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The Evolution of the Market for Corporate Control

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Abstract

In a canonical takeover model we let informed large shareholders choose between making a bid and initiating a sale to another acquirer. Such takeover activism complements direct takeovers because the very choice mitigates the asymmetric information problem, thereby improving efficiency. As more investors enter the market for corporate control, takeover activism increasingly substitutes for direct takeovers and becomes the prevailing mode of disciplinary control change. Our model shows how an evolution towards takeover activism—characterized by a symbiotic relationship between activist hedge funds and private equity—arises to overcome asymmetric information and collective action problems through a form of intermediation.

Keywords: Tender offer, hostile takeover, takeover activism, asymmetric information, free-rider problem, market for corporate control

JEL Classification: G34.

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> The lower the stock price, relative to what it could be with more efficient management, the more attractive the takeover becomes to those who believe that they can manage the company more efficiently. And the potential return from the successful takeover and revitalization of [a] poorly run company can be enormous.
> — Henry G. Manne (1965, p.118)

1 Introduction

The market for corporate control has come a long way since the above quote. Professional control-oriented investors such as activist hedge funds and private equity funds, which have grown enormously since the 1990s (e.g., Barry et al. 2020, Renneboog & Vansteenkiste 2017), are now central players in this market.[1] Furthermore, hostile tender offers were the prominent feature of the market in the 1980s, but the mode of control change has since shifted from such direct takeovers to takeover activism—large shareholders do not take over firms themselves but broker a sale to outside bidders.

We propose that a growth of (capital at the disposal of) control-oriented investors leads to such a shift in the mode of control changes. Our explanation of this evolution builds on the theory of large shareholders as being crucial to overcoming collective action problems in corporate governance and the market for corporate control. The novelty of our theory is to recognize that control-oriented investors need not have ex-ante designated roles on the buy- or the sell-side. Rather they can choose to become large shareholders, who have the option to acquire firms themselves or put firms in play, or to become outside bidders for firms that are put in play. We show that both modes of control change can coexist and that the choice between them allows to overcome free-riding and asymmetric information problems, leading to an efficient control allocation. We moreover show that the optimal role choice depends on the number of control-oriented investors in the market. The resulting equilibrium patterns match the secular trend: an emergence and rise of takeover activism and a decline of tender offers.

[1] We reference detailed statistics on the growth of hedge fund activism and private equity in Section 5. The rise of this professional investor class is a remarkable development that has taken place over the last decades. Manne (1965) himself did not focus on financial acquirers, which were less prominent at the time; among those he saw as most apt to identify managerial inefficiencies and take over firms were competitors, customers, and suppliers (Coffee 1984).

The starting point of our analysis it to examine what determines at the single-firm level a large shareholder's choice between being on the buy- or the sell-side and how this choice impacts the efficiency of the control allocation. To this end, we add to the seminal framework of Shleifer & Vishny (1986) the option of *initiating a sale of the firm* in lieu of making a tender offer. Concretely, a large shareholder has private information about a value improvement that can be realized by restructuring the firm. The restructuring requires a control change. The large shareholder can acquire control through a direct takeover and implement the value improvement herself. Alternatively, she can invite an outside bidder to take control. In such an invited merger, the large shareholder negotiates on behalf of all shareholders a binding agreement with the bidder. (While a collectively binding merger agreement precludes dispersed shareholders from free-riding, this is not crucial for our results as we discuss later.) Having less prior involvement with the firm, the outside bidder lacks the large shareholder's private information about the value improvement at the time of the merger negotiation. Once in control, the outside bidder has access to the same restructuring technology[2] as the large shareholder, learns the true value improvement, and implements it.

The equilibrium features a simple cut-off structure: For all firm types with substantial value improvements, the large shareholder makes a tender offer to take the firm over herself, whereas she initiates a sale to the outside bidder for firms with modest value improvements. Her choice is driven by the information rents that accrue at opposite ends of the value improvement distribution. In equilibrium, all firms taken over directly by the large shareholder receive the same bid price. Consequently, the large shareholder buys a firm with large value improvements at a discount, whereas she buys a firm with moderately large value improvements at a premium. With redistribution from moderately large to large firm types, the information rents in tender offers accrue at the upper end of the value improvement distribution. For all firm types with modest value improvements, the outside bidder pays the same expected price in equilibrium. Therefore, large shareholders of firms with moderately small value improvements sell their stakes below their true value, while those of firms with small value improvements sell them above their true value. With redistribution from moderately small to small firm types, the information rents in invited mergers accrue at the lower end of the value improvement distribution. Large shareholders owning stakes in firms with

[2]We show in an extension that our qualitative results hold when the value improvement has a common as well as a private (bidder-specific) component.

intermediate value improvements thus earn negative information rents from either control change mode and are left with choosing the "lesser evil."

In the setting of Shleifer & Vishny (1986), in which direct takeovers are the sole mode of control change, the conjunction of free-riding behaviour and asymmetric information implies that control is not always efficiently allocated. Firms with modest value improvements are not taken over and restructured. The gains that the large shareholder makes on her initial stake are not enough to offset the premium at which she would have to acquire the dispersedly held shares. By contrast, we show that adding the option to be on the sell-side results in a fully efficient control allocation. All firms are taken over and restructured either by the large shareholder or by the outside bidder. The efficiency gains arise because the large shareholder can choose to be on the buy- or the sell-side, combined with the fact that selling the stake at a positive (expected) price dominates staying passive irrespective of the value improvement. That is, informed control sales are a more effective mechanism to bring about value-creating control changes than informed control acquisitions. Furthermore, takeover activism does not only complement direct takeovers but also replaces the latter for some firms as the mode of control change. By raising the value of the large shareholder's "outside option" from staying passive to selling her stake with a positive profit, our model predicts a tender offer to be the large shareholder's preferred strategy for a smaller set of firms than is the case in the setting of Shleifer & Vishny (1986).

To explore the implications of our single-firm analysis for the evolution of the *market* for corporate control, we embed it into a market model. There exists a continuum of firms, each with a potential value improvement, among which control investors look for targets. Each control investor chooses whether to become a large shareholder and buy an initial stake or to be a potential outside bidder, putting in place human and financial capital, prior to being randomly matched to a particular target.[3] Thus, we assume the presence of search frictions but no ex-ante designated buyers or sellers in our framework.

We characterize the evolution of the market by comparing the market composition as the number of control investors grows. In the early stage with relatively few control investors, everyone enters the market as large shareholders. Consequently, direct takeovers are the sole

[3]One can interpret the entry decision or role choice also as a reduced-form model of investors deciding to invest in funds that prioritize one or the other strategy (e.g., activist funds or private equity funds) since both sets of decisions are ultimately determined by the profitability of the two strategies.

means to effectuate (hostile) control changes. Intuitively, a large shareholder can implement a control change through a direct takeover herself, whereas an outside bidder has to rely on a large shareholder to put a firm in play (as, with no toehold, the outside bidder cannot profit from a direct tender offer). When the market for corporate control is thin, the likelihood of receiving a merger invitation is simply too small. Hence, all control investors become large shareholders.

Once a sufficient fraction of firms have a large shareholder, entering as a bidder becomes attractive. Furthermore, as more outside bidders are in the market, it becomes increasingly more profitable to enter as a large shareholder: A large shareholder cannot only acquire a firm with substantial value improvements, but she is also more likely to find an outside bidder to extend a merger invitation for modest value improvements. Similarly, as the fraction of firms with a large shareholder grows, it becomes increasingly more profitable to enter as an outside bidder since the likelihood of receiving a merger invitation increases. Because of this complementarity, the (expected) profits of both large shareholders and outside bidders do not erode but keep increasing as more control investors enter the market. In this transformation phase, control changes are also increasingly more often carried out through takeover activism relative to direct takeovers. Control investor profits and the relative frequency of takeover activism keep increasing until all firms are matched with large shareholders and the market for corporate control reaches its mature stage. Depending on parameters, some firms may in the mature stage be matched with two outside bidders who compete in case of a merger invitation. Outside bidder competition shifts takeover gains to the sell side, making it even more likely that large shareholders opt for takeover activism over direct takeovers. This is an additional effect that promotes the shift to takeover activism in the mature stage.

The market for corporate control becomes overall more efficient as the number of control investors grows. The efficiency gains comprise two effects. In the early stage, in which control changes occur only through direct takeovers, the gains stem from a standard "scale" effect: a growing number of control investors identifies a growing number of potential targets. In the transformation stage, with the rise of takeover activism, an additional source of gains is the increase in the probability that identified potential targets are successfully restructured. This reflects that the market evolves toward a more efficient mode of control change, gradually capturing the efficiency gains from takeover activism that we identify in our single-firm model.

As is well documented, there has been a decline in hostile tender offers since the late 1980 (e.g., Eckbo (2009)) with a contemporaneous rise in shareholder activism (e.g., Fos (2017)). In the extant literature this shift is usually attributed to the proliferation of takeover defenses and legal changes that facilitate shareholder activism. We contend that this does not provide a comprehensive explanation. Takeover defenses necessitate activism to remove them (and overcome board resistance) before a disciplinary ownership change. But they do not dictate what mode the control change takes, which could occur through a merger invitation as much as through a tender offer.[4] In short, activism and tender offers are not mutually exclusive. For instance, Carl Icahn—well known as both raider and activist—ran a campaign in 2021 to "replace Southwest Gas Holdings' (SWX) board and commence a tender offer for all common shares at $75 per share in cash."[5] Conceptually, therefore, takeover defenses explain a rise in activism with the corollary that disciplinary ownership changes become costlier to implement. They do not, however, necessitate a shift from tender offers to merger invitations. We argue that another layer of explanation accounts for such a shift.

On a factual level, the rise in shareholder activism has not eliminated disciplinary control transactions. Many activist campaigns and the most profitable ones result in outside bidders such as private equity funds acquiring the firm (Greenwood & Schor 2009, Boyson et al. 2017). Furthermore, governance-driven (going-private) buyouts have not declined but rather risen over this time period (Kaplan & Stromberg 2009, Renneboog & Vansteenkiste 2017). These observations do not suggest a shift away from disciplinary takeovers but a change in how they are carried out. In our theory, market frictions create scope for both takeover activism and direct takeovers. But initially the market is so thin that direct takeovers by large shareholders (bidders with toeholds) are the likeliest transaction mode. A growth of (funds managed by) control investors—raising the number of campaigns seeking control changes and of potential acquirers—eventually advances the market toward a state where most targets are put in play. The mature market is characterized by an interplay of control investors in specialized roles: outside acquirers and large shareholders who supply them with targets. This resonates with the specialization and the "symbiotic relationship between private equity funds and hedge

[4] Corum & Levit (2019) argue that activists who aim to take over the firm themselves have a lower chance of winning a *merger* vote. However, they do not consider the option of voting to remove takeover defenses to pave the way for a *tender offer*.

[5] CNBC 2021, https://www.cnbc.com/2021/10/23/carl-icahns-tender-offer-for-southwest-gas-sets-the-table-for-a-proxy-fight.html .

funds" that has indeed evolved in the market for corporate control.[6]

By no means do we question that the arrival of takeover defenses had an adverse impact on (the prevalent mode of) control changes at the time and benefited incumbent managers (Bertrand & Mullainathan 2003). Yet our theory posits that, this damper notwithstanding, the market for corporate control continued to develop and thrive, unlocking complementarities between "large-shareholder" and "outside-bidder" strategies. We think that the market for corporate control is possibly as effective today as ever due to this evolution, despite the proliferation of defensive mechanisms that has made it costlier to impose control changes.

While we frame the shift to takeover activism in terms of market growth, market frictions are the root cause. Absent free-riding or asymmetric information, takeover activism becomes redundant from an efficiency perspective; the growth of control investors would merely raise the number of large shareholders and direct takeovers and reduce control investor profits—with neither a shift to takeover activism nor a complementarity between large shareholders and outside bidders. Note also that the large shareholders, irrespective of takeover defenses, occupy a pivotal role in our model because of the free-rider problem which prevents bidders from succeeding without a toehold or unless large shareholders put the firm in play. Hence, the evolution we describe is not *just* a consequence of growth; it reflects the emergence of a specific "industrial organization" (of the control investment sector) to overcome those market frictions.

