\kappa)}{((1-\theta)\, q + \Delta)^2} \right)
\end{aligned}$$

Fix $\gamma > \kappa$, then the term inside the parentheses converges (as $N \to \infty$) to

$$(\kappa - \gamma) \left(1 + \frac{1}{\gamma} \frac{\theta}{1-\theta} \right) < 0$$

Combined with the existing result that $\gamma > \kappa$ for any N, this establishes that $\gamma^* \to \kappa$ as $N \to \infty$. ■

D Consequentialist bidders

In this Appendix we extend the analysis to bidders with consequentialist preferences: in addition to deriving a warm-glow utility of $\delta\phi_1$ per acquired share, the bidder internalizes an externality of $\rho\phi_1$ ($\rho\phi_0$) per non-acquired share if the takeover succeeds (fails), where $\rho \in [0, \delta]$. Proposition A-2 below generalizes Theorem 1 and shows that consequentialist preferences ($\rho > 0$) can backfire. Specifically: starting from a case in which preferences are balanced ($\eta + \delta = \alpha$, for example, because shareholders are consequentialist and the bidder is purely profit-orientated), the introduction of consequentialist preferences for the bidder reduces the likelihood of socially efficient takeovers that worsen externalities (i.e., $s > 0$ but $\phi_1 < \phi_0$).

The intuition for this result starts from the generalized holdout property (17): because of free-riding by target shareholders, the bidder captures only a small fraction of the surplus (s). However, under consequentialist preferences the bidder fully internalizes the negative externalities associated with the takeover. This asymmetry leads the bidder to place excessive weight on these externalities in its bidding strategy, which can distort the takeover decision and ultimately block an otherwise socially beneficial takeover. Paradoxically, this implies that a purely profit-maximizing bidder (i.e., ones with $\delta = \rho = 0$) may achieve higher social efficiency. This finding provides a normative rationale for a *narrowed Friedman doctrine* for acquiring firms, particularly when target shareholders already exhibit social responsibility.

Proposition A-2. *Suppose the bidder has consequentialist preferences* ρ.

(*i*) *Suppose* $s < 0$. *If* $s \leq (\alpha - \eta - \delta + \rho)\,\phi_1 - \rho\,(\phi_1 - \phi_0)$, *then* $\gamma^* = 0$ *is an equilibrium. If* $(\alpha + \rho - \delta - \eta)\,\phi_1 - \rho\,(\phi_1 - \phi_0) < 0$, *then* $\gamma^* = 1$ *is an equilibrium. No other equilibrium exists.*

(*ii*) *Suppose* $s > 0$ *and* $\rho\,(\phi_1 - \phi_0) = 0$. *In the unique equilibrium:*

- (*a*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 < 0$ *then* $\gamma^* > \kappa$, *and* $\Lambda^* \to 1$ *as* $N \to \infty$.
- (*b*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 = 0$ *then* $\gamma^* = \kappa$, *and the takeover outcome is uncertain as* $N \to \infty$.
- (*c*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 > 0$ *then* $\gamma^* < \kappa$, *and* $\Lambda^* \to 0$ *as* $N \to \infty$.

(*iii*) *Suppose* $s > 0$ *and* $\rho\,(\phi_1 - \phi_0) > 0$. *In the unique equilibrium:*

- (*a*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 < \frac{\rho}{\kappa}\,(\phi_1 - \phi_0)$ *then* $\Lambda^* \to 1$ *as* $N \to \infty$.
- (*b*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 \geq \frac{\rho}{\kappa}\,(\phi_1 - \phi_0)$ *then* $\Lambda^* \to 0$ *as* $N \to \infty$.

(*iv*) *Suppose* $s > 0$ *and* $\rho\,(\phi_1 - \phi_0) < 0$. *In the unique equilibrium:*

- (*a*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 \leq \frac{\rho}{\kappa}\,(\phi_1 - \phi_0)$ *then* $\Lambda^* \to 1$ *as* $N \to \infty$.
- (*b*) *If* $(\alpha - \eta - \delta + \rho)\,\phi_1 \geq 0$ *then* $\Lambda^* \to 0$ *as* $N \to \infty$.

