Activism and Takeovers

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August 2020

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Abstract

We compare activism and takeovers from a blockholder's perspective who can invest effort into improving firm value. Profits from the two intervention modes move in opposite directions when the marginal return to effort changes such that activism, although less efficient, can be more profitable. Activists are most efficient when brokering takeovers rather than restructuring firms directly. Such takeover activism should record superior returns as its opportunity cost includes the foregone returns from free-riding on tender offers instead. Our results suggest that activists specialize in governance reforms and that limited, temporary engagement is a strength rather than a shortcoming of activism.

Keywords: Hedge fund activism, takeover activism, merger activism, hostile takeovers, tender offers, market for corporate influence, market for corporate control, blockholders

JEL Classifications: G34, G23

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> It is our contention that sizeable profits can be earned by taking large positions in 'undervalued' stocks and then attempting to control the destinies of the companies in question by:
>
> a) trying to convince management to liquidate or sell the company to a 'white knight'; b) waging a proxy contest; c) making a tender offer and/or; d) selling back our position to the company."
>
> —Excerpt from the "Icahn Manifesto," 1976

1 Introduction

Building on the premise that dispersed shareholders have little incentive to monitor management, theories of shareholder governance focus on blockholders whose large stakes may lead them to bear the effort of engaging with management. Existing theories offer a wealth of insights on activism and takeovers, the mechanisms through which blockholders can intervene, yet little in the way of a direct comparison in terms of profitability and efficiency.

Dual free-rider problem. This omission is partly owed to the fact that it is not straightforward to derive a trade-off because free-riding behavior of dispersed shareholders impairs both mechanisms. When a shareholder becomes active, others reap part of the gains without sharing in the costs. While concentrated ownership reduces such *Jensen-Meckling* (JM) free-riding, the flawed conclusion that the free-rider problem can be avoided by buying more shares has been dismantled by Grossman and Hart (1980): dispersed shareholders only sell if the price reflects any anticipated value improvement and so free-ride too. According to Orol (2008, p.62f), practitioners are aware of such *Grossman-Hart* (GH) free-riding,

> Investors who jump in the stock after the activist has made its case in its original 13D will typically bump up the stock price, making it difficult... [for the activist] to buy additional stock at cheap prices...[1]

[1]The U.S. Securities and Exchange Commission requires a 13D filing from any investor accumulating more than 5% of any publicly traded security in a public company. The filing discloses the investor's identity and *objective*. The free-rider problem is a key issue in the regulatory debate on the level of the disclosure threshold: "*[An] activist investor that files a 13D...would quickly attract many 'free-rider' copycat investors. That, in turn, would lead to short-term spikes in stock prices, making it more difficult for the activist to obtain a sufficiently large stake at affordable prices.*" (Orol, 2008, 152). Consistent with GH free-riding, the "spike" in stock prices following a 13D filing is stronger when the investor' is an activist and the stated objective more confrontational (Brav et al., 2008; Klein and Zur, 2009).

as well as of JM free-riding,

> Even if investors buy the stock and stick around for however long it takes [for the activist] to succeed in its efforts, those shareholders share the benefit of the activism without spending anywhere near the time, money, and energy.

We show in Section 2 that this duality of the free-rider problem equalizes the profits from activism and takeovers in (the widely used) model setups with binary "effort" variables, in which an activist or acquirer can raise firm value by a fixed amount V at some private cost C (or remain passive). The crux is that the blockholder under neither intervention captures the value increase of the (initially) widely held shares. Therefore, existing comparisons between activism and takeovers typically assume that the interventions *exogenously* differ with respect to the value improvement V or the cost C (e.g., Shleifer and Vishny, 1986; Maug, 1998).

It is arguably true that bidders tend to pursue different objectives than activists. Buyout firms, for example, typically stay involved for several years to execute a comprehensive set of changes across many levels of the acquired targets, ranging from product market and operational strategies to asset composition and capital structure. Activist campaigns have comparatively shorter time horizons and more narrowly focused objectives; in fact, often they aim for changes "only" in the governance of the firm. In this paper, we endogenize such differences in involvement based on the standard corporate governance paradigm that incentives to provide effort to improve firm value increase with the equity stake (Jensen and Meckling, 1976).

Takeovers or activism. In our model, there are many possible effort levels, i.e., "restructuring objectives." For simplicity, we model effort as a continuous variable, $e \in \mathbb{R}_0^+$, and value improvement V and cost C as differentiable functions of e. All "restructuring objectives" are available independent of how a blockholder gains control of a firm to execute improvements. That is, functions V and C are the same regardless of whether a blockholder succeeds as an activist or as an acquirer. The only ex-ante difference between activism and takeovers is how the blockholder obtains control: an activist *works* for control through a costly campaign, whereas an acquirer *buys* control by paying the takeover price. We explore how *this* difference impacts the profitability of these intervention modes. To do so cleanly, we abstract from further differences between activists and bidders.[2]

[2] In Section F of the Appendix, we discuss possible implications of adding further differences.

The first key difference to binary-effort models is rather obvious: Since a larger ownership stake raises incentives, takeovers go along with higher levels of effort, cost, and value improvements. The more surprising result is that takeovers, despite the higher efficiency, are not always more profitable. Specifically, we show that activist profits and bidder profits react in *opposite* directions to variation in the marginal return to effort such that, for a range of parameters, blockholders benefit more from activism than from takeovers.

While a takeover increases the blockholder's incentives to improve value, she does not fully recoup the costs of doing so since GH free-riders sell their shares only if the takeover premium incorporates the anticipated value improvement. Although socially more efficient, the higher effort in a takeover thus exceeds the ex-ante privately optimal level for the blockholder. A higher return to effort worsens this "unrecompensed effort" problem, as it induces more effort, leading to a smaller profit. Intuitively, a takeover strategy is unattractive when the blockholder anticipates a large effort *and* a high takeover price associated with that effort.

Activism does not require a majority stake—the point of campaigns is to succeed without it. The downside of a smaller stake is that effort is constrained by JM free-riding. Activism is unattractive to the blockholder when the gains expected under these limited incentives do not justify the costs of pursuing a campaign. In contrast to the unrecompensed effort problem, this "limited effort" problem is mitigated by a higher return to effort. Since the low effort level, though socially less efficient, is ex-ante optimal for the blockholder, her expected profit from activism increases in the marginal return to effort. Intuitively, activism is an attractive strategy when even small efforts have potentially large impacts on firm value.

Takeover activism. The free-rider problem could be overcome by the target board of directors, who have the authority to force a collectively binding merger on all shareholders. Within the context of disciplinary interventions, of course, the premise is that the incumbent board opposes the desired changes. Still, the fact that the board has authority over mergers gives an activist the possibility to campaign for control of the board to negotiate a merger. Our main second result is that such takeover activism can be a more profitable intervention and produce larger efficiency gains than both "regular" activism and hostile takeovers.

As a "regular" activist, a blockholder avoids GH free-riding by campaigning for control but allows JM free-riding on the value improvement. Conversely, with a takeover, she decreases JM free-riding by acquiring a controlling stake but confronts GH free-riding when doing so. Choosing between these intervention modes is tantamount to trading off the two manifestations of free-riding. The ingenuity of takeover activism is that it combines the best of both worlds: takeover activists not only avoid GH free-riding while seeking control but—by using the board's authority to sell the entire firm—also eliminate JM free-riding on (the acquirer's) efforts to improve firm value. The logic of the second step in this strategy is to use control to solve the root incentive problem rather than pursue the (ultimate) value improvements directly. This suggests that governance reforms, in particular M&A, should be a popular objective of activist campaigns, as is indeed the case (e.g., Brav et al., 2008; Greenwood and Schor, 2009; and Boyson and Mooradian, 2011).

Despite its superiority, takeover activism does not always emerge when feasible. This is because the blockholder could *free-ride* on a tender offer by a third-party acquirer instead of working towards a merger through a costly campaign (which others free-ride on). Takeover activism prevails only if its expected return exceeds the target shareholders' foregone return from the latent tender offer. This "hurdle rate" set by free-rider rents should cause takeover activism to exhibit very high returns, which is consistent with the evidence (Greenwood and Schor, 2009; Becht et al., 2017). When it does occur, takeover activism benefits both blockholders and third-party acquirers.

Distinctive predictions. For the set of firms that are likely targets of disciplinary intervention, our theory speaks to which type of intervention a specific target firm is more likely to experience. For investors specialized in particular types of intervention, the selection concerns which subset of them is more inclined to engage a given target. Alternatively, for investors who can undertake both takeovers and activist campaigns, such as Paul Singer or Carl Icahn, the selection occurs through the approach they use vis-à-vis a given target. We should note that our theory does not relate to all types of M&A, notably, friendly strategic mergers.

To the extent that the dual free-rider problem affects this selection, the following patterns should be observed in the data according to our theory: (1) A ranking of interventions based on target gains deviates from a ranking based on intervention profits, within the set of tender offers and across tender offers and regular activism; (2) activists specialize in governance reforms, while bidders implement substantial operational and strategic changes; (3) takeover activism generates more value and is more profitable than other categories of activism; (4) institutional changes that facilitate activism do not only lead to more campaigns but also decrease hostile bids while increasing total M&A. We discuss in

Section F of the Appendix that these preditions are difficult to obtain (in models) without the dual free-rider problem.

These predictions are derived in a model in which the target firm has only one blockholder while the remaining shareholder base is formalized as a continuum of shareholders. Nonetheless, our results are robust to introducing more (active or passive) blockholders as long as their cumulative ownership is below 50 percent, and to modeling dispersed shareholders as a discrete population as long as their number is sufficiently large.[3]

Related literature. Our model is adapted from Burkart et al. (1998) with costly effort instead of costly diversion. Our results rely on comparative statics with respect to the return to effort, whose analogue in Burkart et al. is the cost of diversion. They do not study these comparative statics, and in any case the implications would not be the same (as we explain in Section 3.2).

While the literature on takeovers and investor activism is large (see, e.g., surveys by Burkart and Panunzi, 2008, and Edmans and Holderness, 2016), only three papers contain comparisons between the two intervention modes: Shleifer and Vishny (1988), Maug (1998), and Bebchuk and Hart (2001). In all of them, interventions have *exogenous* impacts on firm value, and the focus is on asymmetric information. To our knowledge, we are first to integrate activism and takeovers in a framework where differences are exclusively derived from their modi operandi.

Bebchuk and Hart (2001) further abstract from costs but allow for value-decreasing interventions. They propose that bidders should be permitted to call binding shareholder votes on mergers without board approval, which is not an option in practice. In our framework, takeover activism implements the procedure envisioned by the Bebchuk-Hart proposal except that a costly campaign is necessary to overcome board resistance to the merger.

Corum and Levit (2018) and our paper offer the first analyses of takeover activism. Our insights are complementary. Corum and Levit explore whether a potential acquirer can run a campaign in the target to push for a merger with her own firm and show that, due to an inherent conflict of interest, such a campaign is less likely to be successful than that of a third-party activist. To isolate this point, their model abstracts from the free-rider problem and restricts direct bids.[4] We show that takeover

[3]Holderness (2009) documents in a sample of U.S. firms that 96 percent have at least one blockholder owning more than 5 percent of the stock. The median combined ownership of all blockholders in a firm is 27 percent in the entire sample and 12 percent in the subsample of S&P 500 firms.

[4]Their model allows tender offers only with some exogenous probability. Because their analysis abstracts from the free-rider problem, takeover activism would not emerge without this restriction.

activism can prevail even if direct bids are allowed because the optimal response to the dual free-rider problem is to first gain control without buying shares and afterwards use that control to concentrate ownership. We conversely rely on Corum and Levit's analysis in assuming that the target is sold to a third party (as opposed to the takeover activist herself).

2 The "equivalence" benchmark

It is useful to preface our model with a binary effort example: A blockholder owns a minority stake t in a firm with an otherwise dispersed ownership structure. She can improve the share value by waging an activist campaign, which is modelled as a binary choice variable $e \in \{0, 1\}$: She can either remain passive by choosing zero effort, in which case the share value stays at its current level (normalized to 0), or intervene with a fixed positive effort (normalized to 1), in which case the share value increases by $V > 0$. The cost of an intervention, $C > 0$, is understood to include both the costs of obtaining control and the costs of identifying and implementing the (potential) value improvements.

This type of model setup is a workhorse in the literature on active blockholders. Absent frictions other than the JM free-rider problem, the blockholder's profit from an intervention is $tV - C$, whereas the social gain is $V - C$. Consequently, there are parameters for which an intervention is unprofitable even though it is socially efficient. Could a takeover help? Suppose the blockholder submits a tender offer to raise her stake to $\alpha \geq .5$ prior to implementing the value improvement. Her ex ante profit is then $\alpha V - (\alpha - t)P - C$, where P is the per-share takeover price. Since GH free-riders do not tender unless P matches the post-takeover value V, this profit reduces to $tV - C$. This is the same as under activism for two reasons: (a) the aggregate gains are identical in both cases due to effort being binary and (b) in neither case does the blockholder capture the gains on the $1 - t$ shares that are (initially) widely held due to the dual free-rider problem.

Two caveats readily come to mind. First, the blockholder ends up owning a majority stake and her incentives to identify potential improvements and execute them are therefore stronger. Thus, the value improvement is likely to be larger in a takeover. Second, as majority ownership confers control, a takeover allows the blockholder to dispense with costly activities that she would otherwise have to engage in as part of a campaign. At first sight, these caveats seem to favor takeovers.

To examine this conjecture, we introduce in the next section a more general setting with three key features: (1) There is more than one positive effort level; (2) the blockholder's capability to improve value is independent of how she obtains control; (3) "value improvement" and "control acquisition" are distinct activities. Takeovers and activism differ with respect to the latter activity: a bidder gains control by buying a majority stake, whereas an activist engages in other costly actions to gain control in spite of being a minority owner.

3 Takeover or activism

3.1 Scope for value improvement

Consider a firm with dispersed share ownership, except for a toehold $t < 1/2$ that is owned by a single investor. Following the takeover literature exploring the free-rider problem, we assume a mass $1-t$ of shares distributed among an infinite number of shareholders whose individual holdings are both equal and indivisible.[5] If the investor gains control, she can create a value improvement $V(e, \theta) \geq 0$ where $e \geq 0$ denotes her restructuring effort and $\theta > 0$ parameterizes the marginal return to effort. This productivity parameter captures firm-specific restructuring potential or investor-specific skill. Restructuring effort comes at a cost $C(e)$.

Since the comparative statics with respect to θ will be key to our results, we should point out that it is a prior not innocuous whether the productivity parameter appears in the "public" value function V or in the "private" cost function C due to the free-rider problem. However, as we show in Section A of the Appendix, the main insights obtain in either case.

Continuity of effort is an abstraction that makes the analysis very tractable. One can extrapolate from our results that the identified trade-offs also emerge in models with discrete "effort levels," which can be thought of as different *types* of restructuring objectives requiring varying levels of engagement. Hence, "effort differences" between bidders and activists in our model can be interpreted as takeovers and activism being associated with different types of (strategic, operational, financial, or governance) objectives and changes.

[5] In models with a finite, discrete shareholder base, the free-rider problem worsens with the number of shareholders. In the limit, as the number of shareholders grows, the equilibrium outcome approaches the Grossman and Hart (1980) result that target shareholders extract all the gains in security benefits on tendered shares (Bagnoli and Lipman, 1988; Holmström and Nalebuff, 1992).

Suppose the investor had control with an ownership stake $s \geq t$. She would then solve

$$\max_{e \geq 0} sV(e, \theta) - C(e). \tag{1}$$

This is analogous to the problem faced by the owner-manager in Jensen and Meckling (1976), once $1-s$ of the equity has been sold to investors.[6] We assume that $V(.,.)$ and $C(.)$ are twice differentiable functions with the following properties:

Assumption 1. *$V_e(.,.) > 0$, $V_{ee}(.,.) \leq 0$, $V_{e\theta}(.,.) > 0$, $V_\theta(0,.) = 0$, $C_e(.) > 0$, and $C_{ee}(.) > 0$.*

In words, the value improvement is strictly increasing and (weakly) concave in effort. The return to effort strictly increases with the productivity parameter θ. The cost function is strictly increasing and convex. These properties make the investor's payoff concave in restructuring effort.

Assumption 2. *$C_e(0) = 0$, $\lim_{e\to\infty} C_e(e) = \infty$, and $\lim_{e\to\infty} V_e(e, \theta) = 0$ for all θ.*

These conditions ensure that the first-order condition of the restructuring effort problem always has an interior solution.

Assumption 3. *$tV(0, \theta) \geq C(0)$ for all θ.*

This assumption—toehold gains under zero effort exceed restructuring costs—precludes cases in which the investor would remain passive even if *granted* control due to some "fixed" costs. It is trivially satisfied for $C(0) = 0$ and hence relevant only for $C(0) > 0$.