The final part of our analysis emphasizes this point by reverting to the single-firm model to unearth the causes of the efficiency gains brought about by takeover activism. We start by showing that the assumption of the binding merger agreement is not critical by replicating the firm-level restructuring equilibrium in a modified setting: Instead of extending a merger invitation, the large shareholder can now (with the same bargaining protocol as in a merger) negotiate a sale of her initial stake with the outside bidder, who subsequently makes a tender offer for the remaining, widely held shares. Alternatively, the large shareholder could make a bid for the firm herself. The equilibrium of this modified game has the same cut-off structure with an identical cut-off value, and the control allocation remains fully efficient. Firms with substantial value improvements are acquired by the large shareholder. Firms with modest value improvements are acquired in a tender offer by the outside bidder after she acquired

[6]Financial Times 2007, https://www.ft.com/content/6a3e50b2-1070-11dc-96d3-000b5df10621. This and other empirical patterns consistent with our model predictions are discussed in detail in Section 5.

the initial stake in a negotiated block trade. All value improvements are realized because this variant of takeover activism allows to fully separate the asymmetric information and the free-rider problem. In the block trade, the large shareholder has private information about the value improvement. Nonetheless bilateral trade is efficient because there are known gains from trade. In the subsequent tender offer, the outside bidder faces free-riding by dispersed shareholders but has no informational advantage, and efficient trade is again feasible.

Even when the outside bidder learns the value improvement after the block trade but prior to the tender offer, takeover activism leads to more firms being taken over and restructured compared to a setting where the large shareholder can only make a tender offer. By selling the block instead of acquiring the firm, the large shareholder reveals that the value improvement is not substantial. After a block trade, the dispersed shareholders expect a moderate value improvement and the outside bidder can make a successful bid at a lower price. Thus, more control changes are realized. Still, firms with too small a value improvement are not taken over because the gains on the stake acquired in the block trade are not enough to offset the premium at which the outside bidder would have to acquire the dispersedly held shares.

We show that this remaining inefficiency can be completely eliminated if there are many bidders *located in a "bidder chain."* In this extension, each bidder can, after having acquired the block, either make a tender offer to the dispersed shareholders or sell the block to the next bidder in the chain.[7] Adding more bidders increases efficiency, and in the limit all value-increasing control changes are realized. Independent of how small the value improvement is, sufficiently many bidders can collectively signal through the sequence of block trades that the value improvement is small until one bidder makes a successful tender offer at a sufficiently low price. The bidder chain allows to incrementally separate the free-rider problem from the asymmetric information problem. This result distills our argument that takeover activism is a form of intermediation that arises to overcome the conjunction of those market frictions.

Related literature We build on the canonical framework on large shareholders and corporate control by Shleifer & Vishny (1986). Subsequent papers on takeovers with asymmetric information and free-riding by dispersed shareholders are Hirshleifer & Titman (1990), At et al. (2011), Burkart & Lee (2015, 2016), Marquez & Yılmaz (2008, 2012), Ekmekci & Kos (2016) and Voss & Kulms (2022). We show that asymmetric information and free-riding can

[7] Contrary to the typical intermediation chains in the literature following Glode & Opp (2016), each bidder becomes perfectly informed before making an offer.

be overcome at the firm level when large shareholders can choose to be on the buy- or the sell-side of the transaction. None of the above papers consider this choice.

There is a large literature on shareholder activism as surveyed by e.g., Edmans & Holderness (2017). Only four papers in this literature allow the large shareholder to choose between intervention modes: Shleifer & Vishny (1986), Bebchuk & Hart (2001), Maug (1998), and Burkart & Lee (2022).[8] The first three papers compare activism and takeovers as alternative ways for a large shareholder to gain control. By contrast, we study a large shareholder who chooses between two alternative ways to bring about a takeover: make a takeover bid herself or initiate the sale of the target to another party. Burkart & Lee (2022) also compare direct takeovers and regular activism but introduce takeover activism as a third intervention mode. In their moral hazard framework takeover activism is typically superior.[9] In our asymmetric information framework takeover activism and direct takeovers coexist and complement each other in achieving an efficient control allocation. Moreover, unlike in Burkart & Lee (2022), a binding merger agreement is not crucial to the efficiency gains from takeover activism in our model.

Corum & Levit (2019) focus on takeover activism. They argue that activists possess an inherent advantage to campaign for a merger compared to bidders who as buyers suffer from a conflict of interest. Different from the focus of the above papers, there is no choice between intervention modes in their analysis; tender offers are exogenously restricted and campaigns to remove the restrictions (takeover defenses) to endogenously allow for tender offers are not considered.[10] Their model also abstracts from the free-rider problem.

Three aspects of our analysis are unique compared to all of the above papers. First, direct takeovers and takeover activism endogenously coexist in equilibrium and are complementary in overcoming market frictions. We can thus address when one or the other mode of control change prevails. Second, we combine this with the idea of control investors choosing "roles" in the market for corporate control and find an endogenous evolution from direct takeovers to takeover activism as the number of control investors grows. Lastly, the gains from takeover

[8] We abstract here from exit as an intervention mode. There is, of course, a literature comparing voice and exit in a variety of settings. See, e.g., Hirschman (1970), Edmans & Manso (2010), Dasgupta & Piacentino (2015), Edmans et al. (2018), Levit (2018), Broccardo et al. (2020) and Voss (2022).

[9] This is always the case in their framework if control changes, irrespective of the final transaction mode, require an activist campaign to remove defensive mechanisms first.

[10] We discuss (modeling) the removal of takeover defenses in more detail in Online Appendix 2.4

activism in our model do not hinge on negotiated mergers that simply circumvent free-riding. Conceptually, the gains equal those created by an intermediation chain among many bidders that allows to uncouple the asymmetric information problem from the free-rider problem.

Our result that bidder chains overcome asymmetric information and free-riding presents a novel form of intermediation chain à la Glode & Opp (2016). We discuss papers related to this analysis in Section 4.3. Interpreting tender offers and takeover activism as buy-side and sell-side driven takeovers loosely relates our paper also to Gorbenko & Malenko (2022) who provide a rationale for why the trade of common value assets is more likely to be initiated by the sell side. They consider whether designated buyers or sellers initiate an auction whereas we consider whether a large shareholder wants to be a buyer or a seller.

2 Control Change in the Firm

We start by describing a single-firm takeover model with free-riding and asymmetric information where we introduce the possibility for a large shareholder to invite another party to acquire the firm as an alternative to acquiring it herself. Our model presupposes a large shareholder with sufficient influence to pressure the board to remove any takeover defenses and allow a control change. Crucially, irrespective of how the large shareholder overcomes potential barriers, she needs to decide whether to acquire the firm herself through a direct takeover or to put the firm in play and broker an acquisition by an outside bidder. The aim is to understand whether or when the large shareholder prefers one to the other and how allowing for this "simple" choice affects efficiency in an otherwise canonical setting. Whichever transaction mode is selected, neither is naturally more "hostile" or "friendly" than the other. If defenses must be removed first, the control change should be seen as conflictual and disciplinary, irrespective of whether the large shareholder subsequently acquires the firm or puts it in play.[11]

[11] Mergers that transpire in the aftermath of activist-induced control changes may not always be classified as "hostile" in empirical data (e.g., the new board following a proxy fight may be in favor of the merger). Indeed, Greenwood & Schor (2009) document that activist campaigns concerned with corporate governance problems at targeted firms tend to pave the way for control changes further down the road even if short-term campaign objectives did not explicitly include (but tacitly accounted for the potential of) ownership changes. Within our model such episodes would fall under takeover activism even if the eventual deal is not classified as "hostile" in empirical data.

2.1 Model

Consider a firm with a one share - one vote structure and a mass 1 of shares. A large shareholder L owns a minority block $\alpha \in (0, \bar{\alpha})$, while the remaining $1 - \alpha$ shares are distributed among a continuum of shareholders whose individual holdings are equal and indivisible. For simplicity, the firm value under the incumbent management is normalized to 0.

The firm value can increase to V if the firm is taken over and restructured. The dispersed shareholders only know that V is drawn from $[0, 1]$ according to a continuously differentiable density function f with full support and cumulative distribution function F. By contrast, L knows the realized value of V and possesses the restructuring capability to implement the value improvement if she takes over the firm. For ease of exposition, we also refer to the value improvement V as L's type.

The two preceding paragraphs describe the basic setting of Shleifer & Vishny (1986) to which we add the option to sell the firm to an outside bidder B. Initially, B does not own a stake and due to a lack of prior involvement with the firm merely knows the distribution of V. However, she has access to the same restructuring technology as L. That is, if she takes over the firm, she learns the realized value of V and can also implement it. In practice, one can think of such outside bidders securing funds and accumulating human capital to be prepared for a possible acquisition. For simplicity, we do not model such preparatory efforts.

After observing V, the large shareholder can choose between making a tender offer or getting the firm taken over by the outside bidder. We refer to the latter strategy interchangeably as merger invitation or takeover activism. Figure 1 illustrates the sequence of events.

Tender offer. The large shareholder makes a take-it-or-leave-it cash bid at a price P per share. The offer is conditional and therefore becomes void if fewer than $1/2 - \alpha$ shares are tendered, that is, if L fails to gain control. There are no takeover costs other than the bid price, and the incumbent management is by assumption unable or unwilling to make a counter-bid, despite being opposed to the restructuring.[12] If L makes a bid, target

[12] An alternative interpretation is that the incumbent management (under pressure or on its own accord) cooperates with the large shareholder as part of a (management) buyout of the firm or in shopping for buyers. Moreover, our model could also be applied to incumbent managers with minority stakes, *as* the large shareholder, aware of misaligned incentives and considering a (management or third-party) buyout of the firm. Under this interpretation the control change is voluntary, illustrating that L's choice of whether to

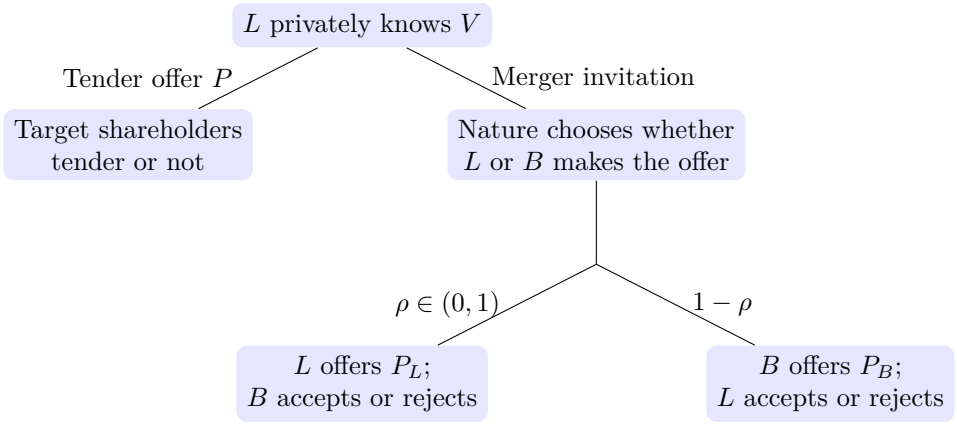


Figure 1: Sequence of events.

shareholders decide simultaneously and non-cooperatively whether to tender their shares. If the bid succeeds, L takes control and realizes the value improvement V. Otherwise, the incumbent management remains in control, and the firm value continues to be 0.