Proof. In this setup, the bidder's expected payoff is

$$\Pi\,(\gamma;\rho) = N\left[\gamma\,(q + \Delta)\,(v_1 - p + \delta\phi_1) + (1 - \gamma)\,q\rho\phi_1 + (1 - q - \gamma\Delta)\,\rho\phi_0\right]. \tag{IA16}$$

Effectively, the bidder's objective is to maximize

$$\gamma\,(q + \Delta)\,(v_1 - p + (\delta - \rho)\,\phi_1) + (q + \gamma\Delta)\,\rho\,(\phi_1 - \phi_0)\,. \tag{IA17}$$

Compared to baseline model, the bidder's payoff reflects two sources of incremental social benefit: the warm-glow preferences, captured by $\delta - \rho$, and the change in takeover externalities driven by consequentialist preferences, quantified as $(q + \gamma\Delta)\,\rho\,(\phi_1 - \phi_0)$, where $q + \gamma\Delta$ is the probability the takeover succeeds.

Notice that the tendering subgame does not change and thus Lemma 1 applies.

If $s < 0$ then Lemma 1 implies that γ^* is given by (9). From (IA16), $\Pi\,(0) = N\rho\phi_0$ and $\Pi\,(1) = N\,(v_1 - p + \delta\phi_1)$. Hence if $v_1 - \hat{v}_1 + \delta\phi_1 < \rho\phi_0 \Leftrightarrow (\alpha + \rho - \delta - \eta)\,\phi_1 - \rho\,(\phi_1 - \phi_0) > 0$, then the bidder's payoff is strictly smaller than $N\rho\phi_0$ in any equilibrium with $\gamma^* = 1$. In this case, $\gamma = 0$ is the unique equilibrium. Conversely, if $(\alpha + \rho - \delta - \eta)\,\phi_1 - \rho\,(\phi_1 - \phi_0) \leq 0$ then for any $p \in (\hat{v}_1, \hat{v}_1 - s]$ there is an equilibrium in which the bidder offers p and $\gamma^* = 1$. The bid $p = \hat{v}_1 - s$ guarantees both $\gamma^* = 1$ and a payoff higher than $N\rho\phi_0$ for the bidder if $v_1 - (\hat{v}_1 - s) + \delta\phi_1 > \rho\phi_0 \Leftrightarrow s > (\alpha + \rho - \eta - \delta)\,\phi_1 - \rho\,(\phi_1 - \phi_0)$. Hence an equilibrium with $\gamma^* = 0$ exists if and only if $s \leq (\alpha + \rho - \eta - \delta)\,\phi_1 - \rho\,(\phi_1 - \phi_0)$.

Second, if $s > 0$ then Lemma 1 implies that γ^* is given by (11). Offers in $(\hat{v}_1 - s, \hat{v}_1)$ deliver shareholder acceptance probabilities γ satisfying $\mu(\gamma) = p$ and associated bidder's payoff (per share) of

$$\frac{\Pi(\gamma)}{N} = \gamma\Delta\left[s + \rho\,(\phi_1 - \phi_0)\right] + \gamma\,(q + \Delta)\,(\delta - \rho + \eta - \alpha)\,\phi_1 + q\rho\,(\phi_1 - \phi_0) + \rho\phi_0$$