Assumptions 1 to 3 ensure a unique, positive solution for the restructuring effort problem (1). To guarantee that the set of θ for which tender offers are profitable is non-empty, we further impose the assumption that returns to effort vanish as $\theta \to 0$.

Assumption 4. *$\lim_{\theta\to 0} V_e(e, \theta) = 0$ for all e.*

The solution to the restructuring effort problem applies to bidders and activists alike. Denote the optimal restructuring effort by $e(s, \theta)$ and the resulting payoff by $\Delta(s, \theta) \equiv sV(e(s, \theta), \theta) - C(e(s, \theta))$.

Lemma 1. *For any ownership stake $s \geq t$, $e(s, \theta)$ is unique and strictly positive. Furthermore,* $e(s, \theta)$ and $\Delta(s, \theta)$ *are strictly increasing in s and θ.*

[6] We assume a bidder's or activist's restructuring incentives are determined by her equity stake and abstract from compensation as an additional incentive mechanism. In Section B of the Appendix, we discuss that allowing for compensation in a way that is consistent with free-riding behaviour does not overturn our results.

Because of JM free-riding by the other shareholders, the investor's effort depends only on her own stake s. It causes the privately optimal effort to increase with s, and the first best is attained at $s = 1$. Effort and surplus also increase with productivity θ.

By Assumption 3, the owner of the toehold would like to implement value improvements. But she lacks the formal authority to do so since $t < 1/2$. We consider two strategies for gaining control. On the one hand, she can "buy" control by acquiring at least $1/2 - t$ shares. On the other hand, she can try to gain control without a majority stake through "work," that is, by running a costly activist campaign.

3.2 Disciplinary takeover

Our tender offer model follows Burkart et al. (1998) except that the bidder engages in effort provision instead of diversion. She needs at least half of the voting rights to control the firm. All shares carry the same number of votes. The sequence of events is as follows:

In stage 1, the bidder with a toehold $t_b = t$ makes a first-and-final, restricted tender offer to buy r_b shares at a cash price of p_b per share, conditional on her holding a final stake s_b no less than 50 percent. Following the literature on control contestability, we assume that the incumbent management is opposed to the restructuring, which necessitates the tender offer, but is unable or unwilling to counterbid.

In stage 2, the target shareholders non-cooperatively decide whether to tender their shares. Being atomistic, each perceives herself as non-pivotal for the tender offer outcome.

In stage 3, the takeover fails if less than $1/2 - t$ shares are tendered. Otherwise, the bidder pays the offered price and gains control with a post-takeover stake of $s_b = t_b + r_b$. Once in control, she chooses her restructuring effort e_b. Whether the effort is exerted before or after the takeover is not important for our results, as we discuss later.

The game is solved backwards. If in control at stage 3, the bidder solves the restructuring effort problem (1) with $s = s_b$. Let $V^*(s_b, \theta)$ and $C^*(s_b, \theta)$ denote the resulting post-takeover firm value and restructuring cost. By Lemma 1, due to JM free-riding, total surplus $V^*(s_b, \theta) - C^*(s_b, \theta)$ would be maximized if the bidder acquired all outstanding shares, i.e., if $r_b = 1 - t_b$ so that $s_b = 1$.

At stage 2, there is GH free-riding. Each target shareholder tenders her shares only if the price at least matches the expected post-takeover share value, i.e., if $p_b \geq V^*(s_b^c, \theta)$ where s_b^c is her conjecture about the bidder's post-takeover stake. We assume that this (weak) inequality is not only necessary but also sufficient for tendering. Under this assumption, every shareholder tenders in a successful bid and the bidder buys r_b shares with certainty.[7] Given rational expectations, the free-rider condition is therefore $p_b \geq V^*(t_b + r_b, \theta)$. As the right-hand side increases with r_b, the supply of tendered shares is upward-sloping. The intuition is that buying more shares incentivizes the bidder to generate more value, which in turn induces shareholders to hold out unless the bid price p_b increases equally much.

Writing the stage-2 and stage-3 equilibrium strategies as constraints, the bidder's optimization problem at stage 1 is

$$\underset{r_b, p_b}{\text{maximize}} \quad s_b V(e_b, \theta) - C(e_b) - r_b p_b \tag{2}$$

$$s.t. \quad p_b \geq V(e_b, \theta_b) \tag{3}$$

$$r_b \geq 1/2 - t_b \tag{4}$$

$$s_b V_e(e_b, \theta) = C_e(e_b) \tag{5}$$

$$s_b = t_b + r_b. \tag{6}$$

Constraints (3) to (6) are, respectively, the free-rider condition (stage 2), the majority requirement for control, the post-takeover incentive constraint (stage 3), and the bidder's post-takeover equity stake.

The next result describes the equilibrium structure of a successful takeover. It is the costly-effort version of an analogous result in Burkart et al. (1998)'s model with costly diversion.

Lemma 2 (Burkart et al., 1998)**.** *In a successful takeover, the bidder acquires $r_b^* = 1/2 - t_b$ shares at a per-share price equal to the post-takeover share value $p_b^* = V^*(1/2, \theta)$.*

According to Lemma 1, by improving bidder incentives, every tendered share increases the post-takeover share value by some measure dV and the bidder's costs by some measure dC. Because GH free-riders extract dV through a corresponding price increase dp_b, the bidder is left with just the cost increase dC. Hence, while value creation becomes more efficient from a social perspective, the effort is too high from the bidder's (ex-ante) perspective. We label this consequence of GH free-riding the

[7] If bids are unrestricted, a successful equilibrium bid features r_b (randomly selected) shareholders tendering such that $p_b = V^*(t_b + r_b, \theta)$. Hence, allowing for restricted bids does not alter the equilibrium outcome, but spares us the assumption that shareholders somehow "coordinate" on tendering precisely r_b shares.

unrecompensed effort problem. Because of it, the bidder buys no more shares than needed for control, i.e., to reach $s_b = 1/2$. She consequently generates a value of $V^*(1/2, \theta)$, which the bid price matches due to the free-rider condition.[8]

The insight that the bidder does not profit from acquiring shares per se implies that the takeover is essentially but a *costly* method of acquiring *control*. We now study how this "cost" depends on the productivity parameter θ. This comparative statics result has no parallel in Burkart et al. (1998).

Proposition 1. *In the tender offer game:*

(i) For any given θ, there exists a toehold threshold $\bar{t}_b > 0$ such that a takeover is unprofitable for all $t_b < \bar{t}_b$.

(ii) Bidder profits are positive in the limit $\theta \to 0$. There exists a toehold threshold $\bar{\bar{t}}_b > 0$ such that bidder profits strictly decrease in θ for all $t_b < \bar{\bar{t}}_b$.

These results are driven by constraints (3) to (5) in the bidder's stage-1 optimization: GH free-riders demand a price that incorporates the entire value improvement but excludes private costs ((3)). Still, the bidder must buy enough shares to reach a majority stake ((4)). At the same time, she cannot commit to provide *less* effort than the majority stake induces, and JM free-riders do not share in the costs ((5)). In consequence, she weighs gains on only her *toehold* $t_b < 1/2$ against costs that are commensurate with a *majority stake* $s_b = 1/2$. Indeed, substituting the binding free-rider condition from Lemma 2 into the bidder's profit function yields

$$t_b V(e(1/2, \theta), \theta) - C(e(1/2, \theta)). \tag{7}$$

The terms represent, respectively, the bidder's toehold gains and costs under the majority stake. If t_b is too small, the former fall short of the latter. In this case the unrecompensed effort problem makes a bid unprofitable (part i of the proposition).

Regarding the impact of θ, note that (7) reduces to $-C^*(e(1/2, \theta))$ for $t_b = 0$. Without a source of private gains, such as the toehold, the bidder only incurs costs (Grossman and Hart, 1980). With endogenous value creation, the cost $C^*(e(1/2, \theta))$ increases in the productivity parameter θ, as a higher

[8] The final stake being $1/2$ is unimportant for our comparative statics results, which would be *more* pronounced if the bidder bought more or all shares, e.g., due to going-private or tax considerations or bidding competition.

θ induces a larger effort. That is, more valuable takeovers are costlier. For $t_b > 0$, the toehold gains $t_b V(e(1/2, \theta), \theta)$, which increase in θ, provide a countervailing effect. But for small t_b, the cost effect dominates such that bidder payoffs decrease in θ (part *ii* of the proposition).[9]

From a practical, less abstract perspective, the notion that (potentially) more valuable takeovers are "costlier" manifests itself to a blockholder through the effects captured by constraints (3) and (5). A takeover for which a bidder would be motivated to invest a *large effort* as per (5) is one for which target shareholders would require a *high takeover premium* as per (3) because of the expected large value improvement. That is, bidders perceive high θ, or severe unrecompensed effort problems, in the form of large efforts *plus* high takeover premia.

The unrecompensed effort problem does not depend on the timing of effort. It arises also if all effort occurs before the bid as long as effort is unobserved: In anticipation of a takeover, a bidder has incentives to exert effort $e(s_b, \theta)$ in accordance with her expected majority stake $s_b \geq 1/2$. Rational shareholders infer this and therefore hold on to their shares for any price p_b below $V^*(s_b, \theta)$, thereby creating the unrecompensed effort problem. To avoid this, the bidder would have to commit to effort $e(t_b, \theta)$ in accordance with her toehold instead, but is unable to do so given effort is unobservable. This implies that in an extended model with effort(s) incurred dynamically around the takeover, the bidder exerts unrecompensed effort at *all* points in time. Only in two cases does the unrecompensed effort problem vanish, neither of which pertains to timing: (a) when effort is binary such that ex ante and ex post optimality do not diverge for non-zero effort and (b) when effort is observable such that the bidder can commit to her ex ante optimal effort level.

Last, note that a higher return to effort benefits a controlling shareholder (Lemma 1). The analogue in Burkart et al. (1998) is that a lower cost of diversion benefits a controlling shareholder. But unlike in our effort model, this also benefits *bidders* at the target shareholders' expense. The key is that diversion reduces share value to the bidder's benefit while effort improves share value at a cost to the bidder. Our findings therefore apply only to governance contexts in which free-riding frustrates valuable effort (rather than enables self-dealing) by large or controlling shareholders.

[9] The envelope theorem does not apply when taking the total differential of (7) because the indirect derivative with respect to effort is $t_b V_e(e(1/2, \theta), \theta) - C_e^*(e(1/2, \theta))$. This is not zero because the optimal effort satisfies the first-order condition for (1) under the *majority stake*: $1/2 V_e(e(1/2, \theta), \theta) - C_e(e(1/2, \theta)) = 0$. Rather, it is negative given $t_b < 1/2$, reflecting the unrecompensed effort problem.

3.3 Regular activism

Now suppose the toehold owner seeks the influence for carrying out the value improvement through activism instead of a tender offer. Activists employ diverse tactics such as informal communications with management, media campaigns, shareholder proposals, and proxy contests. Instead of selecting one tactic for our analysis, we use a reduced-form model that, as shown in Section C of the Appendix, is consistent with various micro-foundations (based on Maug and Rydqvist, 2009; Brav and Matthews, 2011; Gantchev, 2013; and Brav et al., 2017). We clarify later which properties of our reduced-form specification are crucial for the results.

An activist campaign succeeds with probability $q(a, \psi, s)$ and imposes private cost $K(a)$ on the activist, where $a \geq 0$ is her campaign effort and $\psi \geq 0$ is campaigning efficacy, which may depend on activist skill and institutional factors.[10] In addition, it is plausible that q depends on the activist's stake s. The activist's own voting power raises the chance that she succeeds, and lowers the number of other shareholders she must mobilize to succeed. This does not necessarily require an actual vote, as the threat of an escalation or proxy fight can cause management to agree to the activist's demands (e.g., Gantchev, 2013; Fos, 2017).

To ensure a well-behaved optimization problem with a non-empty set of ψ for which the activist makes a profit, we impose in analogy to Assumptions 1 and 2

Assumption 5. *$q_a(.,.,.) > 0$, $q_{aa}(.,.,.) \leq 0$, $q_\psi(.,.,.) > 0$, $q_{a\psi}(.,.,.) > 0$, $q_s(.,.,.) \geq 0$, $K_a(.) > 0$, and $K_{aa}(.) > 0$.*

and

Assumption 6. *$K_a(0) = 0$, $q(0,.,.) = 0$, and $\lim_{\psi \to \infty} q_a(.,.,.) = \infty$.*

The activism game unfolds as follows: Owning an initial stake $t_a = t$, the activist decides in stage 1 whether to launch a campaign, and if so, chooses campaign effort a. If the campaign succeeds, she chooses restructuring effort e_a in stage 2 to improve firm value. Otherwise, no restructuring takes place.

[10] Considerable costs as well as failures of campaigns are well documented. For a sample of 1,492 campaigns from 2000 to 2007, Gantchev (2013) puts the average cost at \$10.5 million, about a third of the average gross return of a campaign. Out of 611 campaigns with well-specified objectives, Brav et al. (2010) find that 52.4 were at least partly successful, leaving 47.6 percent of failed campaigns.

We proceed again by backward induction. If a campaign succeeds, the activist solves the stage-2 restructuring effort problem (1) with $s = t_a$. Excluding campaign costs, she thus earns $\Delta(t_a, \theta)$ when the campaign succeeds. In stage 1, if the activist launches a campaign, she solves

$$\begin{aligned} \underset{a}{\text{maximize}} \quad & q(a, \psi, t_a)\Delta(t_a, \theta) - K(a) \\ s.t. \quad & q(a, \psi, t_a) \leq 1 \end{aligned} \tag{8}$$

Assumptions 5 and 6 guarantee that a solution exists and is unique.

Lemma 3. *If the activist launches a campaign, she exerts a uniquely optimal campaign effort a^* and succeeds with probability $q(a^*, \psi, t_a)$. If successful, she improves firm value to $V^*(t_a, \theta)$.*

A comparison with Lemma 2 shows that a takeover would always be socially more efficient than activism. In addition to incurring deadweight campaign costs $K(a^*)$, a successful activist creates less value, $V^*(t_a, \theta) < V^*(1/2, \theta)$, because the takeover results in a larger ownership stake, $1/2 > t_a$. This is consistent with the notion that bidders, or controlling owners, are willing to immerse themselves into bringing about substantial changes in the long run, while activists may only find it worthwhile to pursue "quick fixes." As the choice of intervention mode is also endogenous, the reverse statement also holds: For small intended changes, activism is chosen, while plans for more substantial changes call for a takeover.

This means that the advantage of activism cannot lie in improving firm value per se, since this is more effectively done through a takeover. Instead, any advantage must lie in its alternative approach to the free-rider problem—or else, it is dominated by a takeover. In parallel to our takeover analysis, we focus on the effects of the productivity parameter θ and toehold size t_a.

Proposition 2. *In the activism game:*

(i) For any given θ, the success probability q goes to zero as $t_a \to 0$. For $K(0) > 0$, there exists a toehold threshold $\bar{t}_a > 0$ such that a campaign is unprofitable for all $t_a < \bar{t}_a$.

(ii) Activist expected profits strictly increase in θ for all $t_a > 0$.

Like bidders, activists require a large enough toehold to make a profit, as the value improvement on the other shares accrues to JM free-riders. A smaller toehold reduces the payoff $\Delta(t_a, \theta)$, which in

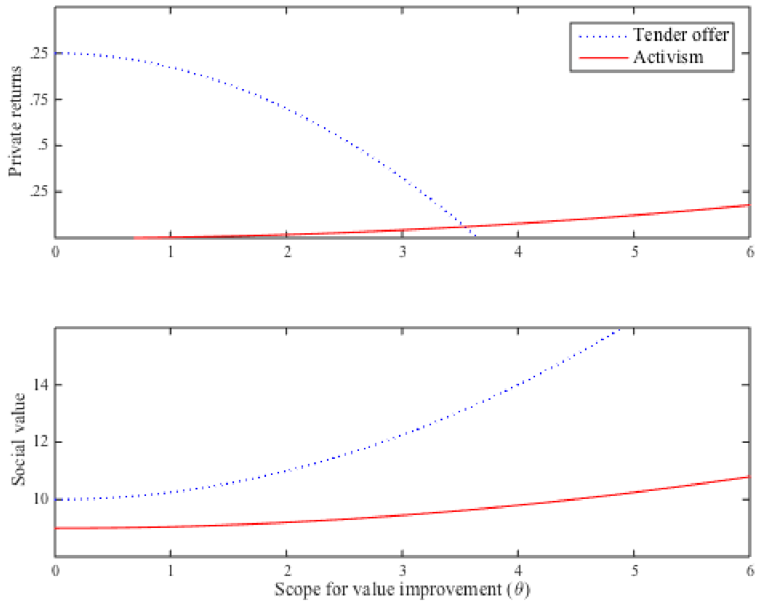

Figure 1: This graph assumes $V(e,\theta) \equiv \theta e + 10$, $C(e) \equiv \frac{e^2}{2}$, $q(a,t_a) \equiv 20 t_a a$, $K(a) \equiv \frac{a^2}{4} + .94$, and $t_a = t_b = .1$. Bidder profits decrease while activist profits increase in the productivity parameter θ; above some point, activism is more profitable (top). From a social perspective, takeovers are always more efficient (bottom).

turn depresses incentives to invest in a campaign, lowering campaign effort a^* and success probability $q(a^*, \psi, t_a)$. The resulting gains may be too small to recoup the fixed costs of a campaign if $K(0) > 0$ (part i of the proposition). We refer to this as the *limited effort problem*.