Merger invitation. The large shareholder negotiates on behalf of all target shareholders a sale of the firm to the outside bidder.[13] We model the negotiation over the merger price as a simple Nash bargaining game: With probability ρ, L makes a take-it-or-leave-it offer for all shares to be bought at price P_L, and B either accepts or rejects the offer. With the complementary probability $(1-\rho)$, B offers to buy all shares at price P_B, and L accepts or rejects the offer. If an offer is rejected, the incumbent management remains in control, and the firm value continues to be 0. If either of the offers is accepted, all shareholders must sell their shares at that price. Having acquired the firm, B gets to know the value improvement V and implements it. Since the merger agreement is binding, it circumvents the free-rider problem. As pointed out in the introduction and substantiated in Section 4, this is, however, not crucial for our results.

As in Shleifer & Vishny (1986), signaling by the large shareholder and coordination problems among dispersed shareholders give raise to multiple equilibria. To obtain a unique

be on the buy- or the sell side is in principle orthogonal to the presence of hostility and associated defenses.

[13] In practice, boards have the prerogative power to enter into merger negotiations. Therefore, a large shareholder or activist must either convince the incumbent board, or alternatively take control of the board, to initiate merger negotiations. As said before, we abstract from how L achieves this. We do not allow for L to negotiate a merger with herself. This is in accordance with Corum & Levit (2019) who argue that if L is on the buy side of the merger, she cannot get board approval for negotiating the deal on the sell side.

equilibrium outcome we impose the following three assumptions: (A1) Target shareholders tender their shares to L if the price P weakly exceeds the expected post-takeover share value; (A2) the beliefs about off-equilibrium moves satisfy the credible beliefs criterion of Grossman & Perry (1986); and (A3) the type distribution has a log-concave density function. This is a common assumption in signaling games with threshold strategies (Bagnoli & Bergstrom 2005). We point out the role of each assumption where it is material.

2.2 Benchmark

To highlight how the option of extending a merger invitation affects the functioning of the market for corporate control, we first solve as a benchmark the model without the outside bidder. This corresponds to the basic setting in Shleifer & Vishny (1986) (Section II) and also to the left-hand side of Figure 1.

When the large shareholder makes a bid P, dispersed shareholders update their beliefs about the value improvement, respectively L's type, and condition their expectation on the offered price. Since no shareholder considers herself pivotal for the outcome, each shareholder tenders only if the offered price at least matches the expected post-takeover share value (Grossman & Hart 1980). Consequently, a successful tender offer must satisfy the free-rider condition $P \geq \mathbb{E}[V|P]$.

Assumption A1 ensures a unique outcome for any offered price P: When the free-rider condition is violated, the bid fails. Otherwise, success is the unique equilibrium outcome and all shareholders tender their shares. In any successful bid offered in equilibrium, L offers the same price since all L types would prefer the lowest successful bid if different bids were to succeed.[14]

Given a bid P, shareholders infer in equilibrium that such a bid must come from any L type for whom such a bid is profitable. Since all shareholders tender in a successful offer, L is willing to offer at most V for the $(1-\alpha)$ shares. Thus, her participation constraint is $V-(1-\alpha)P \geq 0$, and the shareholders' conditional expectation about the post-takeover share value is $\mathbb{E}[V|P] = \mathbb{E}[V|V \geq (1-\alpha)P]$. A tender offer is made in equilibrium if the

[14] Assumption A1 rules out (semi-)separating equilibria in which offers succeed at different prices. Allowing shareholders to play probabilistic tendering strategies generates separating equilibrium outcomes (Hirshleifer & Titman 1990).

above participation constraint of the large shareholder and the free-rider condition

$$P \geq \mathbb{E}[V|V \geq (1-\alpha)P] \tag{1}$$

are satisfied. There is a continuum of prices that satisfies these two conditions and can be supported as Perfect Bayesian Equilibria. The reason is that bids P for which (1) is slack can be supported as Perfect Bayesian Equilibria by attributing any deviation $P' < P$ to the highest type ($V = 1$). Under these beliefs, such deviations violate the free-rider condition and thus fail.

Assumption A2 selects the minimum bid equilibrium $P^* = \mathbb{E}[V|V \geq (1-\alpha)P^*]$ as the unique equilibrium. The credible beliefs criterion (Grossman & Perry (1986)) imposes that a deviation from a Perfect Bayesian Equilibrium price is attributed, consistent with prior beliefs, to *all and only* types that would gain from this deviation. This eliminates all bids $P \in (P^*, 1]$ for which the free rider condition (1) is slack as equilibrium candidates.

Lemma 1. ***Shleifer & Vishny (1986)*** *In the unique Perfect Sequential Equilibrium, the large shareholder makes a bid for all $V \geq V_0^*$ offering the same price $P^* = \mathbb{E}[V|V \geq V_0^*]$.*

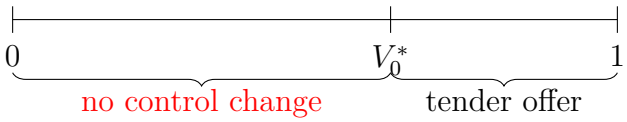


Figure 2: Cutoff equilibrium with only tender offers.

Because all successful types pay the same price $P^* = \mathbb{E}[V|V \geq V_0^*]$, L types with $V \in [V_0^*, P^*)$ pay more than the true value improvement whereas types with $V \in (P^*, 1]$ pay less. Such mispricing deters L types whose gain on their initial stake is too small to compensate for the loss at which they would have to buy the $(1-\alpha)$ shares. More specifically, since L's payoff from a successful bid

$$\alpha V + (1-\alpha)(V - P). \tag{2}$$

is monotonically increasing in V for a given P, the equilibrium features a simple cut-off structure as illustrated in Figure 2: All and only types above the cut-off V_0^* make a bid

offering $P^* = \mathbb{E}[V|V \geq V_0^*]$, and the cut-off threshold V_0^* is the solution to

$$\alpha V_0^* + (1-\alpha)\Big(V_0^* - \mathbb{E}[V|V \geq V_0^*]\Big) = 0.$$

Asymmetric information has two consequences. First, it causes redistribution among successful types: Types $V \in (P^*, 1]$ extract information rents at the expense of types $V \in [V_0^*, P^*)$. Second, it exacerbates the free-rider problem: Types $V < V_0^*$ do not make a bid, that is, there is a cut-off "at the bottom." This reflects that L as a buyer has an incentive to *un-der*state V, which we refer to as a *smart buyer problem* (Burkart & Lee 2016). By contrast, under full information $P^* = V$ for each type, and all types would make a successful bid.

2.3 Modes of Control Change

Since we just have established the large shareholder's payoff from a tender offer, we merely need to work out her payoff from a merger invitation to determine how she chooses between the two control change modes (or remaining passive). When L extends a merger invitation, either she or B make a take-it-or-leave-it offer with probabilities ρ and $1-\rho$, respectively. Thus, L's expected profit from selling her initial stake α to the outside bidder is

$$\alpha[\rho P_L + (1-\rho)P_B]. \tag{3}$$

A failed negotiation leaves the incumbent management in control and firm value at 0. Hence, B's offer optimal offer is $P_B^* = 0$, and she extracts the full surplus. When it is L's turn to make an offer, she cannot ask for more than B's posterior expectation about the firm value $\mathbb{E}[V|invite]$. Given B either accepts or rejects an offer, there can only be one price P_L offered in equilibrium by L and accepted by B since all L types would prefer the highest accepted P_L otherwise.

Yet, any price P_L' strictly smaller than $\mathbb{E}[V|invite]$ being accepted by B can also be supported as a Perfect Bayesian Equilibrium by attributing any deviation from P_L' to the lowest type ($V = 0$). In parallel to the tender offer subgame, the credible beliefs criterion (Assumption A2) eliminates all Perfect Bayesian Equilibrium for which P_L is less than the posterior expectation of V. That is, the "maximum ask" offer $P_L^* = \mathbb{E}[V|invite]$ being accepted by B is the unique Perfect Sequential Equilibrium of the merger invitation subgame

when L makes the offer.

Given the offers P_L^* and P_B^*, L's expected payoff from a merger invitation is $\alpha\rho\mathbb{E}[V|invite]$ which does not depend on her own type. Consequently, below average types among those who extend a merger invitation sell their stake (the firm) at a price above the true value, while above-average types sell at less than the true value. This reflects that L as an informed seller has an incentive to overstate V, that is, mergers are plagued by the *lemons problem* (Akerlof 1970). Thus, information rents accrue to the low types at the expense of the high types which is the opposite redistribution pattern than in the tender offer subgame.

The expected payoff to L from a merger invitation is a positive cash consideration. Hence, extending a merger invitation dominates remaining passive for any type. Unlike the merger payoff, L's tender offer payoff depends on her true type. For a given set of prices $\mathcal{P} = \{P, P_B, P_L\}$, her choice between the two control change modes therefore depends on her true type. Let $\Delta(V, \mathcal{P})$ denote the difference between her tender offer profit (2) and her expected merger profit (3):

$$\Delta(V, \mathcal{P}) = \underbrace{V - (1-\alpha)P}_{\text{Direct Takeover}} - \underbrace{\alpha[\rho P_L + (1-\rho)P_B]}_{\text{Merger Invitation}}. \tag{4}$$

Since $\Delta(V, \mathcal{P})$ is increasing in V for a given set of prices $\mathcal{P}$, there is a cut-off type above which all L types prefer to make a tender offer. Furthermore, the log-concave density function $f(V)$ (Assumption A3) ensures that there is a unique cut-off type.

Proposition 1. *In the unique Perfect Sequential Equilibrium, the large shareholder extends a merger invitation for all $V \in [0, V_1^*)$ and makes a bid for all $V \in [V_1^*, 1]$. The equilibrium prices are $P^* = \mathbb{E}[V|V \geq V_1^*]$, $P_B^* = 0$, and $P_L^* = \mathbb{E}[V|V \leq V_1^*]$.*

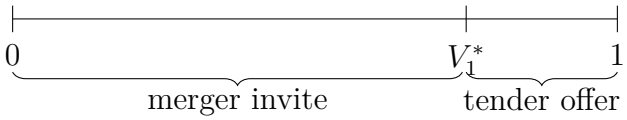


Figure 3: Cut-off equilibrium with tender offer and merger invitation.

High L types acquire the firm themselves, while low L types choose to invite the outside bidder to take the firm over. Intuitively, a tender offer allows the large shareholders to reap the full value improvement of her initial stake, whereas she sells it at some given price in a

merger invitation. Clearly, the former is more attractive to high L types, whereas selling at a pooled price appeals to low L types.

The partial separation of types, which is absent in signaling theories of both external finance and takeovers, is rooted in the ability of the informed party to choose to be either a seller or buyer. This choice prevents pooling on one control change mode because an informed acquisition (smart buyer problem) and an informed sale (lemons problem) imply opposite distributions of information rents across types (see dashed line in Figure 4). Information rents accrue "at the top" in the tender offer but "at the bottom" in the merger invitation. Hence, high L types are drawn to the former and low L types to the latter, while intermediate types pick the "lesser evil." The option to choose between the smart buyer problem and the lemons problem is indeed instrumental for achieving separation. This can be seen by the fact that security design cannot achieve a finer type separation *within* the smart buyer problem (Burkart & Lee 2015) or the lemons problem (Myers & Majluf 1984, Nachman & Noe 1994).[15]

These information-theoretic arguments accord well with intuition. Wary of being short-changed, target shareholders demand a high price in a tender offer. Large shareholders with small(er) value improvements V may find these demands excessive and prefer to initiate a sale to a third party. Conversely, an outside bidder, concerned about overpaying, may refuse to pay a high price. Hence, large shareholders with large(r) value improvements V prefer to take over the firm themselves.

Merger invitations and tender offers appeal to L types at the opposite ends of the distribution. Still, the former does not merely complement the latter.