The offer $p = \hat{v}_1$ delivers a shareholder acceptance probability of $\gamma = 1$ and a bidder payoff of $N\,(\delta + \eta - \alpha)\,\phi_1 = \Pi(1)$. Recall from Lemma 1 that as p increases over the interval $(\hat{v}_1 - s, \hat{v}_1)$ the shareholder acceptance probability increases continuously from 0 to 1. Hence the bidder effectively picks γ (via choice of offer p) to solve $\max_{\gamma \in [0,1]} \Pi(\gamma)$. Rearranging,

$$\begin{aligned}\frac{\Pi(\gamma)}{N} &= \gamma\,(q + \Delta)\left[s + \rho\,(\phi_1 - \phi_0) + (\delta - \rho + \eta - \alpha)\,\phi_1\right] \\ &\quad -\gamma q\left[s + \rho\,(\phi_1 - \phi_0)\right] + q\rho\,(\phi_1 - \phi_0) + \rho\phi_0\end{aligned}$$

From Lemma A-1,

$$\begin{aligned}\frac{\partial\left[\gamma\,(q + \Delta)\right]}{\partial\gamma} &= q + K\Delta \\ \frac{\partial\left[\gamma q\right]}{\partial\gamma} &= q + \frac{N - K}{1 - \gamma}\gamma\Delta,\end{aligned}$$

Hence

$$\begin{aligned}\frac{1}{N}\frac{\partial\Pi(\gamma)}{\partial\gamma} &= (q + K\Delta)\left[s + \rho\,(\phi_1 - \phi_0) + (\delta - \rho + \eta - \alpha)\,\phi_1\right] \\ &\quad - \left(q + \frac{N - K}{1 - \gamma}\gamma\Delta\right)\left[s + \rho\,(\phi_1 - \phi_0)\right] + \frac{N - K}{1 - \gamma}\Delta\rho\,(\phi_1 - \phi_0) \\ &= \frac{\kappa - \gamma}{1 - \gamma}N\Delta s + \left(\frac{q}{N\Delta} + \kappa\right)N\Delta\,(\delta - \rho + \eta - \alpha)\,\phi_1 + \Delta N\rho\,(\phi_1 - \phi_0) \quad \text{(IA18)}\end{aligned}$$

Hence
$$\frac{\partial\Pi(\gamma)}{\partial\gamma} > 0 \Leftrightarrow \frac{\kappa - \gamma}{1 - \gamma}s > \left(\frac{q}{N\Delta} + \kappa\right)(\alpha - \eta - \delta + \rho)\,\phi_1 - \rho\,(\phi_1 - \phi_0)\,.$$

Suppose $\rho(\phi_1 - \phi_0) = 0$. There are three subcases:

- Subcase $(\alpha - \eta - \delta + \rho)\phi_1 < 0$: There exists $\epsilon > 0$ (independent of N) such that $\frac{\partial \Pi(\gamma)}{\partial \gamma} > 0$ if $\gamma \leq \kappa + \epsilon$. So the bidder chooses $\gamma^* \in (\kappa + \epsilon, 1)$. The success probability approaches 1 as N grows large, while $\Delta \to 0$. From Lemma 1, if the bidder offers $p = \hat{v}_1$ then all shareholders tender with probability 1, and so the bidder's payoff is $N(v_1 + \delta - p) = -(\alpha - \eta - \delta)\Phi_1$. This offer is suboptimal, and so $-(\alpha - \eta - \delta)\Phi_1$ is a lower bound for the bidder's payoff. Hence the bidder's payoff approaches $-(\alpha - \eta - \delta)\Phi_1$ as N grows large (which also establishes that $\gamma^* \to 1$).

- Subcase $(\alpha - \eta - \delta + \rho)\phi_1 = 0$: The bidder chooses $\gamma^* = \kappa$. Therefore, $p^* = \mu(\kappa)$. The takeover success probability is bounded away from both 0 and 1. As N grows large the bidder's payoff Π^* approaches $\rho\Phi_0$.

- Subcase $(\alpha - \eta - \delta + \rho)\phi_1 > 0$: There exists $\epsilon > 0$ (independent of N) such that $\frac{\partial \Pi(\gamma)}{\partial \gamma} < 0$ if $\gamma \geq \kappa - \epsilon$. So the bidder chooses $\gamma^* < \kappa - \epsilon$. The success probability approaches 0 as N grows large, and the bidder's payoff approaches $\rho\Phi_0$.