While socially less efficient, the activist's effort levels are privately ex-ante optimal: restructuring and campaign efforts are chosen under the initial stake t_a. Accordingly, her expected payoff under (8) strictly increases in the productivity parameter θ as per the envelope theorem and Lemma 1 (part *ii* of the proposition). In other words, a higher return to effort increases the activist's payoff *because* her effort is optimally limited. At the same time, given that her effort will be optimally limited, the most attractive campaign targets are those for which even little effort has a large impact on value. The contrast between the second parts of Propositions 1 and 2 is our central result, which we restate in a separate proposition.

Proposition 3. *A higher productivity parameter θ always increases activist profits, while it decreases bidder profits for small toeholds ($t_b < \bar{\bar{t}}_b$). As a result, although a takeover is more efficient, activism is more profitable when the toehold and campaign costs are small and the productivity parameter is* *large.*

Bidders and activists differ in our model only in that the former buy control and the latter work for it. The reason their intervention modes are preferable for different parameter values is *that they face different forms of free-riding.* Working for control faces JM free-riding, which creates a limited effort problem where low returns to effort lead to small profits. Buying control faces GH free-riding, which generates an unrecompensed effort problem where high returns to effort lead to small profits. Activism and takeovers are thus profitable at opposite ends of the range of θ, despite both of them being subject to free-riding.

But as mentioned, takeovers are more efficient. While unrecompensed effort involves a transfer of rents from bidder to target shareholders, campaign costs and foregone value creation are deadweight losses. Private and social optimality diverge because the free-riding behavior converts social benefits of takeovers (stronger incentives) into private losses (unrecompensed effort) and, by the same token, social costs of activism (campaign cost) into private gains (avoiding unrecompensed effort).

The empirical predictions of Proposition 3 are distinctive: If one isolates variation in (a measure of) θ, bidder profits should be smaller in tender offers that increase target values more. By contrast, activist profits should be larger in campaigns that increase target value more. In addition, campaigns can be more profitable than hostile takeovers even when the associated effects on target value exhibit the opposite ranking. Indeed, Proposition 3 does *not* generally associate activism with larger value improvements (see Figure 1). While takeovers emerge for lower θ, the higher ownership concentration creates stronger incentives to improve value. At a more superficial level, *prima facie* evidence for our theory would be that a ranking of takeovers and regular activism according to aggregate or target gains deviates significantly from a ranking according to intervention profits. (This excludes takeover activism, which we analyze in Section 4.) This pattern is difficult to generate in a model without free-riding behavior, as we explain in part F of the Appendix.

Hardly any restriction we impose through Assumptions 5 and 6 on our reduced-form technology $q(a, \psi, s)$ and $K(a)$ is critical. The assumptions serve to ensure unique, possibly interior solutions for campaign effort. But even in settings with discrete, corner, or multiple solutions for campaign effort, activist profits increase in θ. Restructuring efforts being chosen after campaign efforts is not crucial either. Proposition 3 holds even if a and e_a are set simultaneously or in reverse order. In conjunction with the analogous discussion for takeovers (end of Section 3.2), this implies that the timing of effort does not matter; the differences that we identify between buying control and campaigning for control hold regardless of when efforts are incurred relative to the control change.

Merely the assumption that neither q nor K depend *directly* on θ is not innocuous. Relaxing it can strengthen or weaken our results. If more valuable campaigns succeed more easily ($\frac{\partial q}{\partial \theta} > 0$), our central result is reinforced. The converse—it is more difficult for such campaigns to succeed—could (but need not) overturn the result, depending on the magnitude of this countervailing effect. Though this would mean that shareholders are *less* supportive of campaigns they expect to gain *more* from.

Propositions 1 and 2 consider each type of intervention in isolation and Proposition 3 compares outcomes. For parameters under which either intervention would be profitable, a single blockholder may choose between them. This does not overturn the comparative statics underlying Proposition 3. A bidder's outside option does not affect her offer, which is pinned down by the free-rider condition and the majority requirement. Campaigns do become less profitable because the option of resorting to a bid after a failed campaign reduces campaign efforts. But this effect decreases in θ as the value of that outside option (i.e., the profit from a tender offer) shrinks.

In an earlier version of this paper, we study a model extension in which activists can make "post-disclosure" share purchases to increase their stake (Burkart and Lee, 2019, Section 4). The benefit of such purchases is that it becomes easier to succeed with the campaign, which we refer to as "buying influence." We stress two insights. First, the unrecompensed effort problem endogenously limits how many shares activists purchase. Second, campaigns (takeovers) remain optimal for high (low) values of the productivity parameter θ, and the activist's optimal stake decreases in θ.

4 Takeover activism

According to the previous section, the advantage of activism lies not in restructuring per se, which is better done through takeovers, but its alternative approach to gaining control of the target. This raises an interesting question: What if, instead of restructuring the firm herself, a successful activist uses that control to initiate a merger that concentrates ownership in the hands of a third party? We refer to such campaigns as takeover activism.

To study this strategy, we modify the activism game of Section 3.3 as follows: In stage 1, owning

$t_a > 0$ shares, the activist can launch a campaign and choose a campaign effort a to seize control of (or convince) the board to negotiate a merger.[11]

If the campaign succeeds, she negotiates on behalf of all target shareholders in stage 2 a merger with a bidder, who already owns $t_b \geq 0$ shares. For simplicity, we assume that the activist has all the bargaining power and makes a first-and-final offer (p_m, r_m) to the bidder. (We consider alternative bargaining power allocations in Section D of the Appendix.) An offer specifies a fraction r_m of shares to be sold to the bidder and the price p_m to be paid per share.

In stage 3, if the offer is declined, the game ends. Otherwise, the bidder gains control and chooses her restructuring effort e_b. If $r_m < 1 - t_b$, the merger is pro-rated among target shareholders. The pro-rated merger can be a restricted cash deal or a cash-equity deal in which target shareholders get cash plus $1 - t_b - r_m$ shares in the post-merger firm.

In a merger, the board *forces* target shareholders to sell shares at the negotiated price even if they individually prefer to retain them. It has been argued before, in the context of freeze-out mergers, that this in principle resolves the free-rider problem (Yarrow, 1985; Amihud et al., 2004). However, it is common for shareholders to legally challenge the merger terms, and Müller and Panunzi (2004) show that such legal risk, even if small, fully restores the free-rider problem.[12] For robustness reasons, we hence include legal risk in our analysis and, like Müller and Panunzi, model it as a potential price revision: with probability ϵ, the merger price is ex post adjusted to the full post-merger share value due to a successful challenge.

4.1 Brokering a merger

Proceeding backwards, consider stage 3. If a merger is realized, the bidder chooses her restructuring effort e_b owning $s_b = t_b + r_m$ shares. As we show in the proof of Lemma 4, this effort problem can be written as (1) except that s_b is replaced with $\hat{s}_b \equiv t_b + (1 - \epsilon) r_m$ due to the legal risk ϵ. Thus, by

[11] Boyson et al. (2017) and Jiang et al. (2018) also describe a strategy referred to as "deal-jumping" in which activists engage already announced merger plans to push for another or better deal. If no rival bidder is involved, this strategy can be mapped into our model of regular activism with improved merger terms being the desired value improvement. If the activist supports a rival bidder, our comparison of takeover activism and tender offers in the subsequent section may help to explain why "deal-jumping" can be preferable to contesting a friendly merger with just a tender offer.

[12] Virtually all major M&A deals in the U.S. attract shareholder litigation. In 2013, lawsuits were filed against 97.5 percent of transactions with a value greater than \$100 million (Cain and Solomon, 2014). Müller and Panunzi (2004) show that such legal risk renders freeze-out mergers ineffective against the free-rider problem. We replicate this insight in Section E of the Appendix. In our setting with endogenous value creation, bidders are, in fact, harmed by having the option to freeze out minority shareholders.

Lemma 1, the bidder's optimal effort $e(\hat{s}_b, \theta)$ increases in what we call her "effective" stake $\hat{s}_b$, which in turn decreases in ϵ. Intuitively, shareholders can free-ride with probability ϵ via a price revision, which reduces the bidder's effort incentives.

In stage 2, if a campaign succeeded, the activist proposes merger terms (r_m, p_m) that benefit target shareholders most. The optimal terms maximize gains from trade and must respect the bidder's participation constraint (or else the offer is rejected). Thus, no effort is unrecompensed and, since the surplus increases in the bidder's stake, she is offered $r_m = 1 - t_b$ shares and ends up owning the whole firm, i.e., $s_b = 1$.

Lemma 4. *If the campaign of a takeover activist is successful, she negotiates a merger with a bidder who acquires the whole firm and improves its value to* $V^*(1 - \epsilon(1 - t_b), \theta)$.

Given our assumption about bargaining power, the activist offers terms such that the bidder's takeover gains merely cover her effort cost. The target shareholders' collective payoff, denoted R^*, hence equals the total surplus from the merger. As t_a of the $1-t_b$ sold shares come from the activist, her merger payoff is $t_a \frac{R^*}{1-t_b}$, and so she maximizes $q(a, \psi, t_a) t_a \frac{R^*}{1-t_b} - K(a)$ subject to $q(a, \psi, t_a) \leq 1$ when choosing campaign effort a in stage 1. The only difference to her stage-1 problem under regular activism (Section 3.3) is that the payoff from a successful campaign is $t_a \frac{R^*}{1-t_b}$ instead of $\Delta(t_a, \theta)$.

The activist's source of gains is still her toehold, but the increase in share value is now generated by a bidder in a merger rather than by herself. Since the merger induces the bidder to buy the whole firm, $t_a \frac{R^*}{1-t_b} > \Delta(t_a, \theta)$ when legal risk ϵ is sufficiently small. In fact, for $\epsilon \to 0$, R^* converges to the first-best restructuring surplus $\Delta(1, \theta)$.[13] Whenever $t_a \frac{R^*}{1-t_b} > \Delta(t_a, \theta)$, takeover activism is more profitable and induces more campaign effort than regular activism. Paired with Proposition 3, this means that takeover activism can simultaneously outperform regular activism and tender offers.

Proposition 4. *For low legal risk,*

(i) takeover activism is more profitable, succeeds with higher probability, and leads to larger value improvements if successful than regular activism, for any $t_a > 0$ *and* $t_b \geq 0$.

[13] In practice, under the baseline review standard for mergers (*business judgement rule*), the risk is arguably small. A stricter review is triggered if a merger involves controlling shareholders (*entire fairness doctrine*) or is initiated by management (*Revlon duties*). This does not apply to firms 'put in play' by activists (*Lyondell Chemical Co. v. Ryan*).

(ii) takeover activism with $t_a + t_b = t$ is more profitable than tender offers with $t_b = t$ when the toehold t and campaign costs are small and the productivity parameter is large.

The dual free-rider problem is fundamental to this result. In the 'control stage,' takeover activists avoid GH free-riding by campaigning on minority stakes, keeping this advantage relative to bidders. Contrary to regular activists, they then get rid of JM free-riding in the 'restructuring stage' by inviting a bidder to buy the whole firm in a merger. In this sense, takeover activism combines the "best of both worlds." To emphasize the importance of the dual free-rider problem in another way, note that (1) without JM free-riding, perfectly coordinated shareholder actions make ownership concentration unnecessary while (2) without GH free-riding, tender offers dominate takeover activism, as they save on campaign costs.[14]

It is instructive to rephrase the comparisons to takeovers and regular activism in more practical terms. A takeover transfers control and concentrates ownership simultaneously. A takeover activist first seeks control without a commensurate increase in ownership in order to concentrate ownership afterwards. Having a path to control with *limited* ownership is a source of efficiency.[15] The comparison to regular activism shows that the most effective line of attack for an activist is not to pursue the ultimately desired strategic or operational changes but to address the underlying incentive problem. In our framework, this amounts to concentrating ownership in the hands of a bidder who, with near first-best incentives after the merger, implements the ultimate value improvements. When activists aim to correct incentives for future managers, their engagements may not need an extended horizon. On the contrary, *temporary* ownership may be socially efficient.

Proposition 4 has implications for the type of firms activists prefer to target. Broadly interpreted, it suggests that *governance* changes, including M&A, should be one of the most preferred objectives of activists. This appears to be the case (Brav et al., 2008; Greenwood and Schor, 2009; and Boyson and Mooradian, 2011). Even if the sale of the company is not explicitly stated as an objective in the

[14]The identified advantage of takeover activism over tender offers does not require bidder-activist pairs to hold larger combined toeholds than single bidders, nor does it involve a buy-low-sell-high trading strategy. This differs from the analysis of merger arbitrage in Cornelli and Li (2002) where arbitrageurs buy "cheap" at the expense of noise traders, creating blocks that relax the GH free-rider problem. Their and our papers investigate different real-world strategies: Arbitrageurs trade to help existing offers succeed, whereas takeover activists campaign to initiate or amend mergers. The advantage is also robust to freeze-out mergers, which successful bidders can use to force out remaining minority shareholders (see previous footnote).

[15]This is related to the result in Burkart and Lee (2015) that decoupling voting rights (control) from cash flow rights (ownership) can be efficient because dispersed shareholders do not value holding on to control rights, which confines the free-rider problem to cash flow rights.

13-D filing, activists tend to target firms that could be attractive to acquirers. The survey by Brav et al. (2010, esp. Section 5) concludes that characteristics of activist targets indicate agency problems and in particular free cash flow problems (Jensen, 1986), which are typical markers of buyout targets too. Greenwood and Schor (2009) find that quite a few of the firms that activists target over general "corporate governance" issues are eventually taken over.

Relatedly, Proposition 4 has implications for the skill sets activists build on. In our framework, takeover activists need not expend resources (C) to identify or implement specific actions to improve value (V) other than the governance change. According to the survey by Brav et al. (2010), activists focus on "issues that are generalizable to all firms," notably governance issues, and are generally "not experts in the specific business of the firms they invest in" (p.210). This makes their skill transferable (Black, 1990) and easily communicable (Kahn and Winton, 1998). Proposition 4 adds the argument that it may simply be more efficient to leave the ultimate value improvements to other parties—who then deploy or invest in specific expertise—once incentives have been appropriately (re)aligned.[16]

Finally, the prediction that takeover activism generates higher target and activist returns, as the "governance change" leads to more efficient incentives and therefore ultimately larger improvements, is consistent with the return patterns documented by Greenwood and Schor (2009) and Becht et al. (2017). (In the next subsection, we identify a *selection* effect that further reinforces these patterns.) The picture of activism that emerges from these arguments and its empirical relevance are succinctly summarized by Greenwood and Schor (p.363):

> Our evidence is consistent with many hedge funds' characterizations of their activism. The activist Robert Chapman, for example, seeks out companies that are "digestible" in the sense that they are easy to market to bidders as potential takeover targets... [Our evidence] helps explain why there is no significant correlation between accounting-based measures of operational change and subsequent returns—the most "successful" targets of activism are those that leave the public markets... soon after the activist becomes involved. Thus, there is a significant selection bias, in that the firms with the largest returns tend to drop out of the sample by way of takeover.

[16]This begs the question why the takeover activist does not use a merger to concentrate ownership in her own hands. Corum and Levit (2018) show that, in light of the apparent conflict of interest in negotiating the merger price, such a campaign would be unlikely to succeed.

When further taking into account the extensive evidence that buyouts *do* lead to significant strategic, operational, and financial improvements,[17] the evidence around activism and takeovers appears quite consistent with the implications of our analysis.

4.2 Profitability, bidder-activist alliances, and the M&A market

So far, we have analyzed tender offers, regular activism, and takeover activism each in isolation and compared outcomes. We now consider cases in which all three intervention modes are simultaneously feasible. Specifically, still assuming a bidder-activist pair, if a brokered merger does not materialize, the bidder can make a tender offer and such an offer would be profitable.