Corollary 1. *For $V \in [V_0^*, V_1^*]$ takeover activism substitutes tender offers. For $V \in [0, V_0^*)$ takeover activism complements tender offers, thereby ensuring an efficient allocation of control.*

In the benchmark without an outside bidder, firm types $V \in [0, V_0^*)$ are not taken over and the value improvement is forgone. Once the large shareholder has the option to extend a merger invitation, all these firm types are taken over by the outside bidder. Thus, merger invitations complement tender offers, and the ability to choose the control change mode

[15] Introducing restricted cash bids or cash-equity bids in our model does not alter the result that, within each intervention mode, there only exists a pooling outcome, nor the "direction" in which information rents shift payoffs across types. The only effect is that the magnitude of redistribution across types is reduced (At et al. 2011), which in our model has no efficiency implications, as all L types are taken over.

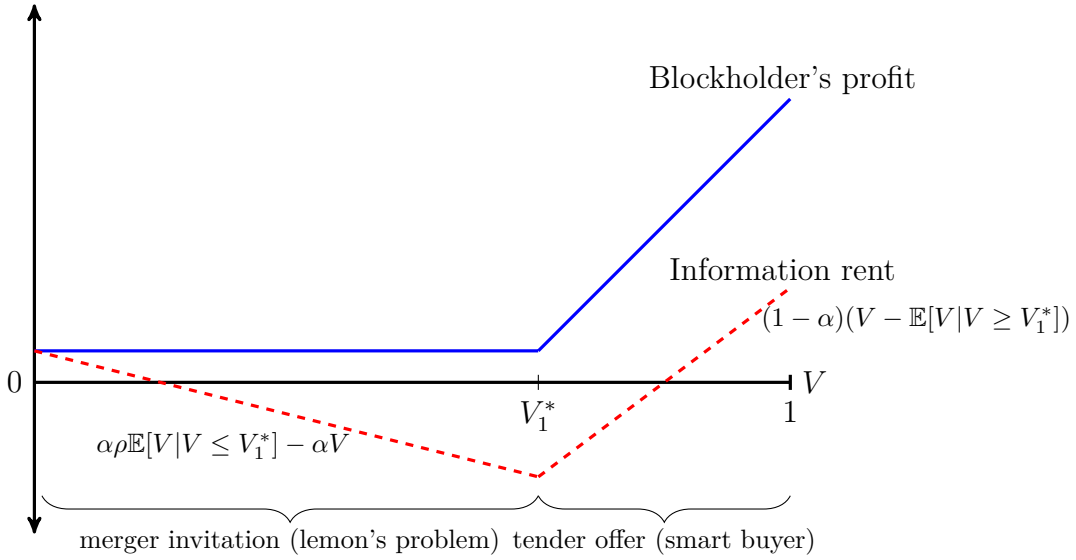


Figure 4: The large shareholder's profit and information rent as a function of her type. The graph is based on a numeric example in which V is uniformly distributed on $[0,1]$ and α is 25%. The cut-off is $V_1^* \approx 0.67$. In the benchmark without an outside bidder, the cut-off is $V_0^* = 0.6$. Hence, merger invitations primarily complement rather than replace tender offers here. Last, if α is reduced to 10%, the cut-off increases to $V_1^* \approx 0.86$, illustrating that smaller initial stakes favor merger invitations.

improves efficiency.

In addition, firm types $V \in [V_0^*, V_1^*)$ are now taken over by the outside bidder rather than by the large shareholder herself as in the benchmark. Fewer L types choose a tender offer, that is, $V_1^* > V_0^*$, because the expected payoff from a merger invitation is positive compared to zero when remaining passive. Hence, the marginal type V_0^* and some types above her now prefer a merger invitation to a tender offer.

Strikingly, the control allocation is fully efficient, that is, all firms are taken over and restructured (Proposition 1), and this holds true for any initial stake size $\alpha > 0$ however small. By contrast, the inefficiency in the benchmark, respectively in Shleifer & Vishny (1986), increases as the initial stake α becomes smaller. In Shleifer & Vishny (1986) and the ensuing literature, the inefficiency results from the interaction of the free-rider problem with asymmetric information about the post-takeover firm value: neither friction alone impairs efficiency (Burkart & Lee 2015). Without free-riding the large shareholder could succeed by offering a price equal to the share value under the current management plus ϵ, and without

asymmetric information she would succeed by offering the true post-takeover share value.

At first glance, it may seem that the control allocation in Proposition 1 is fully efficient only because the merger invitation option allows to circumvent the free-rider problem. This aspect of the merger invitation is, however, not indispensable to the efficiency result. In fact, full efficiency obtains even if one were to impose a merger price that satisfies the free-rider condition, that is, if we set $P_L = P_B = \mathbb{E}[V|invite]$. We furthermore show in Section 4 that Proposition 1 also holds under an alternative variation of takeover activism that does not impose a merger on the dispersed shareholders.

The key feature of takeover activism responsible for the efficiency result is that the large shareholder is an informed seller rather than an informed buyer. In a tender offer L's payoff is $V-(1-\alpha)P$ which is *negative* when the pooling price P is sufficiently larger than the actual value improvement V. Consequently, low L types prefer remaining passive to making a bid (which gives rise to the inefficiency in (Shleifer & Vishny 1986)). In contrast, L's expected payoff in a merger $\alpha[\rho P_L + (1-\rho)P_B]$ is independent of her type and in expectations a *strictly positive* cash consideration. Hence, the merger invitation dominates the option of remaining passive for all V. Indeed, even if L were restricted to only extending a merger invitation, all L types would be taken over by the outside bidder, and the outcome would be efficient. Fundamentally, when free-riding and asymmetric information problems impede value creating takeovers informed control sales (merger invitations) are a more effective mechanism than informed control acquisitions (tender offers).

This also explains why the market for corporate control in Proposition 1 is efficient irrespective of the size of L's stake. Smaller stakes α reduce the payoff from either control change mode. While this makes the tender offer unprofitable for more L types, the merger invitation remains profitable for all L types as long as $\alpha > 0$. Hence, smaller stakes α increase the cut-off V_1^*, making takeover activism more likely.

Since larger toeholds decrease the cut-off V_1^*, both "bid" price $P^* = \mathbb{E}[V|V \geq V_1^*]$ and merger "ask" price $P_L^* = \mathbb{E}[V|V \leq V_1^*]$ decrease with α. Note that from an ex ante perspective a smaller stake α thus leads to a decrease in tender offer profits due to the smaller stake and the increased bid price that L needs to pay. By contrast, the effect on merger profits is ambiguous: the smaller stake reduces profit, whereas the higher per share ask price that L receives increases profit. Hence, expected merger profits fall for some parameter values but increase for others. Overall, however, L's expected profits decrease as

the toehold shrinks.

2.4 Discussion of Firm Modeling Assumptions

Value-decreasing control changes. Allowing also for value-decreasing control transfers, i.e., $V < 0$, does not undermine the efficient allocation of control in our framework. When the large shareholder learns that V is negative, she opts for a merger invitation as she does for small positive realizations of V. This lowers the ask price in the merger negotiation which, in turn, shifts down the cutoff V_1^*. Having acquired the firm, the bidder learns that restructuring decreases firm value and refrains from implementing it since she internalizes the full cost as the sole owner. If there are some private benefits from restructuring that exceed the value destruction, the bidder would restructure which would be efficient.

Counter-bids. When L opts for a tender offer, our model neither allows B to submit a counter-bid nor L to respond and revise her initial bid. One may suspect that this restriction affects the control change mode that L chooses in equilibrium. Yet, precluding B from competing after L made an initial bid is without loss of generality. The reason is that any winning bid by B would result in an expected loss due to the winner's curse. Suppose L bids P and B were to make a winning counter-bid P'. This bid must satisfy the free-rider condition $P' \geq \mathbb{E}[V|P]$. Unlike the dispersed shareholders, L tenders her block only if $V < P'$. Consequently, B acquires all shares if the bid is overpriced but merely $1-\alpha$ shares if the bid is underpriced, therefore making an expected loss.

Bidding competition. While the bidder does not want to counter a tender offer by L, another bidder may want to compete with B after a merger invitation. In this case, the merger invitation transforms into letting the bidders compete in a standard second-price auction. In our common value framework, all bidders (and L) have the same restructuring capability. Hence, L's merger payoff with two bidders (or more) is the same as if she had full bargaining power in the bilateral negotiations ($\rho = 1$). Thus, competition results in a higher merger price, making takeover activism relatively more attractive, that is, increasing the cutoff V^*.

Heterogeneous restructuring capabilities. In our common value model, a merger invitation signals a lower value improvement and mergers are associated with lower prices and returns compared to tender offers. In practice, large shareholders and outside bidders differ

in their ability to improve firm value. While some activist shareholders focus on governance-oriented strategies, outside bidders, such as specialized private equity funds or non-financial bidders, aim to exploit synergies. If one adds idiosyncratic restructuring abilities to our common value framework, merger invitations typically lead on average to higher prices and returns compared to tender offers. We provide a formal analysis in Appendix A.1.

By way of illustration, consider two hypothetical target firms. For target 1 there are multiple bidders who can exploit large synergies. Anticipating a high price due to competition among these bidders, the large shareholder is very likely to opt for a merger invitation, respectively, initiating a bidding competition. By contrast, bidders for firm 2 have no such synergies and L is therefore more likely to take over the firm herself. While in both firms tender offer prices are larger than merger prices, the average tender offer price is lower than that of the average merger. The reason is that when there are large value improvements due to synergies, they are more often implemented through a merger with an outside bidder.

Consistent with an extended framework with heterogeneous restructuring abilities, Boyson et al. (2017) find larger expected acquisition premia and returns if outside bidders take over a firm relative to incumbent shareholders. Boyson et al. (2017) hypothesize that "[t]he lower premia could reflect the lack of synergies available to hedge fund buyers."

Takeover defenses. Explicitly accounting for takeover defenses requires modeling a shareholder proposal to remove the defenses prior to the decisions analyzed above. Trivially, the dispersed shareholders would back the proposal as they gain from either mode of control change compared to none. They are further unlikely to restrict L's mode of control change. Requiring a merger invitation if L seeks a tender offer would make them worse off. If L petitions for a merger invitation, thus revealing a valuation below the cut-off type, requiring a tender offer can benefit dispersed shareholders *provided* L's valuation is close to the cut-off type (which is hidden information). But if L's valuation is low, such a requirement frustrates the takeover (i.e., reintroduces the inefficiency found in Shleifer & Vishny (1986)). This risk outweighs the potential upside unless B's bargaining power in the merger is very high.

Strikingly, any restriction dispersed shareholders might impose would go *against* takeover activism. This is because L and the dispersed shareholders have aligned interests in a merger but opposite interests in a tender offer. That is, L opts against a tender offer when it would allocate more of the surplus to the dispersed shareholders (which is why the latter might like it). In fact, in the case of symmetric information, dispersed shareholders always prefer

limiting L to a *tender offer*.[16] Hence, the role for takeover activism in our model arises from the asymmetric information problem, regardless of (whether we formalize) the presence and removal of defensive mechanisms.

Informed outside bidder. Allowing B to become better informed (during the merger negotiation) than dispersed shareholders would strengthen the point that takeover activism complements and partly replaces direct takeovers. If B can learn as much about the firm as L prior to a deal, takeover activism replaces tender offers completely (due to the information advantage and unraveling). However, it is plausible that owning a toehold—for some time—provides L with more information than analysing the firm like B as an outsider. Assuming that B is uninformed is the simplest way of maintaining information frictions and to not give takeover activism a trivial advantage. It is also the only way to maintain Shleifer & Vishny (1986) as a clean benchmark, by adding the outside bidder *without* relaxing the information asymmetry. Last, we should emphasize that this assumption does not play up the role of L. Even if B is informed, she *alone* cannot acquire the firm given asymmetric information and free-riding—L is needed either way; that is the essence of Shleifer & Vishny (1986) after all.