Suppose $\rho(\phi_1 - \phi_0) > 0$. There are three subcases:

- Subcase $(\alpha - \eta - \delta + \rho)\phi_1 \leq 0$: There exists $\epsilon > 0$ (independent of N) such that $\frac{\partial \Pi(\gamma)}{\partial \gamma} > 0$ if $\gamma \leq \kappa + \epsilon$. So the bidder chooses $\gamma^* \in (\kappa + \epsilon, 1)$. The success probability approaches 1 as N grows large, while $\Delta \to 0$. From Lemma 1, if the bidder offers $p = \hat{v}_1$ then all shareholders tender with probability 1, and so the bidder's payoff is $N(v_1 + \delta - p) = -(\alpha - \eta - \delta)\Phi_1$. This offer is suboptimal, and so $-(\alpha - \eta - \delta)\Phi_1$ is a lower bound for the bidder's payoff. Hence the bidder's payoff approaches $-(\alpha - \eta - \delta)\Phi_1$ as N grows large (which also establishes that $\gamma^* \to 1$).

- Suppose $0 < (\alpha - \eta - \delta + \rho)\phi_1 < \frac{\rho}{\kappa}(\phi_1 - \phi_0)$. Recall that according to Lemma A-2, $\frac{q}{\Delta}$ is strictly increasing in γ (with limits being 0 and ∞). Thus, there exists $\bar{N} > 0$ such that if $N > \bar{N}$ there exists $\epsilon > 0$ (independent of N) such that $\frac{\partial \Pi(\gamma)}{\partial \gamma} > 0$ if $\gamma \leq \kappa + \epsilon$. So the bidder chooses $\gamma^* \in (\kappa + \epsilon, 1)$. The success probability approaches 1 as N grows large.

- Subcase $(\alpha - \eta - \delta + \rho)\phi_1 \geq \frac{\rho}{\kappa}(\phi_1 - \phi_0)$. There exists $\epsilon > 0$ (independent of N) such that $\frac{\partial \pi(\gamma)}{\partial \gamma} < 0$ if $\gamma \geq \kappa - \epsilon$. So the bidder chooses $\gamma^* \in [0, \kappa - \epsilon)$, the success probability approaches 0 as N grows large, and the bidder's payoff approaches $\rho\Phi_0$.

Suppose $\rho(\phi_1 - \phi_0) < 0$. There are three subcases:

- Subcase $(\alpha-\eta-\delta+\rho)\,\phi_1 \le \frac{\rho}{\kappa}(\phi_1-\phi_0)$: There exists $\epsilon>0$ (independent of N) such that $\frac{\partial\Pi(\gamma)}{\partial\gamma}>0$ if $\gamma\le\kappa+\epsilon$. So the bidder chooses $\gamma^*\in(\kappa+\epsilon,1)$. The success probability approaches 1 as N grows large, while $\Delta\to 0$. From Lemma 1, if the bidder offers $p=\hat{v}_1$ then all shareholders tender with probability 1, and so the bidder's payoff is $N(v_1+\delta-p) = -(\alpha-\eta-\delta)\,\Phi_1$. This offer is suboptimal, and so $-(\alpha-\eta-\delta)\,\Phi_1$ is a lower bound for the bidder's payoff. Hence the bidder's payoff approaches $-(\alpha-\eta-\delta)\,\Phi_1$ as N grows large (which also establishes that $\gamma^*\to 1$).

- Subcase $(\alpha-\eta-\delta+\rho)\,\phi_1\ge 0$: There exists $\epsilon>0$ (independent of N) such that $\frac{\partial\Pi(\gamma)}{\partial\gamma}<0$ if $\gamma\ge\kappa-\epsilon$. So the bidder chooses $\gamma^*\in[0,\kappa-\epsilon)$, the success probability approaches 0 as N grows large, and the bidder's payoff approaches $\rho\Phi_0$.