Tender offer terms are pinned down by the free-rider condition, i.e., the post-takeover share value and are therefore independent of the bidder's outside option. Suppose a tender offer is profitable. Let $t_a v_a^f > 0$ denote the activist's payoff from selling her shares in a tender offer. For (potential) activists, this outside option is always more attractive than a regular campaign: A takeover creates more value, from which a target shareholder benefits through the offer price (thanks to the free-rider condition) without incurring any campaign effort.

Lemma 5. *Free-riding on a tender offer dominates regular activism.*

Takeover activism may still arise, albeit with less intensity. On the one hand, target shareholders earn less from a merger, as the negotiation must leave the bidder with at least her tender offer profit. On the other hand, their payoff from a campaign failure increases with the tender offer as a fallback. The takeover activist's campaign effort problem is $\max_a q(a, \psi, t_a)R_a^* + (1 - q(a, \psi, t_a))t_a v_a^f - K(a)$ and her marginal return to effort is $\frac{\partial q}{\partial a}(R_a^* - t_a v_a^f)$. Both a reduced merger payoff R_a^* and the latent tender offer payoff $t_a v_a^f$ weaken incentives. This makes any given campaign less profitable. However, there is also a selection effect: Campaigns fail to emerge unless the activist's expected profit exceeds her outside option $t_a v_a^f$.[18]

[17] There is by now a large but still growing empirical literature documenting large buyout returns and that private equity firms create value *inter alia* by improving managerial practices, total factor productivity, innovation, technological change, human capital, growth, and product and pricing strategies (see, e.g., Chevalier, 1995; Boucly et al., 2011; Guo et al., 2011; Lerner et al., 2011; Edgerton, 2012; Davis et al., 2014; Harris et al., 2014; Bloom et al., 2015; Agrawal and Tambe, 2016; Bernstein and Sheen, 2016; Fracassi et al., 2019).

[18] This condition concerns the activist's ex-ante profit, including her tender offer payoff after a failed campaign, but it implies that the same lower bound holds for her profit from a successful campaign.

Proposition 5. *Free-riding on a tender offer need not dominate takeover activism, but the presence of this option entails that campaigns are only undertaken if expected profits exceed* $t_a v_a^f > 0$.

This implies that activists earn excess returns in brokered mergers even higher than the excess returns target shareholders would have earned from a tender offer. Given the latter returns can be very high, this selection effect may contribute to the fact that takeover activism "outperforms" other types of campaigns in the data (Greenwood and Schor, 2009; Becht et al., 2017).

A brokered merger obviates the need for a tender offer. The bidder has no interest in preempting this possibility. Indeed, when selected, takeover activism Pareto-dominates the other interventions: Passive shareholders incur none of the activist's costs but share the benefits, while the bidder accepts no less than her tender offer profit in the merger negotiation.

Corollary 1. *Takeover activism benefits both activists and bidders.*

In other words, activists can benefit from selling targets rather than improving them directly, and bidders benefit from making merger bids rather than tender offers. This resonates with commentary that activist funds and buyout firms benefit from each other (Orol, 2008, p.8):

> They are co-dependent enablers... The [private equity] companies encourage the hedge fund guys to put companies in play and the activists take positions in companies and pressure for auctions enabling private equity firms to get a hold of divisions or entire companies they might otherwise not have been able to.

Indeed, there are publicized cases in which potential acquirers employed activists as "Trojan horses," going as far as to finance the activists' stakes in targets through "toehold deals" (Gandel, 2015). We discuss this and other aspects of bidder-activist interactions in Section D of the Appendix.

The prediction that takeover activism can be profitable when tender offers are not or may replace them—or put differently, that activists and bidders may find alliances necessary or beneficial—implies the following link between activism and the M&A market.

Corollary 2. *An increase in campaign efficacy* ψ *spurs total M&A activity but reduces tender offers.*

This prediction is in line with broad empirical trends: There has been a surge in investor activism since the 1990s (Sharara and Hoke-Witherspoon, 1993; Bradley et al., 2010; and Fos, 2013), which has coincided with a rise in total M&A but a decline in hostile bids (Betton et al., 2008, Fig. 9). It has been argued that the surge resulted from regulatory changes that made it easier for shareholders to communicate and coordinate efforts (Bradley et al., 2010; Fos, 2013). Anti-takeover mechanisms can be an alternative explanation for the substitution effect but cannot account for the rise in total M&A, nor the fact that takeover activists do more than simply remove takeover defenses.

A tacit premise of Corollary 2 is that some changes (ψ) ease coordination in activism but not in tender offers. One possible reason is that coordination in activism relates to *communication*: others must be persuaded to back a campaign, but once convinced, find it individually rational to do so (c.f., the micro-foundations in Section C of the Appendix). By contrast, the coordination problem in tender offers concerns *commitment*: individually, no shareholder tenders for less than the expected post-takeover share value. Such differences in the nature of the coordination problem can matter for the relative importance of these intervention modes as information technology and regulation evolve.

5 Concluding remarks

Comparative corporate governance theory studies how alternative mechanisms fare against the same frictions on a level playing field. We compare ownership-based intervention mechanisms—takeovers and activism—in the context of widely held firms. Considering a firm in which some form of hostile intervention is necessary for value-improving changes, we examine which type of intervention is more profitable or more efficient.

We identify differences that originate from the fact that the interventions confront different forms of free-riding by dispersed shareholders. These differences have distinct implications for the returns to takeovers and activism and offer a rationale for why takeover activism can outperform both tender offers and regular activism. Moreover, it has implications for how institutional changes impact the co-evolution of these governance mechanisms, which has seen significant shifts as of late (Solomon, 2013; Fujita and Barreto, 2017).

Existing discussions of what makes activist hedge funds "special" usually focus on what may make these funds successful governance actors *despite* their limited ownership and temporary involvement, especially in comparison with other institutional investors (Kahan and Rock, 2007; Brav et al., 2008). At the same time, much of the criticism levelled against them is based on concerns that their limited stakes and horizon entail a lack of alignment (relative to the influence they seek) and an inclination to short-termism. Our theory compares activism with takeovers. This resonates with the historical fact that the predecessors of hedge fund activists were raiders and blockholders who put targets "in play" during the 1980s takeover wave (Orol, 2008; Carlisle, 2014). More importantly, this perspective suggests that limited and temporary ownership is the very trait that allows activism to be effective as a governance mechanism.

There are three main gaps in our analysis. First, we study a "post-disclosure" choice between the different intervention mechanisms conditional on a toehold, but we do not endogenize the acquisition of the toehold through anonymous, "pre-disclosure" trading. This latter problem—in which there is scope for profitable cut-and-run strategies—has been comprehensively studied by Back et al. (2018). We leave an analysis of how these pre-disclosure and post-disclosure decisions interact to future work. Second, we do not explicitly model the underlying managerial agency problem and therefore abstract from managerial responses to the *threat* of intervention. This is common in the literature both on activism and on takeovers (with Scharfstein, 1988, and Kahn and Fos, 2019, being notable exceptions). While endogenizing the managerial agency problem goes beyond the scope of this paper, our results predict when activism or a takeover poses the relevant or greater threat, which in turn should affect the optimal managerial response. Last, our model focuses only on active shareholder strategies, i.e., "voice." A comprehensive framework of shareholder governance should also compare "exit" strategies (Edmans, 2009; Admati and Pfleiderer, 2009) with "voice" strategies in light of the effects analyzed in this paper.

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Proofs

Proof of Lemma 1

Assumption 1 implies $sV_{ee}(e) - C_{ee}(e) < 0$ for all e, i.e., strict concavity of the objective function, and Assumption 2 implies $sV_e(0) - C_e(0) = sV_e(0) > 0$ and $\lim_{e\to\infty} sV_e(e) - C_e(e) = -\infty$. Hence, the first-order condition $sV_e(e,\theta) = C_e(e)$ has a unique, strictly positive solution, and identifies the global maximum provided that the associated investor payoff is positive. This last condition holds because $\Delta(s,\theta) \geq sV(0,\theta) - C(0) > tV(0,\theta) - C(0) \geq 0$, where the last weak inequality applies Assumption 3. By the implicit function theorem, $\frac{\partial e(s,\theta)}{\partial s} = -\frac{V_e(e,\phi)}{sV_{ee}(e,\phi) - C_{ee}(e)} > 0$ and $\frac{\partial e(s,\theta)}{\partial \phi} = -\frac{V_{e\theta}(e,\phi)}{sV_{ee}(e,\phi) - C_{ee}(e)} > 0$. Furthermore, $\frac{\partial \Delta(s,\theta)}{\partial s} = [sV_e(e,\phi) - C_e(e)]\frac{de}{ds} + V(s,\theta) > 0$ and $\frac{\partial \Delta(s,\theta)}{\partial \theta} = [sV_e(e,\phi) - C_e(e)]\frac{de}{d\theta} + sV_\theta(s,\theta) > 0$ by the envelope theorem. ■

Proof of Lemma 2

For admissible e_b and r_b, the objective function decreases in p_b. Hence, p_b is optimally set to its lower bound in (3): $p_b = V(e_b,\theta)$. Substituting this into the objective function and differentiating with respect to s_b yields $[t_bV_e(e_b,\theta) - C_e(e_b)]\frac{\partial e_b}{\partial s_b}$. If this derivative is negative for all $s_b > t_b$, s_b is optimally set to its lower bound given by (4). This is indeed the case: While $\frac{\partial e_b}{\partial s_b} > 0$ by Lemma 1, it follows from (5) that $t_bV_e(e_b,\theta) - C_e(e_b) < 0$ since $t_b < s_b$. By constraint (3), the bid price is therefore $p_b = V^*(1/2,\theta)$. ■

Proof of Proposition 1

Using Lemma 2 and the binding free-rider condition, the bidder's profit can be written as $\Pi_b^*(t_b,\theta) = t_bV^*(1/2,\theta) - C^*(1/2,\theta)$. Part (i) follows from $\partial\Pi_b^*/\partial t_b > 0$, $\Pi_b^*(0,\theta) = -C^*(1/2,\theta) < 0$, and $\Pi_b^*(1/2,\theta) = \Delta(1/2,\theta) > 0$ by Lemma 1. Next, since $V^*(1/2,\theta) \equiv V(e_b^*,\theta)$ and $C^*(1/2,\theta) \equiv C(e_b^*,\theta)$ depend also indirectly on θ via e_b^* (i.e., the incentive constraint (5)), $\frac{d\Pi_b^*}{d\theta} = t_bV_\theta(e_b^*,\theta) + [t_bV_e(e_b^*,\theta) - C_e(e_b^*,\theta)]\frac{de_b^*}{d\theta}$. This is strictly negative if $t_bV_\theta(e_b^*,\theta) < -[t_bV_e(e_b^*,\theta) - C_e(e_b^*,\theta)]\frac{de_b^*}{d\theta}$. As $t \to 0$, the left-hand side goes to 0, while the right-hand side goes to $C_e(e_b^*,\theta)\frac{de_b^*}{d\theta} > 0$. Combined with $\lim_{\theta\to 0}\Pi_b^*(t,\theta) = tV(0,0) - C(0) \geq 0$ (Assumption 3), this implies part (ii). ■

Proof of Lemma 3

Given $q_a(.,.,.) > 0$ (Assumption 5), there exists a unique campaign effort level $\overline{a} > 0$ such that $q(\overline{a}, \psi, t_a) = 1$. Because $a \geq 0$ and any effort beyond $\overline{a}$ is suboptimal, we can write program (8) as $\max_{a \in [0,\overline{a}]} q(a, \psi, t_a)\Delta(t_a, \theta) - K(a)$. The domain is compact and the objective function is continuous, so a solution exists. The first-order derivative with respect to a is $q_a(a, \psi, t_a)\Delta(t_a, \theta) - K_a(a)$. This is strictly positive at $a = 0$ because $q_a(.,.,.) > 0$ (Assumption 5) and $K_a(0) = 0$ (Assumption 6). Hence, the solution is strictly positive (if a campaign is launched). The second-order derivative with respect to a is $q_{aa}(a, \psi, t_a)\Delta(t_a, \theta) - K_{aa}(a)$. This is strictly negative for all a because $q_{aa}(.,.,.) \leq 0$ and $K_{aa}(.) > 0$ (Assumption 5). Hence, the solution identifies a unique global maximum. Last, if successful, the activist solves the restructuring effort problem in stage 2 owning a stake t_a and hence generates the value improvement of $V^*(t_a, \theta)$. ■

Proof of Proposition 2

Under Assumptions 5 and 6, the optimal campaign effort is given by the first-order condition $q_a(a^+, \psi, t_a)\Delta(t_a, \theta) = K_a(a^+)$ if $q(a^+) < 1$, or else, by the boundary condition $q(\overline{a}) = 1$. Hence, $a^* = \min\{a^+, \overline{a}\}$. The activist's expected profit from a campaign is $q(a^*, \psi, t_a)\Delta(t_a, \theta) - K(a^*)$. Now, as $t_a \to 0$, $\Delta(t_a, \theta) \to -C(0)$, and hence $a^* \to 0$. Thus, $\lim_{t_a \to 0} q(a^*, \psi, t_a) = 0$ and $\lim_{t_a \to 0} \Pi_a^*(t_a, \theta) = -K(0)$. This proves part (i). Next note that $\partial\Delta/\partial\theta = t_a V_\theta(e_a^*, \theta) > 0$ by the envelope theorem applied to the restructuring effort problem at stage 2. If $a^* = \overline{a}$, this directly implies part (ii) because $q(a^*, \psi, t_a)$ and $K(a^*)$ remain fixed. If $a^* = a^+$, note that $\partial\Pi_a^*/\partial\Delta = q(a^*, \psi, t_a) > 0$ by the envelope theorem applied to the campaign effort problem at stage 1. Together with the fact that θ affects $\Pi_a^*(t_a, \theta)$ only through $\Delta(t_a, \theta)$, this implies part (ii). ■

Proof of Proposition 3

First, takeovers are more efficient: Since the objective function in the restructuring effort problem (1) is strictly concave, $V(e, \theta) - C(e, \theta)$ increases in e for all $e \leq e(1, \theta)$. The social surplus is $V^*(1/2, \theta) - C^*(1/2, \theta)$ in a takeover and $q(a, \psi, t_a)\left[V^*(t_a, \theta) - C^*(t_a, \theta)\right] - K(a)$ in a campaign. Note that $V^*(t_a, \theta) - C^*(t_a, \theta) < V^*(1/2, \theta) - C^*(1/2, \theta)$, since $e(t_a, \theta) < e(1/2, \theta) < e(1, \theta)$. Furthermore, $q(a, \psi, t_a) \leq 1$ and $K(a) \geq 0$. Second, as the example in Figure 1 shows, activism can nevertheless be more profitable. This requires that campaign costs and toeholds are sufficiently small but θ sufficiently large. Consider the following limits: For $t_a, t_b \to 1/2$, tender offers are always more profitable than activism because the unrecompensed effort problem vanishes. For $t_a, t_b \leq \bar{\bar{t}}_b$, as $\theta \to \infty$, tender offers become unprofitable but activist profits increase and reach a positive level provided that campaign costs $K(a)$ are sufficiently small. For more concise conditions we would need to resort to specific functional forms. ■

Proof of Lemma 4

If a merger occurs, the bidder owns $s_b = t_b + r_m$ shares afterwards and sets her restructuring effort e_b to maximize $s_b V(e_b, \theta) - C(e_b) - \epsilon r_m [V(e_b, \theta) - p_m]^+$ where the last term reflects the price revision risk. The objective function simplifies to $\hat{s}_b V(e_b, \theta) - C(e_b) + \epsilon r_m p_m$ with $\hat{s}_b \equiv t_b + (1-\epsilon) r_m$. Since $\epsilon r_m p_m$ is independent of e_b, we can apply Lemma 1. The bidder generates the post-merger value $V^*(\hat{s}_b, \theta)$ at cost $C^*(\hat{s}_b, \theta)$. At the time of the merger, the bidder's expected payoff is $\Delta(\hat{s}_b, \theta) - (1-\epsilon) r_m p_m$.

In stage 2, if a campaign succeeded, the activist negotiates a merger (r_m, p_m) to maximize target shareholders' expected payoff $R(r_m, p_m, s_b, \epsilon) \equiv r_m [(1-\epsilon) p_m + \epsilon V^*(\hat{s}_b, \theta)] + (1 - r_m - t_b) V^*(\hat{s}_b, \theta)$ subject to the bidder's participation constraint $s_b V^*(\hat{s}_b, \theta) - C^*(\hat{s}_b, \theta) - r_m [(1-\epsilon) p_m + \epsilon V^*(\hat{s}_b, \theta)] \geq 0$. Decomposing $s_b V^*(\hat{s}_b, \theta)$ into $\hat{s}_b V^*(\hat{s}_b, \theta) + (s_b - \hat{s}_b) V^*(\hat{s}_b, \theta)$ and using the fact that $s_b - \hat{s}_b = \epsilon r_m$, the constraint simplifies to $\Delta(\hat{s}_b, \theta) - (1-\epsilon) r_m p_m \geq 0$.