3 Control Changes in the Market

In the previous section we determined under what circumstances a disciplinary ownership change in a single firm may occur through a direct takeover or a merger invitation—assuming the existence of a large shareholder and of an outside bidder for that firm. Whether, or which of, the two options are available for a potential target in the market depends on the extent to which governance-oriented "control investors" deploy the strategies that we associate with the large shareholder L and the outside bidder B in our model. Under which conditions do control investors tend to fund or pursue strategies that involve becoming a large shareholder (i.e., buying minority blocks or toeholds to monitor a firm) or strategies that involve acquiring firms as an outside bidder when they are put in play? We presume that the investors must

[16] This outcome is excluded in Corum & Levit (2019)'s model because it exogenously restricts tender offers and abstracts from free-riding. In general, they only allow campaigning for the right to negotiate a merger, not for a vote on the removal of takeover defenses in conjunction with a tender offer. For the latter see Bebchuk & Hart (2001).

specialize to some degree on one or the other strategy.[17] To keep the model simple, we proxy influx of capital as growth in the number of control investors, each of whom chooses either a "large-shareholder" or an "outside-bidder" strategy before being matched to a firm. We are interested in how this role choice unfolds as the market grows.

3.1 Model

Consider an economy with a continuum of ex ante identical firms of measure one. As in the firm-level model, each firm has a current (normalized) value of 0 and a potential value improvement $V \sim F[0,1]$, distributed identically and independently across firms. The value improvement is realized through restructuring, which requires a control change. At the outset, no firm is matched with a large shareholder or an outside bidder. Rather, there is a measure n of control investors. These investors are ex ante not designated large shareholders or outside bidders but choose in which role to enter the market.

Large Shareholder. A control investor can buy an initial minority stake $\alpha \in (0, \overline{\alpha})$ in a firm. For simplicity, she can acquire the stake at the current share value of 0.[18] By virtue of becoming a large shareholder, she learns V privately. If there are multiple large shareholders in the same firm, we assume that a "lead" L is determined randomly. All other Ls sell their stakes to her or to the outside bidder. As a result, the expected payoff of L is independent of the number of Ls in the same firm, substantially simplifying things, and in particular allowing analytical solutions. (We discuss in Online Appendix 3.3 how multiple Ls might affect each other and ultimately the chosen mode of control transfer.) Furthermore, $\overline{\alpha}$ is sufficiently small so that the combined stake of multiple Ls never exceeds $1/2$. Hence, a control change requires either a direct takeover by the lead L or a sale to an outside bidder.

Outside bidder. Alternatively, a control investor can choose to become an outside bidder for a particular firm. We think of this as the investor setting aside financial and human capital to be prepared and ready to acquire the firm if invited by a L. If there are multiple Bs and at least one L in a firm, extending a merger invitation transforms into letting those Bs compete in a second price auction. As discussed in Online Appendix 2.4,

[17] We take the *need* for specialization as given. It could be endogenized via limited attention or monitoring costs, but as this would add little to the main point of our paper, we abstract from such micro-foundations.

[18] Clearly, rational investors would anticipate the possible value improvement due to restructuring, and consequently the price at which the control investor could acquire her stake would be above the current share value. We discuss this in more detail in Online Appendix 3.3.

competition between outside bidders yields zero bidder profits in our common value setting and is isomorphic to L having all the bargaining power in merger negotiations ($\rho = 1$).

A control investor cannot perform her chosen role in any arbitrary firm due to, for example, search frictions, lack of industry expertise, or capital constraints. To capture such limitations, each control investor with her chosen role is randomly matched to a single firm according to the subsequent matching protocol: Let n_L (n_B) denote the measure of control investors entering the market as large shareholders (outside bidders) with $n = n_L + n_B$. For $n_L \leq 1$ each L is randomly assigned to a firm such that a fraction n_L of firms is matched with one L. In particular, there are no firms with multiple Ls if $n_L \leq 1$. For $n_L > 1$, each L is randomly allocated to a firm such that a measure $(n_L - \lfloor n_L \rfloor)$ has $\lceil n_L \rceil$ Ls and a measure $(\lceil n_L \rceil - n_L)$ has $\lfloor n_L \rfloor$ Ls.[19] Matching of Bs is independent and works analogously.

To portray the evolution of the market for corporate control we explore how the market composition (n_L^*, n_B^*) changes as the measure n of control investors increases. We consider the following equilibrium.

Definition 1. *An equilibrium of the entry subgame for a given measure n of control investors is characterized by the measures (n_L^*, n_B^*) of L and B such that neither any L nor any B has an incentive to deviate given the chosen roles of all other investors and $n = n_L^* + n_B^*$.*

3.2 Choosing Roles in the Market for Corporate Control

Let $\Pi^L(V)$ and $\Pi^B(V)$ denote the equilibrium payoff of a large shareholder and an outside bidder, respectively. When the firm is not matched with a B, L's payoff is

$$\mathbb{E}[\Pi^L(V)|V^* = V_0^*] = \int_{V_0^*}^{1} V - (1-\alpha)\mathbb{E}[V|V \geq V_0^*]dF(V).$$

This is simply the expected profit from a direct takeover as in the benchmark (Section 2.2). Conditional on the firm being matched with one B, L's payoff is

$$\mathbb{E}[\Pi^L(V)|V^* = V_1^*] = \int_0^{V_1^*} \alpha\rho\mathbb{E}[V|V \leq V_1^*]dF(V) + \int_{V_1^*}^{1} V - (1-\alpha)\mathbb{E}[V|V \geq V_1^*]dF(V).$$

[19] $\lfloor n_L \rfloor$ gives the highest integer smaller than n_L and $\lceil n_L \rceil$ gives the smallest integer larger than n_L.

This is the sum of the expected revenues from selling the stake in an invited merger and the expected profit from a direct takeover. As discussed in Section 2.3, a direct takeover is less likely than in the benchmark ($V_1^* > V_0^*$) because the expected sale price in a merger is strictly positive. When the firm is matched with two (or more) bidders, L's payoff is

$$\mathbb{E}[\Pi^L(V)|V^* = V_2^*] = \int_0^{V_2^*} \alpha\ \mathbb{E}[V|V \leq V_2^*]dF(V) + \int_{V_2^*}^1 V - (1-\alpha)\mathbb{E}[V|V \geq V_2^*]dF(V).$$

The cut-off value for a direct takeover, V_2^*, is in this case even higher because the price in the bidding competition is the expected post-merger share value. Recall that multiple Ls in the same firm do by assumption not affect $\Pi^L(V)$.

An outside bidder who is matched with a firm with at least one L receives the expected merger profit of

$$\mathbb{E}[\Pi^B(V)|V^* = V_1^*] = \int_0^{V_1^*} V - \rho\mathbb{E}[V|V \leq V_1^*]dF(V).$$

In any other constellation, her expected payoff is zero. Either there is no L, and she never receives a merger invitation, or competition with other Bs obliterates expected profits.

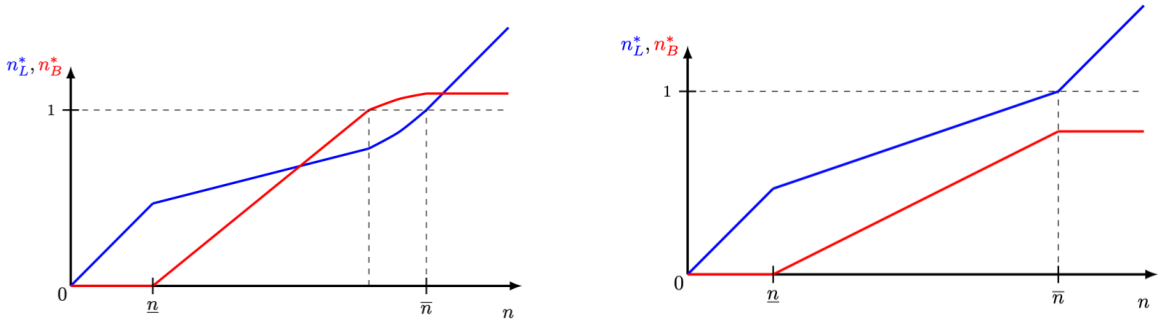
For some parameter values (α, ρ, and $f(V)$), $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] < \mathbb{E}[\Pi^L(V)|V^* = V_0^*]$ such that no control investor ever enters the market as B. Clearly, if L's payoff when the firm is not matched with a B exceeds B's payoff when the firm is matched with a L, becoming a L is the dominant strategy for any measure n of control investors. To focus on the interesting case where both roles are viable we assume $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_0^*]$ (Assumption A4).[20]

Proposition 2. *There are three stages in the evolution of the market for corporate control:*

- ***Early stage*** *($n < \underline{n}$):* *All control investors enter as large shareholders and their profits are independent of n.*
- ***Transformation stage*** *($n \in [\underline{n}, \overline{n}]$):* *Control investors enter as large shareholders and bidders. Both make the same expected profit which strictly increases in n.*
- ***Mature stage*** *($n > \overline{n}$):* *Control investors beyond $\overline{n}$ enter only as large shareholders, and control investor profits attain their maximum and are constant in n.*

[20] Assumption 4 is more likely to hold when ρ and α are small. For instance, with $V \sim \mathcal{U}[0,1]$ and $\alpha = 0.1$, Assumption 4 is satisifed whenever $\rho < 0.958851$.

Figures 5*a* and 5*b* depict the entry decisions as the measure n of control investors increases. In a thin market ($n < \underline{n}$), all control investors enter as large shareholders. L acquires the firm herself whenever the value improvement is large ($V \geq V_0^*$), thereby generating a strictly positive expected payoff $\mathbb{E}[\Pi^L(V)|V^* = V_0^*]$. By contrast, a bidder makes zero profit unless there is a L in the firm who extends a merger invitation. With relatively few control investors the likelihood of receiving a merger invitation is too small, even if all others were to choose to be a L. Thus, the red n_B^* line in Figures 5*a* and 5*b* is flat for $n \leq \underline{n}$, whereas the blue n_L^* line increases one-to-one with n.



(a) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ (b) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] < \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$

Figure 5: Equilibrium measures n_L^* and n_B^* as a function of the market size n.

Given $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_0^*]$ (by Assumption A4), there exists a measure of control investors $\underline{n} < 1$ such that becoming an outside bidder becomes equally attractive as being a large shareholder, that is, $\mathbb{E}[\Pi^L(V)|V^* = V_0^*] = \underline{n}\mathbb{E}[\Pi^B(V)|V^* = V_1^*]$. Once n crosses this threshold the market enters its transformation stage in which control investors assume both roles. Importantly, a complementarity arises and either role becomes more profitable as more control investors enter the market. The expected payoff of B is strictly increasing in n_L^* because the probability of a merger invitation increases. Conversely, the expected payoff of L is increasing in n_B^* because it increases the likelihood of being able to extend a merger invitation when the value improvement is low and the direct takeover is not profitable.

For a given $n \in [\underline{n}, \overline{n}]$, control investors are indifferent between the two roles in equilib-

rium. As long as $n_B^* < 1$ and $n_L^* < 1$, the equilibrium entry condition is

$$(1 - n_B^*)\mathbb{E}[\Pi^L(V)|V^* = V_0^*] + n_B^*\mathbb{E}[\Pi^L(V)|V^* = V_1^*] = n_L^*\mathbb{E}[\Pi^B(V)|V^* = V_1^*] \quad (5)$$

There are two cases of relative entry rates that satisfy condition (5). For $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ being an outside bidder in a firm with a large shareholder is more profitable than vice versa (case (a)). Therefore, more control investors enter initially as Bs, and n_B^* reaches 1 before n_L^* does. That is, all firms are matched with a B before every firm has been matched with a L. Once $n_B \geq 1$, the equilibrium entry condition becomes

$$(n_B^* - 1)\mathbb{E}[\Pi^L(V)|V^* = V_2^*] + (2 - n_B^*)\mathbb{E}[\Pi^L(V)|V^* = V_1^*] = n_L^*(2 - n_B^*)\mathbb{E}[\Pi^B(V)|V^* = V_1^*] \quad (6)$$

When control investors now enter as B, some firms end up with two Bs who each makes zero profits either because of the bidding competition or because the firm does not (yet) have a L. At the same time, the payoff of L is increasing since the sale price may be determined in a bidding competition rather than in a merger negotiation. Consequently, more control investors enter as L than as B to meet condition (6). Still, the expected profits of Ls and Bs keep increasing because there are more Bs and Ls in the market. This holds true until the transformation stage ends and all firms have one L ($n_L^* = 1$). These are the reasons why the red n_B^* line in the interval $[\underline{n}, \overline{n}]$ is initially steeper than the blue n_L^* line until $n_B^* = 1$ and then flatter in Figure 5*a*.