■

E Unconditional offers

We consider an unconditional tender offer, in which the bidder offers p for each share in the target *without* the condition that at least K shareholders accept.

To summarize: relative to a conditional offer, an unconditional offer introduces a gain/loss from trade if $(\eta+\delta-\alpha)\,\phi_0\ne 0$; and under some conditions, different feasibility/multiplicity of tendering probabilities in the tendering subgame.

E.1 Basics

A shareholder's payoff from accepting an unconditional offer is simply

$$p+(q+\Delta)\,(\eta\phi_1-\eta\phi_0)+\eta\phi_0.$$

A shareholder's payoff from retention continues to be given by (5). Hence the gain from tendering is

$$\tau_{un}(\gamma;p)=\Delta s+(p-v_0-(\alpha-\eta)\,\phi_0)-(q+\Delta)\,(s-(\eta\phi_1-\eta\phi_0)).$$

Note that

$$\begin{aligned}\tau_{un}(0;p) &= p-v_0-(\alpha-\eta)\,\phi_0\\ \tau_{un}(1;p) &= p-v_1-(\alpha-\eta)\,\phi_1.\end{aligned}$$

In particular, and in contrast to the case of conditional offers, whether or not $\gamma = 0$ is an equilibrium of the tendering subgame is determined by whether p exceeds $v_0 + (\alpha - \eta)\,\phi_0$.

Differentiation yields

$$\begin{aligned}\frac{\partial \tau_{un}}{\partial \gamma} &= \left(\left(\frac{K-1}{\gamma} - \frac{N-K}{1-\gamma}\right) s - \frac{K-1}{\gamma}\left(s - (\eta\phi_1 - \eta\phi_0)\right)\right)\Delta \\ &= \left(\frac{K-1}{\gamma}\left(\eta\phi_1 - \eta\phi_0\right) - \frac{N-K}{1-\gamma} s\right)\Delta.\end{aligned}$$

Consequently, if $s < 0$ then τ_{un} is monotone increasing if $\phi_1 \geq \phi_0$, and is decreasing then increasing if $\phi_1 < \phi_0$; while if $s > 0$ then τ_{un} is increasing then decreasing if $\phi_1 > \phi_0$, and is monotone decreasing $\phi_1 \leq \phi_0$.

Hence: Different from the case of conditional offers: if $s < 0$ then there may exist a stable interior equilibrium of the tendering subgame if $\phi_1 < \phi_0$; and if $s > 0$ and $\phi_1 > \phi_0$ then multiple equilibira of the tendering subgame may exist, and not all tendering probabilities γ are achievable.

The bidder's per-shareholder payoff is

$$\gamma\left(v_0 + \delta\phi_0 + (q+\Delta)\left(v_1 + \delta\phi_1 - v_0 - \delta\phi_0\right) - p\right).$$

If the tendering probability is interior then the bidder's per-shareholder payoff is (using $\tau_{un} = 0$)

$$\gamma\Delta s + (\eta + \delta - \alpha)\,\gamma\left((q+\Delta)\left(\phi_1 - \phi_0\right) + \phi_0\right). \tag{IA19}$$

From (15), if p_{un} and p are, respectively, unconditional and conditional offers that both induce the same tendering probability $\gamma < 1$, then the bidder's profits are same in the two cases if $(\eta + \delta - \alpha)\,\phi_0 = 0$.

As a final (and trivial) preliminary observation: if p_{un} and $p = p_{un}$ are, respectively, unconditional and conditional offers that both induce $\gamma = 1$ then both bidder and target-shareholder payoffs are identical across the two offers.

E.2 Direct gains/losses from trade: $(\eta + \delta - \alpha)\,\phi_0 \neq 0$

A potential gain from using an unconditional offer arises if

$$(\eta + \delta - \alpha)\,\phi_0 > 0.$$

If a target shareholder holds the share under status quo operations, the utility from externality-exposure is $\alpha\phi_0$, while if the share is held by the bidder the combined (across divested target shareholder and bidder) utility from externality-exposure increases to $\eta\phi_0 + \delta\phi_0$, even without any change in operations. In this case, unconditional offers enjoy a potential advantage stemming from this utility gain.