Since $\partial R / \partial p_m > 0$, the activist optimally increases p_m until the bidder's participation constraint $\Delta(\hat{s}_b, \theta) \geq (1-\epsilon) r_m p_m$ binds. Thus, $r_m p_m = \frac{\Delta(\hat{s}_b, \theta)}{1-\epsilon}$, which allows us to rewrite target shareholders' expected merger payoff as $\Delta(\hat{s}_b, \theta) + \epsilon r_m V^*(\hat{s}_b, \theta)$. Since both $\Delta(\hat{s}_b, \theta)$ and $V^*(\hat{s}_b, \theta)$ strictly increase in $\hat{s}_b$, which in turn strictly increases in r_m, it is optimal to set $r_m = 1 - t_b$. This completes the proof of the lemma.

For completeness, we further derive the equilibrium of the stage-1 subgame. Under the optimal merger, $\hat{s}_b^* = 1 - \epsilon(1 - t_b)$ and $\Delta(\hat{s}_b^*, \theta) = \hat{s}_b^* V(e_b(\hat{s}_b^*, \theta), \theta) - C(e_b(\hat{s}_b^*, \theta))$. Thus, target shareholders' equilibrium payoff is $R^*(t_b, \epsilon, \theta) \equiv V(e_b(\hat{s}_b^*, \theta), \theta) - C(e_b(\hat{s}_b^*, \theta))$ and, on a per-share basis, $\frac{R^*(t_b, \epsilon, \theta)}{1 - t_b}$. The activist's merger payoff is $R_a^*(t_a, t_b, \epsilon, \theta) \equiv t_a \frac{R^*(t_b, \epsilon, \theta)}{1 - t_b}$. In stage 1, the activist sets campaign effort a to maximize $q(a, \psi, t_a) R_a^*(t_a, t_b, \epsilon, \theta) - K(a)$ subject to $q(a, \psi, t_a) \leq 1$. This is isomorphic to the activist's stage-1 problem under regular activism in Section 3.3, except that $R_a^*(t_a, t_b, \epsilon, \theta)$

replaces $\Delta(t_a, \theta)$ in the objective function. As in Lemma 3, Assumptions 5 and 6 ensure a unique solution. ■

Proof of Proposition 4

Consider $\epsilon \to 0$. Then, for part (i), the optimal restructuring effort is higher under takeover activism than under regular activism: $\lim_{\epsilon\to 0} e_b(\hat{s}_b^*, \theta) = e_b(1, \theta) > e_a(t_a, \theta)$. So, the value improvement after a successful campaign is larger in takeover activism. Also, a takeover activist benefits more from a successful campaign (gross of campaign costs): $\lim_{\epsilon\to 0} R_a^* = t_a \frac{\Delta(1,\theta)}{1-t_b} = \frac{1}{1-t_b} t_a \left[V(1, \theta) - C(1, \theta)\right] > t_a \left[V(t_a, \theta) - C(t_a, \theta)\right] > t_a V(t_a, \theta) - C(t_a, \theta) = \Delta(t_a, \theta)$. This leads to a greater campaign effort and also an ex ante more profitable campaign. To see this, consider the generic campaign problem $\max_a q(a, \psi, t_a)X - K(a)$. It is easy to show that larger X increase optimal effort a^* (for interior solutions) and the expected profit under the optimal effort (by the envelope theorem). For part (ii), it suffices to combine this result with Proposition 3, namely that regular activism is more profitable than tender offers when the campaign costs are low and the productivity parameter is high. ■

Proof of Lemma 5

In a pro-rated tender offer with $r_b \geq 1/2 - t_b$, a potential activist sells $t_a\gamma$ shares, where $\gamma^{-1} \equiv \frac{1-t_b}{r_b}$ measures how oversubscribed the offer is. In such a sale, she earns $t_a v_a^f$ where $v_a^f \equiv \gamma p_b + (1-\gamma)\, V^*(s_b, \theta)$. Given $s_b \geq 1/2$ and the free-rider condition $p_b \geq V^*(s_b, \theta)$, v_a^f is weakly larger than $V^*(1/2, \theta)$. Her expected profit from regular activism, $t_a q(a^*) V^*(t_a, \theta) - q(a^*) C^*(t_a, \theta) - K(a^*)$, is strictly smaller than $V^*(1/2, \theta)$, since $V^*(t_a, \theta) < V^*(1/2, \theta)$ given that $t_a < 1/2$. ■

Proof of Proposition 5 and Corollary 1

It follows from the text that a campaign does not emerge unless the activist's expected profit exceeds $t_a v_a^f$. What remains to be shown is that this is indeed possible. To this end, we focus on a specific level of legal risk, $\hat{\epsilon} = \frac{1}{2(1-t_b)}$, at which the bidder's effective post-merger stake $\hat{s}_b^*$ equals $1/2$ and hence the value generated in a brokered merger is the same as in a tender offer. In this case, takeover activism in the absence of campaign costs is strictly more profitable than selling in a tender offer whenever $\epsilon < \hat{\epsilon}$; this implies that takeover activism remains more profitable even for positive, but sufficiently small, campaign costs.

Suppose campaigns are costless. The activist initiates a merger and holds the bidder to her outside option: the tender offer profit Π_b^{to}. Target shareholders' payoff equals total surplus minus the bidder's payoff. This is $\Delta(\hat{s}_b^*, \theta) - \Pi_b^{to}$ in a brokered merger and $\Delta(1/2, \theta) - \Pi_b^{to}$ in a tender offer. For $\epsilon = \hat{\epsilon}$, $\hat{s}_b^* = 1/2$ so that the total surplus and all payoffs are the same across the two interventions. For $\epsilon < \hat{\epsilon}$, $\hat{s}_b^* > 1/2$ and $\Delta(\hat{s}_b^*, \theta) > \Delta(1/2, \theta)$. Takeover activism (absent campaign costs) is then strictly more profitable than selling in a tender offer. Target shareholders are also better off when $\Delta(\hat{s}_b^*, \theta) > \Delta(1/2, \theta)$. Finally, as the bidder always receives at least her tender offer profit in the merger negotiation, she also fares (weakly) better. Hence, whenever takeover activism is more profitable than free-riding on a tender offer, it is Pareto-improving. ■

Appendix: Robustness and Extensions

A Productivity parameter in the cost function

For any specification of the effort choice problem where the productivity parameter θ is embedded in the value function V, there is an isomorphic specification where it is embedded in the cost function C instead. So, in most cases, it is irrelevant where θ appears. This is clearly true of the activism game: the activist's profit increases with productivity regardless of whether the productivity parameter is embedded in the value or the cost function.

While less obvious, this is also true in the tender offer game. Even when θ is embedded in the cost function, $C(e, \theta)$, we find that the bidder's profit can decrease in θ if the toehold is sufficiently low. Recall that, after substituting the binding free-rider condition, the bidder's ex ante profit function under her optimal effort reduces to

$$\Pi_b^* = t_b V(e^*) - C(e^*, \theta). \tag{9}$$

For small enough t_b, the comparative statics of (9) are, as in our original model, driven by $C(e^*, \theta)$. The total derivative of $C(e^*, \theta)$ with respect to θ is

$$\frac{dC(e^*, \theta)}{d\theta} = C_\theta(e^*, \theta) + C_e(e^*, \theta)\frac{\partial e^*}{\partial \theta}. \tag{10}$$

The first term reflects the direct effect that higher productivity decreases the cost of a given effort. If the effort level is fixed (as is effectively the case in a binary effort model), this captures variation in the fixed cost of an intervention. The second term reflects the indirect effect that higher productivity increases the marginal *incentive* to provide effort, which in turn increases the costs. Our results rely on the incentive effect dominating, that is, (10) being strictly positive. This in turn depends on the curvature of C (and V) in a sense made more precise below.

The exact same logic also holds in our original model where the key derivatives are $V_\theta > 0$ and $V_{\theta e} > 0$. V_θ reflects the direct effect that higher productivity increases the value improvement for a given effort. If the effort level is fixed (as is effectively the case in a binary effort model), this captures variation in the fixed value of an intervention. If this is the only effect, bidder profits increase with θ.

$V_{\theta e}$ reflects the indirect effect that higher productivity increases the *incentive* to provide effort, which in turn will increase costs. This underlies the unrecompensed effort problem. Again, our results rely on the incentive effect dominating.

Curvature of cost function To be more precise, we assume an affine value improvement function $V(e) = \gamma e + \underline{V}$ and derive a necessary and sufficient condition the cost function $C(e, \theta)$ must satisfy for (10) to be strictly positive. The baseline assumptions about C are

Assumption. *$C_e > 0$, $C_{ee} > 0$, $C_\theta < 0$, and $C_{e\theta} < 0$.*

In words, C is increasing and strictly convex in effort e and a higher productivity θ decreases both the marginal cost of effort as well as the cost for given effort.

First, consider the bidder's post-takeover restructuring effort problem following an optimal bid: $\max_e \frac{1}{2}V(e) - C(e, \theta)$. The solution satisfies the first-order condition $\frac{1}{2}V_e(e^*) - C_e(e^*, \theta) = 0$. By the implicit function theorem,

$$\frac{\partial e^*}{\partial \theta} = -\frac{-C_{e\theta}(e^*, \theta)}{\frac{1}{2}V_{ee}(e^*) - C_{ee}(e^*, \theta)} = -\frac{C_{e\theta}(e^*, \theta)}{C_{ee}(e^*, \theta)} > 0$$

where the last equality follows from $V_{ee}(e^*) = 0$ under affine V. Substituting this into (10) yields that (10) is strictly positive if and only if

$$\frac{C_{e\theta}(e^*, \theta)}{C_\theta(e^*, \theta)} > \frac{C_{ee}(e^*, \theta)}{C_e(e^*, \theta)}. \tag{11}$$

The right-hand side measures the convexity of C with respect to effort in a way that is invariant to affine transformations.[19] Evaluated at e^*, this measure reduces to a scaled second-order derivative. Given our V-specification, the first-order condition yields $C_e(e^*, \theta) = \frac{1}{2}V_e(e^*) = \frac{2}{\gamma}$, so the convexity measure is $\frac{2}{\gamma}C_{ee}(e^*, \theta)$. The larger this measure, the faster do costs increase when the optimal effort increases. This in turn implies that the optimal effort will be less "elastic."

The left-hand side is the ratio of the two effects of a change in θ. First, it affects the marginal cost of effort at e^*. This "incentive" effect is captured by $C_{e\theta}(e^*, \theta)$ in the numerator. Second, it affects the total costs (keeping effort) at e^*. This "level" effect is captured by $C_\theta(e^*, \theta)$ in the denominator.

[19]This is effectively the Arrow-Pratt measure (of absolution risk aversion) applied to C.

The ratio thus measures the relative importance of the incentive effect compared to the level effect. The unrecompensed effort problem manifests when this ratio is sufficiently large, or more precisely, larger than the convexity measure on the right-hand side of (11).

Two limit cases are instructive. If the cost function becomes increasingly less convex, $C_{ee}(e^*, \theta) \to 0$, effort becomes very "elastic" and (11) holds in the limit. Alternatively, if θ predominantly affects a "*fixed* cost" component of C, i.e., if $C_\theta(e^*, \theta) < 0$ but $C_{e\theta}(e^*, \theta) \to 0$, (11) is violated in the limit.

Example of the analogy Consider two versions of a quadratic optimization problem with a linear value improvement function V and a quadratic cost function C. In the first version, let productivity be parameterized in $V = \theta e$ with $C = \frac{c}{2}e^2$. Following a takeover after which the bidder owns 1/2 of the shares, her restructuring effort problem is $\max_e \frac{1}{2}\theta e - \frac{c}{2}e^2$. The first-order condition is $\frac{1}{2}\theta = ce$, so $e^* = \frac{\theta}{2c}$. The bidder's ex-ante profit (7) is then $\Pi_b^* = t_b\theta e^* - \frac{c}{2}e^{*2} = t_b\frac{\theta^2}{2c} - \frac{\theta^2}{8c}$. The derivative of this expression with respect to θ is $t_b\frac{\theta}{c} - \frac{\theta}{4c}$, which is negative if and only if $t_b < \frac{1}{4}$.

In the second version, productivity is parameterized in $C = \frac{c}{2\theta}e^2$ with $V = e$. The bidder's post-takeover restructuring effort problem is $\max_e \frac{1}{2}e - \frac{c}{2\theta}e^2$. The first-order condition is $\frac{1}{2} = \frac{c}{\theta}e$, so $e^* = \frac{\theta}{2c}$. The bidder's ex-ante profit is then $\Pi_b^* = t_b e^* - \frac{c}{2\theta}e^{*2} = t_b\frac{\theta}{2c} - \frac{\theta}{8c}$. The derivative of this expression with respect to θ is $t_b\frac{1}{c} - \frac{1}{4c}$, which is negative if and only if $t_b < \frac{1}{4}$, *as in the first version*. Finally, it is straightforward to verify that (11) is satisfied, which in this example is equal to $\frac{4c}{\theta} > \frac{2c}{\theta}$.

B. Incentive compensation contracts

Much, if not all, of the literature on ownership and control presumes that some underlying contract incompleteness makes the allocation of residual control rights relevant. That said, consider contracts that could provide bidders or activists with incentives beyond those created through their ownership stakes. If *dispersed* shareholders can costlessly write such contracts without any help from management, ownership structure no longer matters to firm value. This is tantamount to assuming away the free-rider problem and would void the literatures on large shareholders, investor activism, and tender offers.

Our analysis includes though one situation in which writing such contracts does not require the participation of dispersed shareholders, namely a successful bid: Once in control, a bidder can write a contract with herself. Even if she owns only half of the shares, she could claim compensation that incentivizes her to generate $V^*(1,\theta)$ instead of $V^*(1/2,\theta)$. A simple example is a "call option" that pays out any improvement above $V^*(1/2,\theta)$ to the bidder-manager.

The described contract ensures that the additional effort $e(1,\theta)-e(1/2,\theta)$ is compensated. But it does not compensate for the effort induced by the takeover, $e(1/2,\theta)-e(t_b,\theta)$. The relative magnitude of these effort costs determines how much our results are affected, if such post-takeover compensation could be imposed. In practice, such compensation contracts are bound to be controversial because of the unequal treatment of shareholders and potentially astronomical size, especially if $\Delta(1,\theta)-\Delta(1/2,\theta)$ is large.[20]

Even more controversial would be a post-takeover contract compensating the bidder for $e(1/2,\theta)-e(t_b,\theta)$ or part of it. Such compensation is *dilutive* in that, at the time of being awarded, it harms shareholder value. The same applies to post-takeover compensation for *pre*-takeover effort, which is also subject to the unrecompensed effort problem (as noted in Section 3.2). To permit such contracts is to allow self-dealing at the expense of minority shareholders. As already pointed out by Grossman and Hart (1980), such dilution enables bidders to overcome the free-rider problem. But dilution—via compensation or otherwise—conflicts with law and legal practice even if it occurs as part of an action that overall creates value (see, e.g., the discussion in Müller and Panunzi, 2004, Section IV).

C. Microfoundations of activism function

We discuss how three models of specific activist tactics from the existing literature can be mapped into our reduced-form campaigning function.

Wolfpack activism. In Brav et al. (2017), hereafter BDM, shareholders pressure management through backdoor communications. Activism succeeds if a sufficient number of shareholders are engaged. Since the engagement decisions are made by dispersed shareholders, a coordination problem arises.

We consider a simplified version of what BDM label the "activism game" for a given ownership structure, using mostly our own notation. As in our model, the (lead) activist owns a non-atomistic stake t_a. The other shares are uniformly distributed among (a continuum of) dispersed shareholders.

[20] It would be payoff-equivalent to forcing minority shareholders to sell their shares at a price equal to $V^*(1/2,\theta)$ in a freeze-out merger. Freeze-outs are sensitive to legal challenges by the minority shareholders because of the potential for abuse. (We analyze freeze-outs in Appendix E.) If self-awarded compensation by controlling owners, as described above, were easily approved and deemed innocuous, one would be left to wonder why freeze-outs ever appear needed, or why they are subjected to legal scrutiny.

A mass $\overline{A}$ of the dispersed shareholders is *potentially skilled*; the rest is *unskilled*. Potentially skilled investors are *actually skilled* with probability γ, which is common knowledge. A campaign succeeds if a mass $\eta = \overline{\eta} - t_a$ of dispersed shareholders decides to engage the firm alongside the activist, where η is a measure of management resistance. We assume that only actually skilled investors are able to engage.[21] Investors privately observe whether or not they are skilled prior to making non-cooperative engagement decisions.