For $\mathbb{E}[\Pi^L(V)|V^* = V_1^*] > [\Pi^B(V)|V^* = V_1^*]$, being a large shareholder in a firm matched with a bidder is more profitable than vice versa (case (b)). Entry condition (5) implies in this case that more control investors enter as Ls than as B until the transformation stage ends and each firm has one $L(n_L^* = 1)$ but not necessarily one B ($n_B^* < 1$). Accordingly, the blue n_L^* line is steeper in the interval $[\underline{n}, \overline{n}]$ and always above the red n_B^* line in Figure 5*b*.

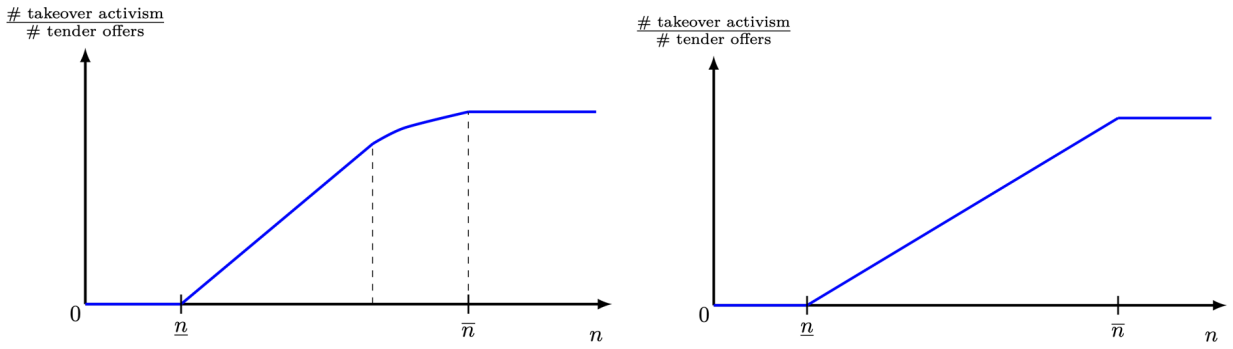
Once each firm is matched with a large shareholder ($n_L^* = 1$), the market for corporate control has reached its mature stage ($n \geq \overline{n}$). The expected payoff of each B no longer depends on n_L. The reason is that in each firm a L already initiates for sure a merger negotiation or a bidding competition for low value improvements (unless the firm is not matched with one B). By contrast, the expected payoff of L still increases in n_B because it makes ei-

ther bidding competition (case (a)) or a merger invitation (case (b)) more likely for low value improvements. In either case, however, more Bs entering would violate equilibrium condition (6), respectively condition (5), so no more control investors enter as B. By Assumption A4, multiple Ls in a firm do not dilute the expected payoff of each L. Consequently, all control investors beyond $\overline{n}$ enter as Ls. Hence, the red n_B^* line is flat for $n \geq \overline{n}$ in Figures 5*a* and 5*b*, whereas the blue n_L^* line increases one-to-one with n. In this mature stage, the expected payoffs of Bs and of Ls are the same and reach their highest level.

The equilibrium market composition (n_L^*, n_B^*) as a function of the measure n of control investors determines which mode of control change is more prevalent as the market for corporate control matures.

Proposition 3. *Relative to direct takeovers, takeover activism becomes more likely as the measure n of control investor increases.*

Figures 6a and 6b depict the relative frequency of takeover activism and direct takeovers as more control investors enter the market. In a thin market for corporate control ($n < \underline{n}$), only large shareholders enter; the ratio of takeover activism to direct takeovers stays constant at 0.



(a) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ (b) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] < \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$

Figure 6: Equilibrium frequency of takeover activism relative to outright tender offers as a function of the market size n.

Once the market for corporate control is in the transformation stage ($n \geq \underline{n}$), some control investors start entering as outside bidders, giving rise to first incidences of takeover activism. As the market for corporate control expands further (larger n), takeover activism becomes

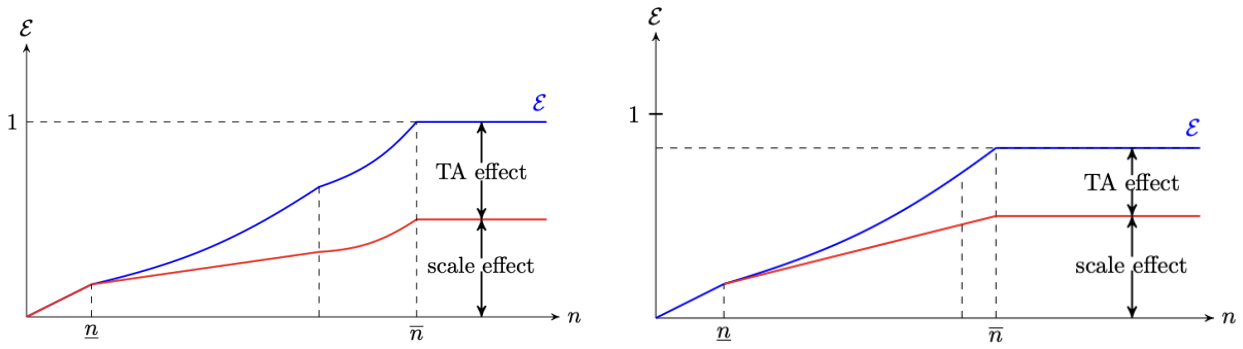
more prevalent due to the asymmetric impact that more Ls and Bs have on the mode of control change. More Bs bring about more control changes because takeovers are realized also for low value improvements through takeover activism. At the same time direct takeovers are being replaced by takeover activism for value improvements $V \in [V_0^*, V_1^*]$. That is, an increase in n_B^* leads to more merger invitations in part at the expense of direct takeovers. By contrast, more Ls bring about more control changes but do not affect the relative frequency of direct takeovers and takeover activism. This is because Ls are necessary for either mode of control change. Hence, takeover activism becomes increasingly more frequent for $n \in [\underline{n}, \overline{n})$, as the ratio in Figures 6a and 6b shows.

For $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ (case (a)) the relative frequency of takeover activism increases at a slower rate once n_B^* reaches 1. Given the firm has a L, a second B leads to a substitution of direct takeovers with takeover activism for $V \in [V_1^*, V_2^*]$ because bidding competition results in a higher sale price. The second B does, however, not alter the mode of control change for value improvements $V \in [0, V_1^*]$ since the first B already ensures that a control change takes place through takeover activism. At the same time, control investors enter now at a slower rate as Bs. Ceteris paribus, bidder competition increases Ls' profits and decreases Bs' profits. Hence, to keep control investors indifferent between the two roles, Ls need to enter at a faster rate to increase Bs' profits. This reinforces the slower increase in takeover activism.

Once every firm is matched with a L ($n_L^* = 1$), no control investors enters the market as a B anymore. Consequently, the relative frequency of takeover activism reaches a "steady state" and the line depicting the ratio of takeover activism to direct takeovers in Figures 6a and 6b becomes horizontal.

As the market for corporate control evolves and more control investors enter, it becomes more efficient. Let $\mathcal{E}$ denote market efficiency measuring the percentage of potential value improvements realized in equilibrium. Figure 7 shows that $\mathcal{E}$ is a weakly increasing function of the measure of control investors n in both cases. While all potential value improvements are realized in case (a), the market does not attain full efficiency in case (b). In case (b) being a L in a firm matched with a B is more profitable than vice versa. As a result not all firms are in equilibrium matched with a B ($n_B^* < 1$) for all values of n. This is due to our simplifying assumption that multiple Ls in one firm do not dilute each other's profits. As we discuss in Online Appendix 3.3, allowing for such dilution would lead to more control

investors entering as B, thereby improving efficiency.



(a) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ (b) $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] < \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$

Figure 7: Equilibrium efficiency $\mathcal{E}$ of the market for corporate control as a function of the market size n.

With a firm population of mass one, the efficiency measure $\mathcal{E}$ can also be interpreted as the probability of each individual firm to be taken over and restructured. This in turn can be decomposed into first the probability of being matched with a L which is a prerequisite for a control change and second the probability of being restructured conditional on being matched with a L.

$$\mathcal{E} = \underbrace{min\{n_L^*, 1\}}_{\mathbb{P}[\text{matched } L]} \quad \underbrace{min\{n_B^* + (1 - n_B^*) \int_{V_0^*}^{1} V dF(V) \frac{1}{\mathbb{E}[V]}, 1\}}_{\approx \mathbb{P}[\text{control change} \mid \text{matched}]} \tag{7}$$

The probability that a firm is matched with a L is simply the equilibrium measure of large shareholders n_L^* or 1 once $n_L^* \geq 1$. Conditional on being matched with an L, a firm matched with a B is always restructured while—for $n_B^* < 1$—a firm not matched with a B is restructured only if $V \geq V_0^*$.

The two components of the efficiency gain $\mathcal{E}$ capture distinct effects. First, when control investors enter only as Ls in the early stage, the sole source of gains is that more control investors are able to identify more restructuring opportunities, that is, more firms. This is a common "scale" effect of more market entry. Second, an additional source of gains materializing in the transformation stage is the increase in the probability that a potential firm, once identified, is actually restructured. This is not a scale effect but reflects the evolution of the market toward a *more effective mode of control change*. It corresponds to

the efficiency gains of takeover activism identified in the firm-level analysis.

Formally, we can decompose the increase in efficiency for $n_L^*, n_B^* \in (0,1)$ into

$$\frac{\partial \mathcal{E}}{\partial n} = \underbrace{\frac{\partial n_L^*}{\partial n}\Big(n_B^* + (1-n_B^*)\int_{V_0^*}^{1} V dF(V)\frac{1}{\mathbb{E}[V]}\Big)}_{>0,\text{ scale effect}} + \underbrace{\frac{\partial n_B^*}{\partial n} n_L^* \int_{0}^{V_0^*} V dF(V)\frac{1}{\mathbb{E}[V]}}_{>0,\text{ TA effect}} > 0. \tag{8}$$

The additional "takeover-activism effect" arises from entry of outside bidders who allow to restructure also companies with value improvements below V_0^*. This effect becomes more dominant if many firms are already matched with a large shareholder as the likelihood that an outside bidder is matched to a firm, where she is needed to restructure the firm, increases.

While we have framed our results in terms of market growth, in Online Appendix 3.4, we discuss why a mere increase in the number of control investors without the assumed market frictions would not lead to a transition from direct takeovers to takeover activism. The latter evolution is the emergence of a specific "industrial organization" to overcome free-riding and asymmetric information problems in the market for corporate control.

3.3 Discussion of Market Modeling Assumptions

Prices of initial stakes. In a setting with rational investors and noise traders (e.g., Kyle (1985), Kyle & Vila (1991)), share prices should generally reflect that control investors buy shares in some firms and bring about value improvements. Hence, as more control investors enter the market, the price at which they can buy initial stakes should be increasing because each firm is more likely to experience a value improvement. This leads to the standard effect that increased entry reduces investor profits.