Similarly, if

$$(\eta + \delta - \alpha)\,\phi_0 < 0$$

then unconditional offers are at a disadvantage because of the utility loss.

E.3 No direct gains/losses from trade: $\phi_0 = 0$

In order to focus on differences between unconditional and conditional offers stemming from effects that go beyond the direct gains from trade just discussed, we assume now that

$$\phi_0 = 0.$$

Moreover, and for purely for conciseness, we assume

$$\eta + \delta \leq \alpha,$$

which we take to be the more relevant case in practice. We establish:

Proposition A-3 *Suppose that $\phi_0 = 0$ and $\eta + \delta \leq \alpha$. The bidder strictly prefers an unconditional offer to a conditional offer* only if *$s < 0$, $\phi_1 < 0$ and $\eta + \delta < \alpha$.*

Proposition A-3 identifies relatively narrow criteria under which a bidder would favor unconditional offers. When these criteria are met, the specific advantage that an unconditional offer delivers is better equilibrium selection (from the bidder's perspective).

In many cases, if unconditional offers are favored, the effect is to increase the probability of a socially inefficient takeover.

Proof of Proposition A-3. First, consider the case of $s > 0$. Suppose the bidder make an unconditional offer p_{un} and that shareholders tender with probability γ_{un}. If $\gamma_{un} = 1$ then $p_{un} \geq v_1 + (\alpha - \eta)\,\phi_1$, and the bidder can achieve the same outcome as a unique equilibrium by making a conditional offer. If instead $\gamma_{un} < 1$ then from (IA19) the bidder can again achieve the same outcome as a unique equilibrium by making a conditional offer.

Second, consider the case of $s < 0$ and $\phi_1 > 0$. Suppose the bidder makes an unconditional offer p_{un} and that shareholders tender with probability γ_{un}. If $\gamma_{un} = 1$ then $p_{un} > v_1 +$

$(\alpha - \eta)\,\phi_1 \geq v_1 + \delta\phi_1$; this cannot be an equilibrium since the bidder's payoff is strictly negative. Similarly, $\gamma_{un} \in (0,1)$ cannot be an equilibrium since from (IA19) the bidder's payoff is strictly negative. Hence the takeover must fail under an unconditional offer, and the bidder can trivially replicate this outcome under a conditional offer.

Third, consider the case of $s < 0$ and $(\eta + \delta - \alpha)\,\phi_1 = 0$. By parallel steps to above, the bidder's payoff under an unconditional offer are weakly negative, and the bidder can trivially replicate this outcome under a conditional offer.

Finally, consider the case of $s < 0$ and $\phi_1 < 0$ and $\eta + \delta < \alpha$. If the bidder makes a conditional offer of $p = v_1 + (\alpha - \eta)\,\phi_1 + \epsilon < v_1 + \delta\phi_1$ then it obtains a strictly positive payoff if shareholders play $\gamma = 1$ in the subgame; but there also exists an equilibrium in which shareholders play $\gamma = 0$ in the subgame. In order to eliminate the $\gamma = 0$ equilibrium the bidder would need to raise the offer to $v_1 + (\alpha - \eta)\,\phi_1 - s = v_0 - \eta\phi_1 > v_0$. In contrast, by making an unconditional offer of $\max\{v_0, v_1 + (\alpha - \eta)\,\phi_1\} + \epsilon$ the bidder preserves the $\gamma = 1$ and eliminates the $\gamma = 0$ equilibrium. The advantage of the unconditional offer is especially clear if $v_0 \leq v_1 + (\alpha - \eta)\,\phi_1$, since in this case an unconditional offer of $p = v_1 + (\alpha - \eta)\,\phi_1 + \epsilon$ eliminates the $\gamma = 0$ outcome of the tendering subgame at zero cost. ■