If engaging, a shareholder incurs a private cost c_s. A successful campaign increases share value by $V^*(t_a, \theta)$.[22] As gains in share value are public (non-excludable), a non-pivotal shareholder engages only if she receives a private (excludable) benefit. In short, there is a free-rider problem. In BDM, engagement allows skilled investors to signal their type (to the market) for a reputational benefit R.[23] This private benefit relaxes the free-rider problem. If R is large enough and η is common knowledge, there are three possible equilibrium constellations: For $\eta \leq 0$, it is a dominant strategy for skilled shareholders to engage, as the campaign is bound to succeed. For $\eta > \gamma\overline{A}$, it is a dominant strategy not to engage, as the campaign is bound to fail. Last, for $\eta \in (0, \gamma\overline{A}]$, two equilibria exist, in which all or none of the skilled shareholders engage.

BDM focus on the case of multiple equilibria. To refine the equilibrium, they assume that skilled investors receive noisy private signals about η of the form $x_{s,i} = \eta + \frac{1}{a}\epsilon_i$, $i \in [0, \gamma\overline{A}]$, where a measures signal precision. Under this information structure (global games), the equilibrium is unique and involves threshold strategies: a skilled investor engages if her signal is below a threshold value x_s^*, and otherwise remains passive. Due to the signal noise, investors can err, that is, wrongly engage or remain passive. Consequently, for $\epsilon > 0$, a campaign has a probabilistic outcome, i.e., $q \in (0, 1)$, even when the true realized state is $\eta \leq \gamma\overline{A}$. When the signal precision a increases, a campaign has the "correct" outcome more often, and as $a \to 0$, succeeds whenever it can be successful.

The above can be mapped to our framework by introducing the assumption that the lead activist controls the signal precision a at private cost $K(a, \psi)$ with $K_a > 0$, $K_\psi < 0$, $K_{\psi a} < 0$, where ψ is a measure of communication skill. In words, the activist's effort affects the skilled investors' inferences

[21] In BDM, all investors are able to engage, but only skilled ones choose to do so in equilibrium.

[22] In BDM, the lead activist may gain less per share due to higher engagement costs. Translated to our model, this would mean $C^*(t_a) + K(a^*) > c_s$.

[23] In BDM, the reputational benefit is more endogenous, as the strength of the signal depends on the unskilled shareholders' engagement decisions (see footnote 21 above). They show that the two types of investors separate in equilibrium under certain parameters (for which the value of a "pooling" reputation relative to the engagement cost is too low for unskilled investors to gamble on it).

about the ease with which a campaign would succeed. In reduced form, this generates a success probability function q that depends on a and ψ as postulated in our model. It also matches our reduced-form assumption that the lead activist's stake t_a has a direct positive effect on q: larger t_a reduce η, which ceteris paribus raises the probability that the campaign succeeds.

Finally, in the above setting, as in our model, q depends on θ only indirectly through the payoff conditional on success, $V^*(t_a, \theta)$. In particular, given that gains in share value are public benefits, they cancel out of the condition that determines any non-pivotal shareholder's engagement decision. However, if one endogenizes the ownership structure prior to engagement decisions, the potentially skilled investors are more inclined to "buy into" the firm (at some opportunity cost as in BDM) when $V^*(t_a, \theta)$ is larger, in anticipation of a more profitable campaign. This would increase the mass of skilled investors in the subsequent activism game, and thereby increase the success probability q *for any given a and ψ*. In reduced form, this would imply $q_\theta > 0$, and so reinforce the key comparative statics in our model.

Proxy fight. In our current setup with perfect information and only value-increasing activists, there is no reason for a proxy fight to fail. For a realistic setting in which an activist must campaign to attract the votes of other shareholders, we need to introduce the possibility that she might extract private benefits at the expense of shareholder value.

Suppose an activist can be either a good type or a bad type: If successful, a good type improves share value by $V_G \equiv V^*(t_a, \theta) > 0$, whereas a bad type reduces it to $V_B < 0$ by extracting private benefits. Let λ be the commonly known prior probability that an activist is the good type.[24] If $\lambda V_G + (1 - \lambda)V_B \geq 0$, dispersed shareholders will vote for the activist even without any additional information. We assume that this condition is violated so that the activist must engage in (costly) communication to garner more votes.

A simple communication model is that the activist emits a signal at cost $K(a)$, which is "noisy" in the sense that only a random fraction $\tilde{\beta}$ of the other shareholders assimilate the information. The good activist can use this communication technology to provide "evidence" of her type to those who end up assimilating the "evidence."[25] If $\tilde{\beta}$ is a continuously distributed variable on $(0, 1)$ with mean

[24]The assumption that a proposal need not be in all shareholders' interest features in models of shareholder voting both on management proposals (Maug and Rydqvist, 2009) and on activist proposals (Brav and Matthews, 2011).

[25]This is in the spirit of Dewatripont and Tirole (2005) who model information as somewhere in-between "hard" and "soft" in that communication *effort* converts a signal into "hard" information with some probability—only in our

$\overline{\beta}(a,\psi)$, $\overline{\beta}_a > 0$, $\overline{\beta}_\psi > 0$, and $\overline{\beta}_{a\psi} > 0$, this implies a success probability function q that increases in a and ψ.[26] Also, larger t_a reduce the number of additional votes the activist needs to succeed, and thus raise q for any given a and ψ. By contrast, θ affects q only through the activist's choice of a. These properties are all consistent with our reduced-form specification.

An alternative communication model with similar implications lets both activist types send noisy signals. Suppose a random mass $\tilde{\beta} \in (0, 1 - t_a)$ of dispersed shareholders assimilate independent signals $x_i \in \{G, B\}$, $i \in [0, \tilde{\beta}]$, with $\Pr(x_i = G\,|\mathrm{bad}) = \rho \in (0, 1/2)$ and $\Pr(x_i = G\,|\mathrm{good}) = a \in (1/2, 1)$, which is to say that signal G indicates a good type. Suppose the good type can increase its probability a of generating signal G at some private cost $K(a,\psi)$ with $K_a > 0$, $K_\psi < 0$, $K_{\psi a} < 0$, where ψ is a measure of communication skill. This generates a success probability function q that depends on a, ψ, and t_a as postulated in our model. In addition, however, θ has a *direct* effect on q: for larger V_G (which increases in θ), a smaller posterior probability that an activist is of the good type suffices to sway shareholder votes. Intuitively, it becomes "easier" to persuade other shareholders to back the campaign, which reinforces the comparative statics in our model.

Sequential escalation. Activists are known not only to have recourse to a range of tactics but also to sequence them, progressing to hostile tactics (e.g., proxy fight) only if others (e.g., backdoor communications) fail. We now describe how such a dynamic setting, inspired by Gantchev (2013), maps into our static formulation.

Suppose a campaign comprises a discrete, finite number n of potential stages (including, e.g., backdoor communications, media campaigns, and proxy contests). In stage $s \in \{1, \ldots, n\}$, the activist chooses stage-s effort a_s at private cost $K_s(a_s)$ to determine the probability $q_s(a_s)$ that the campaign succeeds in stage s. If it does, the activist moves to the restructuring stage and raises share value by $V^*(t_a, \theta)$. Otherwise, she moves to stage $s+1$ unless $s = n$, in which case the game ends with a failed campaign. Activists can "skip" stages by setting $a_s = 0$ and moving to $s+1$, and can "exit" campaigns at any stage k by setting $a_s = 0$ for all $s \in \{k, k+1, \ldots n\}$.[27] Let every q_s

case the receivers (shareholders) do not (need to) exert any effort to assimilate the information.

[26] Strictly speaking, given that atomistic shareholders are non-pivotal, they are indifferent about whether and how to vote. With n discrete shareholders and simple majority rule, the above setting induces sincere voting in equilibrium: knowing her own vote only matters when the aggregate vote is close (i.e., the other shareholders' signals cause their votes to be equally split), each shareholder wants it to tilt the outcome in the "right direction" given her signal. Since this remains true for $n \to \infty$, sincere voting is a plausible assumption also for our setting.

[27] Unlike in Gantchev (2013), the activist's outside option is zero regardless of when she exits a campaign. This is consistent with our framework where the firm retains its status quo value when an activist exits and all (exit) trades

and K_s satisfy Assumptions 5 and 6.

An effort vector $\mathbf{a} = (a_1, \ldots, a_n)$ summarizes a campaign strategy. Given strategy $\mathbf{a}$, $q(\mathbf{a}) \equiv \sum_{s=1}^{n} q_s(a_s) \prod_{k=0}^{s-1}(1 - q_k(a_k))$ and $K(\mathbf{a}) \equiv \sum_{s=1}^{n} K_s(a_s) \prod_{k=0}^{s-1}(1 - q_k(a_k))$ with $q_0(a_0) = 0$ are, respectively, the ex ante success probability and expected campaign costs. Both q and K are continuous in a_s, as they are compositions (specifically, sums of products) of continuous functions. Also, q is increasing in all a_s: $\frac{\partial q}{\partial a_s} = \frac{\partial q_s}{\partial a_s} \Pr(\text{no success before } s) - \frac{\partial q_s}{\partial a_s} \Pr(\text{success after } s) > 0$, since "success after s" is a strict subset of "no success before s." K is not necessarily increasing in all a_s everywhere since costs incurred in early stages, by raising the chance of early success, can obviate the need to expend costs in later stages. But for any strategies $\mathbf{a}$ and $\mathbf{a}'$ such that $q(\mathbf{a}') > q(\mathbf{a})$ but $K(\mathbf{a}') < K(\mathbf{a})$, strategy $\mathbf{a}$ is *dominated*. Restricting attention to the subset of undominated strategies, which is without loss of generality, recovers the trade-off that a higher ex ante success probability q comes at a higher ("campaign effort" as measured by the) expected cost K. Our static specification is akin to this restricted dynamic problem.

Since q and K combine elements that are concave (q_s) and convex ($1 - q_s$, K_s) in a_s, they need not be globally convex or concave. A unique solution $\mathbf{a}^*$ is still guaranteed, since Assumptions 5 and 6 apply to all stage functions q_s and K_s. This is simple to see by backwards induction: The stage-n problem is isomorphic to our static framework, and thus has a unique solution and value function V_n. The activist's problem in stage $n-1$ can be written $\max_{a_{n-1}} q_{n-1}(a_{n-1})\Delta(s_a, \theta) - K(a_{n-1}) + (1 - q_{n-1}(a_{n-1}))\, V_n$. Rearranging the objective function to $q_{n-1}(a_{n-1})\hat{\Delta}_{n-1}(s_a, \theta) - K(a_{n-1}) + V_n$ with $\hat{\Delta}_{n-1}(s_a, \theta) \equiv \Delta(s_a, \theta) - V_n$ shows that this, too, is isomorphic to our static framework save for an adjusted payoff conditional on success and added constant; thus, a unique solution and value function V_{n-1} exists. (If $\hat{\Delta}_{n-1}(s_a, \theta) < 0$, the solution is to skip stage $n-1$.) Proceeding recursively to stage 1 yields a unique $\mathbf{a}^*$.

Finally, the expected campaign profit under the optimal strategy $\mathbf{a}^*$ is increasing in θ, i.e., $\frac{\partial V_1}{\partial \theta} > 0$. In analogy to our static results, $\frac{\partial V_n}{\partial \theta} > 0$. Going backwards, by the envelope theorem, $\frac{\partial V_{n-1}}{\partial \theta} = q_{n-1}(a^*_{n-1})\frac{\partial \Delta}{\partial \theta} + \left(1 - q_{n-1}(a^*_{n-1})\right) \frac{\partial V_n}{\partial \theta} > 0$, as $\frac{\partial V_n}{\partial \theta} > 0$ and $\frac{\partial \Delta}{\partial \theta} > 0$. Applied recursively until stage 1, these steps establish $\frac{\partial V_1}{\partial \theta} > 0$.

To summarize the dynamic setting: ex ante success probability increases in expected campaign effort (ignoring dominated strategies), a unique optimal campaign strategy exists, and the activist's

are fully transparent.

equilibrium expected payoff increases in the scope for value improvement. These key properties are mirrored in our static formulation. As an aside, regardless of mathematical details, the notion of sequential escalation provides conceptual support to our framework: Sequencing implies that a campaign can fail. If the activist's arsenal enabled her to (ultimately) always succeed, rational managers would give in at the outset. Resistance, which leads to subsequent escalation, makes sense only if believed to have some chance of success. Sequencing also implies that campaigns are costly; otherwise, there would be no benefit (option value) of delaying tactics.

D. Bidder-activist interactions

Our model with takeover activism assumes (1) that a successful activist has all the bargaining power in merger negotiations with a bidder and (2) that the potential bidder and activist are both present from the outset of the game. Neither of these assumptions is crucial to our results, though relaxing them generates additional implications.

Bargaining power. Ex post, after a successful campaign, the greater surplus under a brokered merger (provided low legal risk) implies that it prevails over regular activism or a tender offer for any bargaining power distribution, because the participation constraints ensure Pareto gains. However, for the campaign to be *ex ante* profitable, takeover activists must expect to extract enough from the merger negotiations to cover the campaign costs. The assumption that they have all the bargaining power relieves us from having to distinguish bargaining parameters for which this is (not) the case. It also levels the playing field: The bidder in the tender offer game makes a first-and-final offer, and the regular activist in Section 3.3 extracts the maximum restructuring gains conditional on her stake. The above assumption puts the takeover activist on equal footing.

That said, our results obviously hold as long as takeover activists have enough bargaining power to recoup, in expectation, their (by then sunk) campaign costs from the ensuing merger.[28] Moreover, we show in an earlier version of the paper that bidders may want to ensure that campaigns remain *ex ante* attractive even if activists have *ex post* little bargaining power in a merger. A specific strategy to this end is to adjust ex ante toeholds (which affect "threat points" in the merger negotiation) to counteract uneven ex post bargaining powers that would deter a campaign. That is, a bidder may

[28]The result that the *whole* firm is sold after a successful campaign holds for *any* distribution of bargaining power, as bidder and target shareholders each receive a fraction of whatever expected post-merger surplus is generated.

restrict her own toehold and instead "tip off" an activist to build up a toehold in the prospective target, and doing so may be the Pareto-dominant intervention strategy.[29]

Costly search. Our framework abstracts from search-and-matching aspects of M&A markets (e.g., Rhodes-Kropf and Robinson, 2008). We can think of two conceivable search frictions. First, identifying targets is costly for both activists and bidders. To the extent that takeovers and activism are implemented by distinct specialized agents, differences in the profitability of the two intervention modes would lead to differences in search incentives. Conversely, search competition and market thickness would affect the returns to takeovers and activism.[30] Last, because takeover activism offers scope for Pareto-improvements, it would increase the incentives of both bidders and activists to search for (joint) targets.

Second, one could assume that a bidder must incur search costs to involve a takeover activist instead of launching a tender offer. Vice versa, an activist may have to search for a bidder to broker a merger rather than settle for regular activism. In such circumstances, takeover activism can still emerge, as there is scope for Pareto improvement, but it requires that the expected gains exceed the added search costs. Because the gains increase in the productivity parameter θ, the equilibrium could then feature takeovers for low θ, regular activism for intermediate θ, and takeover activism for high θ.

E. Freeze-outs

As studied in Section 4, a key advantage of takeover activism is that, once successful, the activist can induce a merger that is binding for all shareholders. A level playing field comparison between takeover activism and takeovers should account for the fact that bidders, once in control, have the same power. Indeed, successful bidders can force remaining minority shareholders to sell their shares in a freeze-out. Like all mergers, a freeze-out or its terms can be legally contested by the affected

[29] On the downside, such "Trojan horse" tactics can be susceptible to insider trading allegations. A highly publicized case involved the pharmaceutical company Valeant and the hedge fund Pershing Square. With financial backing from Valeant, Pershing Square acquired a 9.7 percent toehold in Allergan and pushed for a sale of the company to Valeant. Valeant and Pershing Square were sued for insider trading. Allergan was eventually sold to another firm, Actavis, but Valeant and Pershing Square made about $2.6 billion on the Actavis deal through their toehold (De La Merced et al., 2014; and Benoit and Hoffman, 2014). In a comment, then-SEC Chair Mary Jo White warned against such "toehold deals" (Gandel, 2015).

[30] Such competitive effects would, however, not change the implication of Proposition 5 that the returns to takeover activism should be higher than those to regular activism because of the "hurdle rate" set by the profit that the activist earns by free-riding on a tender offer.

shareholders.