We intentionally abstract from this effect because it is orthogonal to our main result that takeover activism increasingly replaces direct takeovers as the prevalent mode of control change when more control investors enter the market. Moreover, it allows us to highlight a countervailing effect: In the transformation stage, more entry leads to *higher* control investor profits because of the complementarity between outside bidders and large shareholders.[21]

Multiple large shareholders. In our model multiple outside bidders compete in an

[21] In a model that allows for both of these countervailing effects, prices and profits would depend on the mass of control investors through multiple channels, preventing clear-cut closed-form solutions.

auction while there is no competition among multiple large shareholders. Arguably, multiple Ls render the purchase of a stake more difficult and expensive. Such dilution of profits could be captured for instance by assuming that $\Pi^L(V)$ drops by some fraction or amount with each integer n_B^* reaches. In such a setting, multiple Ls would not only erode each L's profits but also lead to more Bs entering since in equilibrium control investors must be indifferent between assuming either role. Overall, the expected profits to be made in the market for corporate control would be first increasing and then decreasing in the measure of control investors. Ultimately, the market for corporate control would become saturated, that is, expected profits would be so low that further investors would not want to enter. These effects are intuitive, but formalizing them would be rather cumbersome. In particular, capturing multiple Ls as a reduction in the stake size would introduce non-linearities and prevent an analytical solution.

Roles in multiple firms. To keep the analysis tractable we restrict control investors to a single role matched to a single firm. Alternatively, control investors could adopt different roles in different firms, in particular an investor could be a large shareholder in one firm and a potential outside bidder in (an)other firm(s). Clearly, such multiple roles would lead to higher expected profits, making entering the control market more attractive. The resulting larger influx of investors and capital would accelerate the evolution of the market for corporate control. That is, takeover activism would spring into existence "earlier", and the transition from direct takeovers to takeover activism as the prevalent mode of control change would occur faster. Still, as long as there are search frictions in finding a bidder for a particular firm, such a model would continue to generate a growth of takeover activism relative to takeovers as more control investors enter the market.

In practice, there seems to be a specialization to particular roles, at least in a sufficiently developed market: Activist hedge funds perform the role of Ls and private equity funds those of Bs focused on certain industries. Brown et al. (2023) present evidence that private equity funds specialize in specific industries and geographies, and that these funds can use their specialized expertise to generate higher returns. However, such specialization renders executing multiple roles unfeasible for many control investors, albeit not for all as the example of Carl Icahn shows.

Growth of control market. We capture the evolution of the market for corporate control by comparing the market composition (n_L^*, n_B^*) for exogenous increases in the measure

of control investors n.[22] A richer framework would allow investments in the control market and in an alternative market such that capital or number of investors in the control market are a function of (previous) profits. Still, our reduced form approach comprises this logic. Due to the complementarity between L and B profits increase as more control investors enter, thereby providing a rationale for the exogenous growth of the market.

An alternative way to model the growth of the control market would include entry costs with investors entering once this cost drops below some threshold. Due to the complementarity, all investors would immediately enter once it becomes worthwhile for the first few. In reality, market entry and capital formation take time. Our reduced form model delivers the relevant dynamics and is, therefore, better equipped to speak to the evolution over time.

3.4 Market Growth without Frictions

Our theory stresses how entry into the market for corporate control facilitates the transition from direct takeovers to takeover activism. As more control investors enter, more firms have gotten large shareholders to put them in play for potential buyers. Because this induces more control investors to become outside bidders, there is a shift from "buy-side" initiated direct takeovers to "sell-side" initiated takeover activism. This trend is reinforced when greater market entry also leads to competition among outside bidders, which further shifts surplus from the buy side to the sell side.

However, it is important to note that increased entry per is not sufficient to produce this pattern over time; it is rooted in the frictions generated by the separation of ownership and control. In the absence of free-riding and asymmetric information, another pattern emerges: All value-improving bidders—even ones with no toehold—could succeed by paying (at least) a price equal to the share value under the incumbent management. There is neither a need nor an efficiency rationale for takeover activism. This is the case even with takeover defenses; a large shareholder removing these is as able to make a tender offer as anyone else. In fact, there is little gain from specializing in outside-bidder roles since bidding competition against large shareholders (bidders with toeholds), who unlock targets, makes this strategy unattractive.[23] In such a model, no control investor chooses to become an outside bidder

[22] For a view on the broader developments that have driven the growth of activist hedge funds and private equity funds, see, e.g., Chapter 1 in Orol (2007).

[23] In our model, bidding contests between L and B are endogenously absent because of the very information

and all takeovers would be undertaken by large shareholders. As a result, an increase in the number of control investors only leads to the standard scale effect but not a shift in the mode of control change. More potential targets are identified and, after a removal of defenses if necessary, taken over directly. Further, each control investor's profit (weakly) falls as more of them enter; there is no endogenous complementarity between the entry of large shareholders and that of outside bidders to create a countervailing positive effect on profits. Hence, the evolution described in Section 3.2 is not merely a consequence of market entry but an emergence of a peculiar "industrial organization" among control investors to overcome frictions in the market for corporate control. Moreover, the complementarity between large shareholders and outside bidders can actually enhance profits for both entities, which can explain why there is market entry in the first place.

4 On the Efficiency Gains from Takeover Activism

The seminal framework of Shleifer & Vishny (1986) initiated a strand within the theoretical takeover literature that analyzes the inefficiency resulting from the conjunction of the free-rider problem with asymmetric information. It is therefore intriguing that allowing the large shareholder to opt for the sale of the firm rather than acquiring it eliminates the inefficiency. In our discussion of why the equilibrium outcome in Corollary 1 is fully efficient, we claim that bypassing the free-rider problem in the merger invitation is immaterial for this result. In this section, we corroborate this claim by analyzing a model variation in which the outside bidder also faces the free-rider problem. This additional analysis shows that the efficiency gains do not stem from avoiding the free-rider problem; rather, the choice between brokering and undertaking a takeover allows for a (partial) *separation* of the free-rider problem and the asymmetric information problem.

4.1 Block Trade and Bidder Tender Offer

Consider a variation of the single-firm model in which "takeover activism" is carried out through a block trade between the large shareholder and the outside bidder who subsequently makes a tender offer for the widely held shares. That is, L can make a tender offer τ_L herself

asymmetry that provides the rationale for takeover activism (cf. Section 2.4).

or sell her stake α to B. After a block trade, B can make a tender offer τ_B to dispersed shareholders, which exposes her to the free-rider problem. To keep a level playing field, we assume the same bargaining protocol for the block trade as we did for the merger invitation: With probability ρ, L makes a take-it-or-leave-it offer p_L for the α stake, and with probability $1-\rho$, B makes a take-it-or-leave-it offer p_B. The difference in L's payoff from making a tender offer herself and trading the α stake to B is

$$\underbrace{(1-\alpha)(V-\tau_L)+\alpha V}_{\text{Direct Takeover}} - \underbrace{\alpha[\rho p_B+(1-\rho)p_L]}_{\text{Takeover Activism}}. \tag{9}$$

If $P=\tau_L$, $P_B=p_B$ and $P_L=p_L$, L's decision between a direct takeover and takeover activism is the same as in the baseline model (see Equation (4)).

After the block acquisition, the dispersed shareholders accept the tender offer from B only if her offer τ_B at least matches the conditonal expected share value $\mathbb{E}[V|invite]$. Since B and the dispersed shareholders share the common posterior $\mathbb{E}[V|invite]$, her bid τ_B does not alter their expectation of V. So they accept the offer $\tau_B=\mathbb{E}[V|invite]$.

Proposition 4. *The model with block trades and subsequent tender offers replicates the equilibrium outcome of Proposition 1: For all $V\in[V_1^*,1]$, the large shareholder makes a bid herself. For all $V\in[0,V_1^*)$, she sells her block to the bidder, who subsequently makes a successful bid.*

As in Proposition 1, high L types prefer to acquire the firm themselves because it allows them to reap the full value improvement of their initial stake. By contrast, low L types prefer takeover activism, since selling the α stake at a pooled price is more attractive. Furthermore, Proposition 4 shows that the cut-off V_1^* remains unchanged and that all firms are taken over and restructured. Intuitively, L sells her entire stake in the block trade and in the merger negotiations, and both proceed under the same bargaining protocol. The expected price and the cutoff are the same as in merger negotiations, since the firm is ultimately acquired by B. All firm types are taken over in this variant of takeover activism because asymmetric information and the free-rider problem are separated. In the block trade, there is an asymmetric information problem, but no free-riding. As there are known gains from trade, asymmetric information itself does not prevent efficient trade. In the subsequent tender offer B has the same posterior as the dispersed shareholders. Thus, B is only exposed

to free-riding which per se does not preclude efficient trade. As a result, the control allocation is efficient.

The only difference from the baseline model is a redistribution of profits from B to dispersed shareholders. Under a block trade with subsequent tender offer, B's expected profit stems solely from the block trade. The bid price for the $(1-\alpha)$ shares must equal the expected value $(1-\alpha)\mathbb{E}[V|V \leq V^*]$, as dispersed shareholders do not tender at any lower price. By contrast, B makes an expected profit on all shares in a merger, in which also the dispersed shareholders have to sell at the negotiated price.

4.2 Informed Bidder after Block Trade

The efficiency gains associated with takeover activism arise because block trade and subsequent tender offer permit a full separation of asymmetric information and the free-rider problem. One wonders whether takeover activism still generates efficiency gains when the bidder learns the true value improvement V after the block trade but before a tender offer. In this case, B—like L—knows more than dispersed shareholders. The tender offer is then again plagued by both asymmetric information and the free-rider problem. Still, takeover activism improves efficiency, albeit to a lesser extent.

Proposition 5. *When the bidder learns V after the block trade, the large shareholder makes a bid for $V \in [\overline{V}_1^*, 1]$ and otherwise sells her block. Subsequently, the bidder makes a bid for all $V \in [\underline{V}_1^*, \overline{V}_1^*)$ but does not bid for $V \in [0, \underline{V}_1^*)$ with $\underline{V}_1^* < V_0^*$.*

This equilibrium is characterized by two cutoffs (see Figure 8). For substantial improvements ($V \geq \overline{V}_1^*$), L makes a direct acquisition, offering the expected post-takeover share value $\tau_L^* = \mathbb{E}[V|V \geq \overline{V}_1^*]$. For moderate value improvements ($V < \overline{V}_1^*$), L negotiates a block trade with B.

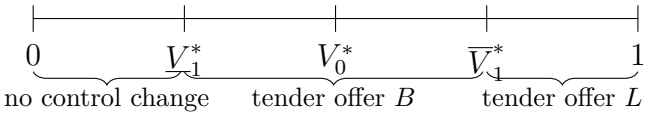


Figure 8: Equilibrium cutoffs with informed bidder.

Once B learns the value improvement V, she is in a situation similar to the large shareholder in the Shleifer & Vishny (1986) setting, though with one crucial difference. The very

fact that L abstained from making a tender offer credibly reveals that the possible value improvements are truncated to the subset $[0, \overline{V}_1^*]$ when B makes her bid. Consequently, B can succeed with a lower offer price than L. In parallel to the tender offers made by L, all successful B types pay the same price $\tau_B^* = \mathbb{E}[V|V \in [\underline{V}_1^*, \overline{V}_1^*]]$, and those types with a smaller (larger) value improvement buy the firm at a premium (discount). The mispricing deters B types with sufficiently small value improvements $V < \underline{V}_1^*$. Their gain on the block α does not compensate for the loss they make on the $1 - \alpha$ shares purchased in the tender offer.

Since the block trade only occurs if $V \in [0, \overline{V}_1^*]$, the bid price τ_B that B has to pay and the cutoff type $\underline{V}_1^*$ above which a bid is profitable must be smaller than in the setting where only L can acquire the firm (Section 2.2). Therefore, more firms are taken over and restructured than without takeover activism. Finally, anticipating the outcome at the tender offer stage, B the block at $\alpha\mathbb{E}[V \mathbb{1}_{V \geq \underline{V}_1^*} | V \leq \overline{V}_1^*] = \alpha\mathbb{P}[V \geq \underline{V}_1^* | V \leq \overline{V}_1^*] \times \mathbb{E}[V | \underline{V}_1^* \leq V \leq \overline{V}_1^*]$. Thus, L cannot ask more than $p_L^* = \mathbb{E}[V \mathbb{1}_{V \geq \underline{V}_1^*} | V \leq \overline{V}_1^*]$ for her stake in the block trade negotiations. Since L's payoff is zero should the negotiations fail, B offers $p_B^* = 0$.