Combining a tender offer with a freeze-out could overcome the free-rider problem (Yarrow, 1985; Amihud et al., 2004): If remaining minority shareholders can be forced to sell at the initial bid price, a shareholder's payoff is independent of her tendering decision. But subsequent work shows this to be a knife-edge result. Dalkir et al. (2018) demonstrate that in a model with finitely many shareholders, as their number grows large, bidder profits vanish for all freeze-out thresholds above simple majority. Müller and Panunzi (2004) show that legal risk in a freeze-out, however small, also restores the free-rider problem. We examine the latter argument in a setting with endogenous value creation. In this setting, the freeze-out option not only restores the free-rider problem but even works to the bidder's *disadvantage*.

Two-tier tender offer

We extend the tender offer game from Section 3.2 as follows: Subsequent to a successful restricted bid (p_b, r_b) with $r_b \in [1/2 - t_b, 1 - t_b]$, the bidder can freeze out $f_b \in [0, 1 - r_b - t_b]$ of the remaining minority shareholders at p_b.[31] Thereafter, the bidder chooses effort e_b. Finally, a legal challenge succeeds with probability ϵ in which case the freeze-out price is adjusted to the post-freeze-out firm value $V^*(e_b, \theta)$.[32]

Proceeding by backward induction, consider a freeze-out that increases the bidder's stake from $t_b + r_b$ to $s_b = t_b + r_b + f_b$. Taking into account the legal price-revision risk, her post-freeze-out problem is to choose a restructuring effort e_b to maximize $s_b V(e_b, \theta) - C(e_b, \theta) - \epsilon f_b [V(e_b, \theta) - p_b]^+$, which simplifies to $\widetilde{s}_b V(e_b, \theta) - C(e_b, \theta) + \epsilon f_b p_b$ where $\widetilde{s}_b \equiv t_b + r_b + f_b(1 - \epsilon)$. Since $\epsilon f_b p_b$ is independent of e_b, Lemma 1 applies, and the bidder generates post-freeze-out value $V^*(\widetilde{s}_b, \theta)$ at cost $C^*(\widetilde{s}_b, \theta)$. The risk that the freeze-out price is revised upwards means, intuitively, that minority shareholders can still free-ride with some probability. Due to this probabilistic ex post free-riding, the bidder's effective or incentive-relevant stake is $\widetilde{s}_b$ rather than s_b. Legal risk thus undermines incentives. At the time of a

[31] Rather than imposing $r_b = 1/2 - t_b$ and the binary choice $f_b \in \{0, 1/2\}$ we allow for any $r_b \in [1/2 - t_b, 1 - t_b]$ and $f_b \in [0, 1 - r_b - t_b]$ and derive that the bidder optimally sets $r_b = 1/2 - t_b$ and either $f_b = 0$ or $f_b = 1/2$.

[32] Although our results hold also for infinitesimal $\epsilon > 0$, it is worth noting that the legal issues surrounding a freeze-out are non-negligible because they involve a conflict between controlling and minority shareholders. For a detailed discussion, see Sections IV-V in Müller and Panunzi (2004). Also, assuming that a successful legal challenge causes the price to be adjusted all the way to the post-freeze-out value is not crucial. As long as there is a chance of some upward revision, however small, our results hold except that, in Proposition 6 below, the size of the commitment premium needs to be adjusted to the expected revision.

freeze-out, the bidder's freeze-out payoff is

$$\widetilde{s}_b V^*(\widetilde{s}_b, \theta) - C^*(\widetilde{s}_b, \theta) + \epsilon f_b p_b - f_b p_b = \Delta(\widetilde{s}_b, \theta) - (1-\epsilon) f_b p_b. \tag{12}$$

The above turn out to be off-equilibrium considerations because, in equilibrium, a freeze-out does not materialize. The proof is straightforward: A bidder only executes a freeze-out if the price p_b is strictly below the post-freeze-out value $V^*(\widetilde{s}_b, \theta)$. Anticipating a freeze-out, target shareholders do not sell at p_b in the initial offer because the freeze-out price may be revised upwards as the result of a successful legal challenge. Hence, in any equilibrium with a *successful* tender offer, the price must be such that a freeze-out is unattractive. This is the effect of legal risk identified in Müller and Panunzi (2004).

In our model with endogenous value generation, this equilibrium effect has the novel implication that the bidder pays *strictly* more than what the shares will ultimately be worth.

Proposition 6. *In the two-tier tender offer game, the bidder acquires $r_b = 1/2 - t_b$ shares, with no subsequent freeze-out, at a per-share price strictly above the post-takeover share value*

$$\underline{p}_b = \frac{\Delta(1 - \epsilon/2, \theta) - \Delta(1/2, \theta)}{1/2 - \epsilon/2} > V^*(1/2, \theta).$$

Proof. The proof is at the end of this appendix. □

For the bidder to find buying additional shares after the takeover unattractive, the wedge between post-freeze-out value and price must be insufficient for her to recoup the additional effort cost. If so, it remains optimal for her to acquire just enough shares to gain control, $r_b = 1/2 - t_b$. To determine the lowest bid for which a freeze-out is unattractive, consider deviations $f_b > 0$ at a given price p_b. As the post-freeze-out value $V^*(1/2 + f_b, \theta)$ strictly increases in f_b, while the price is fixed, the best possible deviation is to buy all minority shares, $f_b = 1/2$. To deter this deviation, p_b must satisfy

$$\Delta(1/2, \theta) \geq \Delta(1 - \epsilon/2, \theta) - (1-\epsilon)\tfrac{1}{2} p_b.$$

The left-hand side is the bidder's payoff without a freeze-out after having bought $r_b = 1/2 - t_b$ shares, and the right-hand side is her payoff (12) from a freeze-out with $f_b = 1/2$. The price $\underline{p}_b$ at which this inequality is binding is the optimal bid and it turns out to be strictly above the post-takeover value

$V^*(1/2, \theta)$. It follows from a comparison to Lemma 2 that the bidder is worse off with the freeze-out option.

In Müller and Panunzi (2004), the freeze-out option is merely irrelevant. In their model, the post-takeover value $\overline{V}$ is exogenous and so the same for all $s_b \in [1/2, 1]$. Therefore, once $p_b = \overline{V}$, the bidder is indifferent with respect to s_b and a freeze-out. In our model, the post-takeover value $V^*(s_b, \theta)$ is endogenous and increases with $s_b \in [1/2, 1]$. At $p_b = V^*(1/2, \theta)$, the bidder would want to exercise the freeze-out option and rational shareholders, anticipating this, would hold out in the initial bid. This forces the bidder to pay a "commitment" premium that deters a freeze-out.

Higher legal risk reduces the firm value that the bidder would generate after a freeze-out. This lowers her off-equilibrium gain from undertaking a freeze-out, which in turn lowers the commitment premium she must incorporate in the initial equilibrium bid. In the limit, the bidder's effective stake under the optimal bid converges to $\lim_{\epsilon \to 1} \widetilde{s}_b = 1/2$ for any freeze-out strategy f_b, as the freeze-out price is almost surely revised to the post-freeze-out value. This undermines incentives such that the value improvement becomes $V^*(\widetilde{s}_b, \theta) = V^*(1/2, \theta)$—i.e., independent of the bidder's ultimate stake as in a setting with exogenous post-takeover values. In this limit, the temptation to execute a freeze-out vanishes, and therewith the commitment premium such that the bidder's profit is the same as in Section 3.2.

Proof of Proposition 6

We first provide a formal proof that a freeze-out never occurs in equilibrium. Suppose to the contrary that there is a freeze-out. Anticipating this, rational shareholders would only tender if $p_b \geq (1-\epsilon)p_b + \epsilon V^*(\widetilde{s}_b, \theta)$, respectively, $p_b \geq V^*(\widetilde{s}_b, \theta)$. Therefore, there would be no risk of a price revision in equilibrium, which simplifies the bidder's effort problem to $\max_{e_b} s_b V(e_b, \theta) - C(e_b)$ with $s_b \equiv t_b + r_b + f_b$. Accordingly, the post-freeze-out firm value would be $V^*(s_b, \theta)$. Hence, while the bidder's interim expected profit would hence be $(t_b + r_b)V^*(t_b + r_b, \theta) - C^*(t_b + r_b, \theta)$ without a freeze-out, it would be $(t_b + r_b)V^*(s_b, \theta) - C^*(s_b, \theta)$ with a freeze-out. By revealed preference, $(t_b + r_b)V^*(t_b + r_b, \theta) - C^*(t_b + r_b, \theta) > (t_b + r_b)V^*(s_b, \theta) - C^*(s_b, \theta)$. So, the bidder would refrain from the freeze-out, in contradiction to the shareholders' premised anticipation.

We next prove that the bidder buys no more than $1/2 - t_b$ shares. At $p_b = V^*(t_b + r_b + \delta, \theta)$ with $\delta > 0$, the bidder's profit from acquiring $r_b \in [1/2 - t_b, 1 - t_b)$ shares is $\Pi^{r_b}{}_{V^*(t_b + r_b + \delta, \theta)} =$

$(t_b + r_b)V^*(t_b + r_b, \theta) - C^*(t_b + r_b, \theta) - r_b V^*(t_b + r_b + \delta, \theta)$, while her profit from acquiring $r_b + \delta$ shares is $\Pi^{r_b+\delta}{}_{V^*(t_b+r_b+\delta,\theta)} = t_b V^*(t_b + r_b + \delta, \theta) - C^*(t_b + r_b + \delta, \theta)$. Since $(t_b + r_b)V^*(t_b + r_b, \theta) - C^*(t_b + r_b, \theta) > (t_b + r_b)V^*(t_b + r_b + \delta, \theta) - C^*(t_b + r_b + \delta, \theta)$, it follows that $\Pi^{r_b}{}_{V^*(t_b+r_b+\delta,\theta)} > \Pi^{r_b+\delta}{}_{V^*(t_b+r_b+\delta,\theta)}$. Given $p_b \geq V^*(t_b + r_b, \theta)$ must hold in equilibrium, $r_b = 1/2 - t_b$ is optimal (Lemma 2).

Last, we prove that the bidder must pay strictly more than the post-takeover share value. To buy no more than $r_b = 1/2 - t_b$ in equilibrium, the bidder must choose p_b such that a subsequent freeze-out is unprofitable. To derive the optimal freeze-out strategy, write the bidder's interim expected payoff from a freeze-out as $\Pi_b^F = \widetilde{s}_b V(e_b(\widetilde{s}_b, \theta), \theta) - C(e_b(\widetilde{s}_b, \theta), \theta)) - (1 - \epsilon) f_b p_b$, where $e_b(\widetilde{s}_b, \theta)$ is the post-freeze-out restructuring effort, and take the total derivative with respect to f_b for a given p_b. This yields $\frac{d\Pi_b^F}{df_b} = (1 - \epsilon)V(e_b(\widetilde{s}_b, \theta), \theta) + [\widetilde{s}_b V_e(e_b(\widetilde{s}_b, \theta), \theta) - C_e(e_b(\widetilde{s}_b, \theta))] \frac{\partial e_b(\widetilde{s}_b,\theta)}{\partial \widetilde{s}_b} - (1 - \epsilon)p_b$. Using the first-order condition for restructuring effort, $\widetilde{s}_b V_e(e_b(\widetilde{s}_b, \theta), \theta) = C_e(e_b(\widetilde{s}_b, \theta))$, simplifies this to $\frac{d\Pi_b^F}{df_b} = (1 - \epsilon)V(e_b(\widetilde{s}_b, \theta), \theta) - (1 - \epsilon)p_b > 0$. Since $V(e_b(\widetilde{s}_b, \theta), \theta)$ increases in f_b, the optimal freeze-out—if one is profitable—is $f_b^* = 1 - r_b - t_b$. To deter a freeze-out given $r_b = 1/2 - t_b$, p_b must hence satisfy $1/2 V^*(1/2, \theta) - C^*(1/2, \theta) \geq (1 - \epsilon/2)\, V^*(1 - \epsilon/2, \theta) - C^*(1 - \epsilon/2, \theta) - \frac{1-\epsilon}{2} p_b$, respectively,

$$\Delta(1/2, \theta) \geq \Delta(1 - \epsilon/2, \theta) - \frac{1 - \epsilon}{2} p_b. \tag{13}$$

Imposing equality in (13) and solving for the price yields the price $\underline{p}_b$ in the proposition. To see that $\underline{p}_b > V^*(1/2, \theta)$, set $p_b = V^*(1/2, \theta)$ in (13), which then simplifies to $\left(1 - \frac{\epsilon}{2}\right) V^*(1/2, \theta) - C^*(1/2, \theta) \geq \Delta(1 - \epsilon/2, \theta)$, which is false by revealed preference. ■

F. Importance of free-riding behavior

We begin by restating the four distinctive predictions of our theory: (1) A ranking of interventions based on target gains deviates from a ranking based on intervention profits, within the set of tender offers and across tender offers and regular activism; (2) activists specialize in governance reforms, notably takeover activism; (3) takeover activism generates more value and is more profitable than other categories of activism; (4) institutional changes that facilitate activism do not only lead to more campaigns but also decrease hostile bids while increasing total M&A.

Absence of free-riding behavior. The above predictions are difficult to generate without free-riding behavior. Suppose campaigns are costless and target shareholders respond to tender offers as if acting collectively. Even if effort is unobservable, the first-best outcome then obtains: a bidder buys all shares and provides first-best effort. *Activism would never emerge*—unless further constraints are introduced.

Wealth constraints that necessitate outside financing to acquire shares (beyond the toehold) are a natural candidate. If effort is unobservable, outside financing is not always feasible, creating scope for activism. Since higher θ relax financing constraints, such a framework predicts activism for low θ and takeovers for high θ. Accordingly, *takeovers should be categorically more profitable than activism, and bidder profits should be positively related to takeover surplus.* In fact, the ranking of interventions according to aggregate (or target) gains would equal their ranking according to intervention profits. Furthermore, in such a model, *there is no rationale for takeover activism.*

Takeover defenses, such as poison pills, are another constraint that generates scope for activism and even for takeover activism, as in Corum and Levit (2018). If a takeover activist cannot commit to exercising the poison pill even when bilateral negotiations fail, the bidder cannot be held to less than her tender offer profit in any bargaining outcome. Without free-riding, the bidder's tender offer profit equals the first-best surplus minus the profit the activist would make from implementing value improvements on her own, that is, from regular activism. (Unless the offer includes this concession, the activist exercises the poison pill and engages in regular activism.) Thus, *takeover activism would be equally profitable as regular activism.*

All the above being said, we need to emphasize that assuming free-rider problems is by no means unique to our paper. The takeover literature has extensively studied GH free-riding. Similarly, more or less by their very nature, all theories of active shareholders presume JM free-riding. Moreover, all papers that analyze the endogenous formation of activist stakes through anonymous market trading assume JM free-riding *and* GH free-riding. In the latter models, the reliance on GH free-riding is two-fold: First, the GH free-rider condition appears as the market-maker's break-even condition, except it is relaxed by the presence of "noise traders." In fact, the very point of Kyle and Vila (1991), who pioneered this literature, is that noise traders relax the GH free-rider problem. Second, the premise that "secret" toehold formation matters implies GH free-riding. Without the latter, a plain takeover (without or after the toehold acquisition) would lead to a first-best outcome in those models. What distinguishes our analysis from others in the literature is *not* that we assume GH and JM free-riding but rather that we explicitly compare the consequences of confronting one or the other.

Additional differences. Our model assumes that bidders and activists differ only in their mode of intervention. This is meant to focus the analysis on the dual free-rider problem rather than to dispute the existence of other differences. That said, many other differences would modify q and K, or differentiate V or C across bidders and activists without altering the sign of the comparative statics. For example, with $n > 1$ activist blockholders, free-riding is partially manifested as an effort-in-team problem, with success probability being a function $q(\mathbf{e};\theta)$ of an effort vector $\mathbf{e}= (e_1, \ldots, e_n)$. If the marginal return to campaign effort, ceteris paribus, increases in θ (i.e., $q_{e_i\theta} > 0$ for $i = 1, \ldots, n$), equilibrium profits generally increase in θ for all activists. Reputational concerns may also matter for activists' incentives. The reputational benefits of current success for engaging future targets could, in reduced form, be captured as a reduction in current campaigning costs K. Again, this would not alter that higher θ raise campaign profit (via financial gains from the current target). For bidders, reputational incentives to increase (restructuring) effort would exacerbate the unrecompensed effort problem in the current takeover.

One difference that could weaken our results is that dilution is a potential source of bidder gains, while activist gains are confined to toeholds (Becht et al. 2009; Brav et al. 2010). If bidders can divert a significant share of the target value once in control, the unrecompensed effort problem disappears. However, minority shareholder protection is a basic principle of corporate (governance) law; and in jurisdictions where minority shareholders are not well protected, disciplinary interventions in *widely held* firms are unlikely to be relevant, as most firms would have controlling shareholders.

G. Post-Disclosure Share Purchases

We extend the regular activism game of Section 3.3 by adding a stage 0 in which the activist can buy r_a shares in the open market at price p_a. We assume that her toehold t_a and intentions are publicly known at this point. As in the tender offer game, all potential sellers are rational, homogeneous, atomistic price-takers; there are no noise traders. The subsequent stages remain unchanged.

Analysis. The campaign and restructuring effort problems in stages 1 and 2 remain as before, except that the activist's stake in both instances is now $s_a = t_a + r_a$. To streamline the analysis, we assume (parameters such) that only a takeover leads to a control transfer with certainty. Specifically, for the stage-0 share purchase problem, we impose $q_s(., ., .) > 0$ for $s < 1/2$ and $q(., ., .) = 1$ for all

$s \geq 1/2$. In addition, we assume that q and K are such that campaign effort is always interior, that is, $q(.,.,.) < 1$ for all $s < 1/2$. Given these assumptions, the tender offer results of Section 3.2 apply for $r_a \geq 1/2 - t_a$. Here we restrict attention to $r_a \leq 1/2 - t$.

For $r_a \leq 1/2 - t_a$, the share purchase problem can be written as

$$\underset{r_a, p_a}{\text{maximize}} \quad q(a, \psi, s_a)\Delta(s_a, \theta) - K(a) - r_a p_a \tag{14}$$

$$s.t. \quad p_a \geq q(a, \psi, s_a)V^*(s_a, \theta) \tag{15}$$

$$r_a \leq 1/2 - t_a \tag{16}$$

$$a = a^* \tag{17}$$

$$s_a = t_a + r_a. \tag{18}$$

where a^* and $\Delta(s_a, \theta)$ represent, respectively, the campaign effort and restructuring effort solutions. It is instructive to compare this with the problem for $r_a \geq 1/2 - t_a$, which is the tender offer problem (2)-(6) in Section 3.2. Free-rider condition (3) and effort constraint (5) have analogues in the above program, but the majority contraint (4) is replaced by the minority constraint (16). This goes hand in hand with the assumption that success probability $q(a, \psi, s_a)$ depends on the activist's stake s_a. By contrast, the size of a bidder's majority stake does not affect her control.

When the activist can buy shares, each ownership level $s_a \in [t_a, 1/2]$ represents a possible strategy. Larger stakes come with benefits and costs. By using the binding free-rider condition (15), we can reduce the profit function (14) to $q(a^*, \psi, s_a)[t_a V^*(s_a, \theta) - C^*(s_a, \theta)] - K(a^*)$. Differentiating this with respect to s_a yields

$$\frac{\partial q}{\partial s_a}[t_a V^*(s_a, \theta) - C^*(s_a, \theta)] + q(a^*(s_a), \psi, s_a)\left[t_a \frac{\partial V}{\partial e}\frac{\partial e}{\partial s_a} - \frac{\partial C}{\partial e}\frac{\partial e}{\partial s_a}\right]$$

(see proof of Proposition 7 for details). The first term is positive as $\frac{\partial q}{\partial s_a} > 0$. It reflects the benefit of more influence: a higher chance of success and hence a higher expected value of the toehold. At the upper bound, $s_a = 1/2$, majority ownership confers full control and thus guarantees success even without any campaigning effort. The second term is negative as $t_a \frac{\partial V}{\partial e}\frac{\partial e}{\partial s_a} - \frac{\partial C}{\partial e}\frac{\partial e}{\partial s_a} < 0$ (Lemma 2). It captures that buying more shares induces more unrecompensed effort. Thus, while low-s_a strategies have a smaller probability of success, high-s_a strategies entail more unrecompensed effort. Each strategy s_a in the continuum $[t_a, 1/2]$ represents a particular trade-off between these opposing effects, with the takeover being the "corner solution." By contrast, existing comparisons between takeovers and activism make a *dichotomous* distinction and assume *exogenous* cost-benefit differences (Shleifer and Vishny, 1986; Maug, 1998).

The essence of Proposition 3—takeovers and activism prevail at opposite ends of the θ-range—carries over to this setting with post-disclosure share purchases.

Proposition 7. *When the toehold and campaign costs are small, there exist unique threshold values θ_b and θ_a for the productivity parameter where $\theta_a \geq \theta_b > 0$ such that*

(i) the optimal intervention is a takeover for all $\theta \leq \theta_b$ and a campaign for all $\theta > \theta_a$,

(ii) the optimal post-disclosure share purchase can be interior, i.e., $r_a^*(\theta) \in (t_a, 1/2 - t_a)$.

Proof. The proof is at the end of this section. □

To understand how to interpret "opposite" comparative statics in this setting with a continuum of strategies, consider how the profit from a given strategy $s_a \in [t_a, 1/2]$ changes with productivity θ. Differentiating $q(a^*, \psi, s_a)[t_a V^*(s_a, \theta) - C^*(s_a, \theta)] - K(a^*)$ with respect to θ yields

$$\frac{\partial}{\partial \theta} [t_a V^*(s_a, \theta) - C^*(s_a, \theta)] \tag{19}$$

given that the envelope theorem applies to campaign effort a^*. The sign of (19) is positive for small s_a as shown for $s_a = t_a$ in Proposition 2, but negative for large s_a as shown for $s_b = 1/2$ in Proposition 1. That is, when θ increases, high-s_a strategies become less profitable while low-s_a strategies become more profitable. This shows that the divergence in comparative statics is not confined to the corners $s_a = t_a$ and $s_b = 1/2$ but holds, more generally, for interventions that rely on buying more influence versus interventions that rely on more campaigning. Whether the profit increases or decreases in θ under a given strategy s_a depends solely on the severity of the unrecompensed effort problem under that strategy, as (19) shows.

As for Proposition 7, the solution to the post-disclosure share purchase problem can be interior. However, for $\theta \to 0$, the optimal strategy must be a takeover since the unrecompensed effort problem vanishes. Conversely, for $\theta \to \infty$, purchasing shares becomes increasingly unattractive such that the optimal strategy must be a campaign. We illustrate this with a simplified example below, but first we discuss this extension from an empirical perspective and relate it to the existing literature.

Example. Characterizing how the optimal share purchase r_a^* depends on θ is complex. First, changes in θ can have an ambiguous effect on the local optima of r_a in the range of strategies that rely on both buying influence and working for it. Second, the profit function can be non-monotonic in r_a and exhibit multiple local optima so that r_a^* may be discontinuous in θ.

Still, to illustrate comparative statics with respect to θ, we present a simplified example in which campaigns only impose a fixed cost $\overline{k}$ and the success probability simply increases with the activist's stake s_a according to $q(s_a) = 2s_a$ for $s_a \in [0, 1/2]$ and $q(s_a) = 1$ for $s_a \geq 1/2$. Also, $V = \underline{V} + \theta e$ and $C(e) = \frac{c}{2}e^2$, so that the restructuring effort problem has the solution $e^* = \frac{s_a \theta}{c}$. Under these assumptions, the activist's stage-0 share purchase problem can be written as

$$\max_{s_a \epsilon [t_a, 1/2]} 2s_a \left[s_a \left(\underline{V} + \frac{s_a \theta^2}{c} \right) - \frac{s_a^2 \theta^2}{2c} \right] - \overline{k} - (s_a - t_a) 2s_a \left(\underline{V} + \frac{s_a \theta^2}{c} \right). \tag{20}$$

The objective function simplifies to

$$2 \left[t_a \left(s_a \underline{V} + \frac{s_a^2 \theta^2}{c} \right) - \frac{s_a^3 \theta^2}{2c} \right] - \overline{k}. \tag{21}$$

The first-order condition with respect to s_a is the quadratic equation

$$s_a \left(s_a - \frac{4t_a}{3} \right) = \frac{2ct_a \underline{V}}{3\theta^2}. \tag{22}$$

(21) is a cubic function that converges to $-\infty$ for $s_a \to -\infty$ and to $+\infty$ for $s_a \to +\infty$. By (22), it has a local minimum for some unique $s_a^- < 0$ and a local maximum for some unique $s_a^+ > \frac{4t_a}{3}$. Of these, only the latter is of interest since $s_a \in [t_a, 1/2]$. It is straightforward to see from (22) that s_a^+ is strictly decreasing in θ. Also, since s_a^+ grows without bound for $\theta \to 0$, the solution to (20) must be $s_a = 1/2$ for sufficiently low θ, in which case a tender offer is optimal and saves on $\overline{k}$. Conversely, for $\theta \to \infty$, s_a^+ converges to $\frac{4t_a}{3}$. Thus, if θ is high (and $\overline{k}$ is low) enough, activism is optimal.

Discussion. Problem (14)-(18) can have solutions anywhere in $[t_a, 1/2]$. In practice, activists tend to hold relatively small stakes. Within the sample of activist hedge funds in Brav et al. (2010), the median size of the toehold and maximum stake accumulated during a campaign are, respectively, 6.3 percent and 9.5 percent. One reason activists seldom acquire larger minority blocks may be legal ramifications, such as a mandatory bid rule or increased fiduciary duties. Alternatively, our theory can be interpreted more broadly to include further categories of active blockholders. If different kinds of interventions coincide with different types of investors (e.g., activist funds, strategic investors, buyout firms), predictions about which s_a is optimal can be interpreted as predictions about which category of investor a target firm attracts. A possibility is then that larger minority blocks predicted by our model represent long-horizon, possibly strategic blockholders whose high effort is manifested in the long-term commitment.

Related literature. There exists a well-known literature in corporate governance on trading by potentially activist blockholders (e.g., Shleifer and Vishny, 1988; Kyle and Vila, 1991; Maug, 1998; Kahn and Winton, 1998; and Cornelli and Li, 2002). Most analyses in this literature inadvertently suppress the unrecompensed effort problem by modelling the intervention choice as a binary variable. With binary "effort," JM and GH free-riding—and thus activism and takeovers—are equivalent save for exogenously imposed differences, as illustrated by the example in Section 2. The above literature focuses instead on asymmetric information (about the impact of an intervention or whether it occurs) and the role of noise traders in relaxing the GH free-rider problem.

The notable exception is Back et al. (2018), who model a general "activism technology." They analyze an investor's incentives to build a "pre-disclosure" toehold through anonymous markets but rule out "post-disclosure" purchases and tender offers. By contrast, we study whether the optimal "post-disclosure" intervention is a campaign or a public bid for majority control, taking the "pre-disclosure" toehold as given. This is not merely a difference in perspective. We study different trade-offs: In our framework, trading is motivated by the demand for influence and curbed by unrecompensed effort. In Back et al. and other models in the spirit of Kyle and Vila (1991), trading is motivated by speculative profits and curbed by information revelation through the price impact.[33]

Proof of Proposition 7. For this proof, we focus on toeholds t_a and campaign cost functions $K(a)$ for which Proposition 3 establishes takeovers and regular activism without post-disclosure share

[33]In anonymous markets with noise traders, changes in the activism technology not only affect the payoffs from an intervention but also the profit a potential activist can make by shorting the stock and abstaining from an intervention ("cut-and-run"). This creates *strategic* uncertainty (resulting from whether or not an intervention is undertaken) and a source of information asymmetry in the market. The results in Back et al. (2018) focus mainly on this effect. In our model with transparent trading, "cut-and-run" strategies are infeasible and the unrecompensed effort problem comes to the fore.

purchases as being optimal intervention modes at opposite ends of the range of θ.

Proposition 3 shows that takeovers are optimal for $\theta \to 0$ while regular activism without post-disclosure share purchases is optimal for $\theta \to \infty$. Now note that, as (unrecompensed) restructuring effort vanishes under either intervention for $\theta \to 0$ but activism comes with additional campaign costs, $\lim_{\theta\to 0} \Pi_b^*(t_a, \theta) > \lim_{\theta\to 0} \Pi_a^*(t_a+\Delta_t, \theta)$ for *any* $\Delta_t < 1/2-t_a$. Hence, even with post-disclosure purchases, takeovers outperform regular activism for some non-empty interval $\Theta_b = [0, \theta_b]$. At the opposite limit, for $\theta \to \infty$, adding the *option* of purchasing more shares cannot make regular activism less profitable. Thus, regular activism remains the optimal intervention for some non-empty interval $\Theta_a = [\theta_a, \infty)$.

The optimal intervention mode only switches once for $\theta \in [0, \infty)$. Consider the share purchase problem (14)-(18). For admissible a and r_a, the objective in (14) decreases in p_a. So, p_a is optimally set to its lower bound by (15): $p_a = q(s_a)V^*(s_a, \theta)$. Using this and $\Delta(s_a, \theta) = s_a V^*(s_a, \theta) - C^*(s_a, \theta)$ in the objective function yields $\max_{s_a \in [t, 1/2]} q(a^*(s_a), \psi, s_a)[t_a V^*(s_a, \theta) - C^*(s_a, \theta)] - K(a^*(s_a))$ where $a^*(s_a)$ denotes (17) as a function of s_a. Now, consider the smallest θ for which activism is more profitable than a takeover. That is, denoting the activist's post-disclosure purchase at that point by $\hat{s}_a < 1/2$,

$$t_a V^*(1/2, \theta) - C^*(1/2, \theta) < q(a^*(\hat{s}_a), \psi, \hat{s}_a)[t_a V^*(\hat{s}_a, \theta) - C^*(\hat{s}_a, \theta)] - K(a^*(\hat{s}_a)). \tag{23}$$

Suppose the productivity paramter increases from θ to θ'. We know from Proposition 1 that the left-hand side decreases. Regarding the right-hand side, there are two cases to consider.

Case A. If $\hat{s}_a$ is sufficiently low, $t_a V^*(\hat{s}_a, \theta) - C^*(\hat{s}_a, \theta)$ increases in θ. Keeping $\hat{s}_a$ as is, it is then straightforward to show (by applying the envelope theorem to campaign effort) that the right-hand side overall increases.

Case B. If $\hat{s}_a$ is sufficiently high, $t_a V^*(\hat{s}_a, \theta) - C^*(\hat{s}_a, \theta)$ decreases in θ. However, the right-hand side overall decreases less than the left-hand side. Keep campaign effort fixed at $a^*(\hat{s}_a)$. Given $\hat{s}_a < 1/2$, $t_a V^*(\hat{s}_a, \theta) - C^*(\hat{s}_a, \theta)$ decreases less than $t_a V^*(1/2, \theta) - C^*(1/2, \theta)$ because the divergence between ex ante and ex post optimal effort (i.e., unrecompensed effort) is smaller. Moreover, letting the activist adjust her campaign effort can only reduce the magnitude of the decrease (by revealed preference).

Thus, in response to an increase in θ, the right-hand side in (23) increases, or decreases less than the left-hand side. That is, if activism (with $\hat{s}_a$) is more profitable than a takeover at θ, then it is also be more profitable at θ'.

To see that the ultimate stake can be interior, consider the value of a marginal increase in s_a,

$$\left(\frac{\partial q}{\partial a^*}\frac{\partial a^*}{\partial s_a}+\frac{\partial q}{\partial s_a}\right)[t_a V^*(s_a,\theta)-C^*(s_a,\theta)]+q(a^*(s_a),\psi,s_a)\left[t_a\frac{\partial V}{\partial e^*}\frac{\partial e^*}{\partial s_a}-\frac{\partial C}{\partial e^*}\frac{\partial e^*}{\partial s_a}\right]-\frac{\partial K}{\partial a}\frac{\partial a}{\partial s_a}.$$

Evaluted at $s_a = t_a$ and using the first-order condition of the campaign effort problem, $\frac{\partial q}{\partial a}[t_a V^*(s_a,\theta)- C^*(s_a,\theta)] - \frac{\partial K}{\partial a} = 0$, this becomes

$$\left.\frac{\partial q}{\partial s_a}\right|_{s_a=t_a}[t_a V^*(t_a,\theta)-C^*(t_a,\theta)]+q(a^*(t_a),\psi,t_a)\left.\left[t_a\frac{\partial V}{\partial e}\frac{\partial e}{\partial s_a}-\frac{\partial C}{\partial e}\frac{\partial e}{\partial s_a}\right]\right|_{s_a=t_a}.$$

In the first component, $\frac{\partial q}{\partial s_a}$ captures that more voting power increases the activist's chance of success. In the second component, $t_a\frac{\partial V}{\partial e}\frac{\partial e}{\partial s_a}-\frac{\partial C}{\partial e}\frac{\partial e}{\partial s_a}$ captures the increase in unrecompensed effort. Clearly, there exist parameterizations such that the first effect dominates. □

Bibligraphy for the Appendix

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