4.3 Bidder Chain

We now allow for the possibility of multiple block trades prior to the tender offer. To this end we introduce many bidders placed in a chain. Specifically, there are $i \in \{1, \ldots, n\}$ outside bidders where L is, for ease of notation, bidder 1. Bidder 1 owns α shares and learns the realization of V. He can then make a tender offer τ_1 or negotiate a block trade with bidder 2. The bargaining protocol remains unchanged: with probability ρ, bidder 1 makes an offer p_1^{ask}, and with probability $1 - \rho$, bidder 2 makes an offer p_2^{bid}. If bidder 2 acquires the block, she in turn learns the realization of V and decides to either make a bid or negotiate a block trade with bidder 3. Generally speaking, if some bidder $i < n$ does not make a tender offer, she can sell the block to bidder $i + 1$. Bidder n can only make a tender offer. The game ends when some bidder $i \in \{1, \ldots, n\}$ makes a tender offer and dispersed shareholders decide whether to tender or when bidder n does not make a bid. Figure 9 portrays the sequence of moves.

Proposition 6. *There is an equilibrium characterized by n cutoffs $1 > V_1 > V_2 > \cdots > V_n > 0$. A bidder i conducts a tender offer if $V \in [V_i, V_{i-1})$ and otherwise negotiates a block*

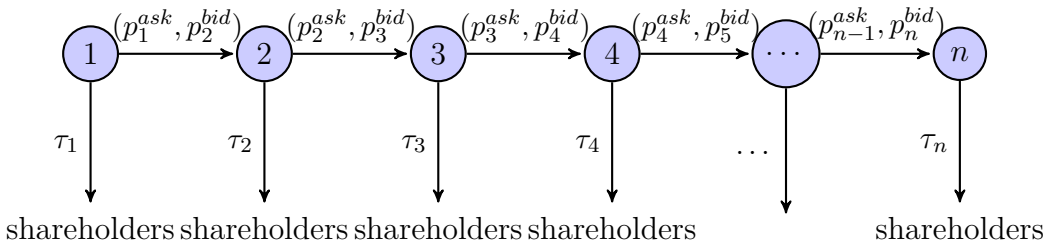


Figure 9: Bidder chain.

with bidder $i+1$.

Each bidder $i < n$ makes a tender offer $\tau_i = \mathbb{E}[V|V \in [V_i, V_{i-1})]$ if the value improvement V is in the interval $[V_i, V_{i-1})$ and enters a block trade if the improvement is smaller ($V < V_i$). In a block trade, bidder $i+1$ offers with probability $(1-\rho)$ to buy at the bid price $p_{i+1}^{bid} = 0$ as bidder i's outside option is zero. With probability ρ, bidder i offers to sell at the ask price $p_i^{ask} = \sum_{j=i}^{n-1} \rho^{j-i}\, \mathbb{E}[V\ \mathbb{1}_{V\in[V_{j+1},V_j)}\ |V \leq V_j]$. The price p_i^{ask} is the expected value of the block to bidder $i+1$ which comprises the expected profits from a takeover and a block trade. The block trade profits, in turn, are given by bidder $i+2$'s expected profits from a takeover and a block trade. Iterating until bidder n gives the price formula above.

If bidder i buys the block at the ask price p_{i-1}^{ask} she realizes a profit only if she subsequently makes a bid. Otherwise, she makes a loss since $p_{i-1}^{ask} > p_i^{ask} > p_{i+1}^{bid}$. Trivially, if she pays her bid price p_i^{bid}, she never makes a loss. Finally, if bidder n ends up buying the block she makes a bid $\tau_n = \mathbb{E}[V|V \in [V_n, V_{n-1})]$ if $V \in [V_n, V_{n-1})$. For $V < V_n$, she does not acquire and restructure the firm.

Proposition 7. *The set of firms that are not being taken over and restructured shrinks with the length of the bidder chain. As* $n \to \infty$*, the control allocation becomes efficient.*

The control allocation becomes more efficient when the bidder chain grows longer. In the limit, the control allocation is fully efficient, notwithstanding the conjunction of free-riding and asymmetric information in every (potential) tender offer. Intuitively, for lower realizations of V more bidders must forgo the option to acquire the firm to *collectively* signal that the value improvement is small. Dispersed shareholders are then willing to sell at such a price that a bid is profitable for small value improvements. If sufficiently many bidders forego to acquire the firm themselves, a takeover becomes profitable for some bidder for any given value improvement, however small.

Comparing this to our baseline model in Sections 2 and 3, this means that the efficiency gains from takeover activism (via merger invitations) there are equivalent to those generated by "intermediation" across a bidder chain as the number of bidders goes to infinity. The latter progressively separates the asymmetric information problem and the free-rider problem. So the point is that allowing large shareholders to choose whether to be on the buy- or the sell-side allows for the two frictions to be uncoupled. We thus argue that the market evolves towards takeover activism to overcome the conjunction of those frictions, taking on a form in which control changes are essentially intermediated

Relation to "Intermediation Chains." Glode & Opp (2016) study a screening problem where an uninformed seller makes a take-it-or-leave-it offer to a buyer who has private information about her willingness to pay. Intermediation chains increase efficiency if intermediaries are increasingly better informed in a way that reduces the dispersion of the seller's belief about the "next buyer's" valuation.

We consider a signalling model with known gains from trade in which the combination of asymmetric information and free-riding is the source of inefficiency. Similar to Glode & Opp (2016), a chain of transactions improves efficiency. In our setting, each consecutive block trade further truncates the shareholders' posterior belief. This *endogenous* concentration of shareholder beliefs makes takeovers with smaller value improvements feasible. In contrast to Glode & Opp (2016), each intermediary (bidder) can become perfectly informed after the block trade while still increasing efficiency in our model.[24]

5 Disciplinary Ownership Changes: Empirical Patterns

Our theory posits that a growing influx (of funds at the disposal) of control-oriented investors causes a shift from direct takeovers towards takeover activism. This transition can be broken down into four trends that unfold in parallel: (*i*) the control-oriented investment sector grows; notwithstanding, (*ii*) the incidence of hostile tender offers declines; (*iii*) the decline in hostile tender offers is not tantamount to a drop in disciplinary control changes; and (*iv*)

[24]More broadly, our paper contributes to the literature on trade under asymmetric information in financial markets. Information revelation through block trades allows for a subsequent trade with the dispersed shareholders. At a conceptual level, this is a variant of information-based trade à la Bond & Eraslan (2010).

takeover activism becomes a prevalent mode of effectuating disciplinary control change in public companies. We argue that the documented developments in the market for corporate control broadly match these predictions.

Growth of control-oriented investment. Active investment strategies specializing in corporate governance issues have grown tremendously. This is part of the spectacular growth that the private equity and hedge fund sectors experienced over the last 30 years. As already stated in the introduction, the assets under management by hedge funds globally grew by a factor of 50 in that period, which includes the rise in the number of hedge funds that engage in activism, as seen for 1994-2018 in Figure 2 of Brav et al. (2022). In parallel, the worldwide deal value of private equity buyouts has gone from $30 billion in 1995 to $1.1 trillion in 2022. For U.S. private equity funds, Kaplan & Stromberg (2009) report that committed capital in nominal dollars rose to over $200 billion in 2007 from about $200 million in 1980. Globally, Braun et al. (2023) estimate that assets managed by private equity funds multiplied nearly eight-fold from about $300 billion in 2000 to almost $2.4 trillion by 2020. A panoramic look at the growth of capital flows into the private equity industry is also provided in Mauboussin & Callahan (2020), relating this growth to useful reference points such as the size and value of public markets. Clearly, these numbers considerably overstate the growth of the subset of funds that map into the "control-oriented investors" within our model: Neither do all activist campaigns seek a sale of the target firm, nor do all private equity buyouts involve a public target. Notwithstanding, these numbers show a general increase in capital flow to investors who pursue *corporate governance* changes or *controlling ownership* stakes (in public or private firms).

Decline of tender offers. At the same time, hostile tender offers experienced a secular decline, as has already been pointed out by several scholars (e.g., Holmstrom & Kaplan 2001, Fos 2017). Figure 10 shows the number of U.S. hostile tender offers. The first graph contrasts this with the growth in total M&A over the same time period. As the latter includes friendly mergers with strategic acquirers, the second graph uses only the subset of M&A by *financial* acquirers for the comparison, which are more likely motivated by governance considerations. Since both sets of total M&A statistics include (a lot of) private targets, especially after the 1980s (Kaplan & Stromberg 2009), Figure 11 uses the number of domestic public firms in the

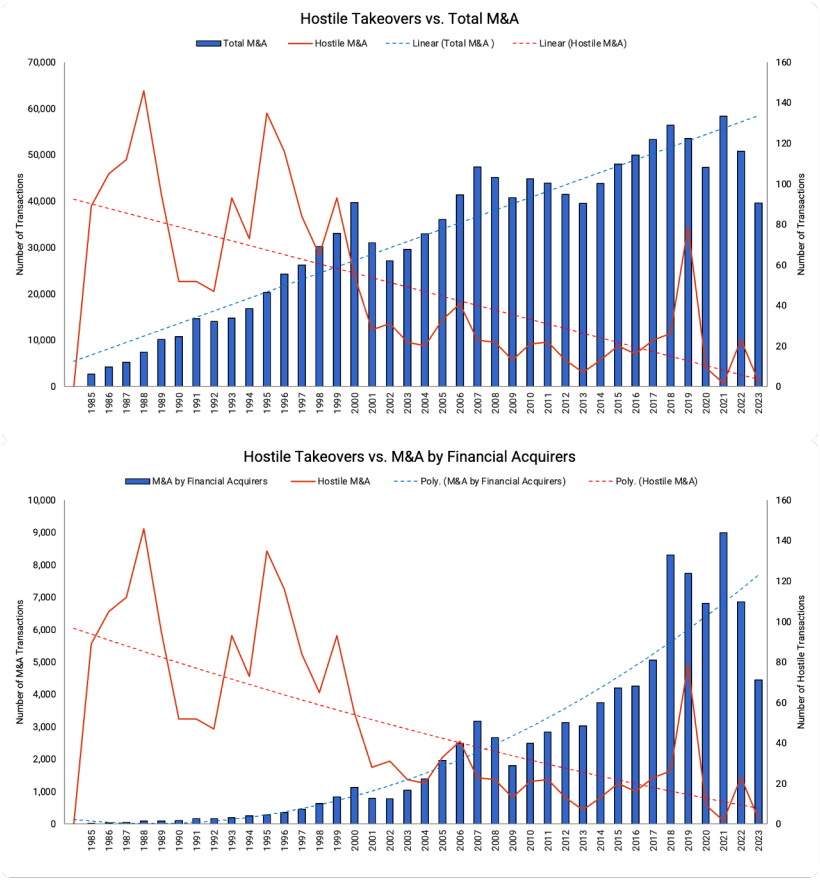


Figure 10: Hostile takeovers, total M&A, and M&A by financial acquirers. Source: The numbers were downloaded from the Institute for Mergers, Acquisitions and Alliances https://imaa-institute.org/mergers-and-acquisitions-statistics/

U.S. as a reference point to ascertain that the decline in hostile tender offers is not merely proportional to the widely documented decline in the number of public companies.[25] In all graphs we see the dramatic dip in the 1989-1992 period, attributable to the confluence of a brief recession and the rise of anti-takeover mechanisms. The decline of hostile tender offers has been more continuous beyond this episode, however, and the normalization in Figure 11 shows that it outpaced the decline in the number of public firms, which shrunk considerably between 1996 and 2010.

[25] See, e.g., Kahle & Stulz (2017).

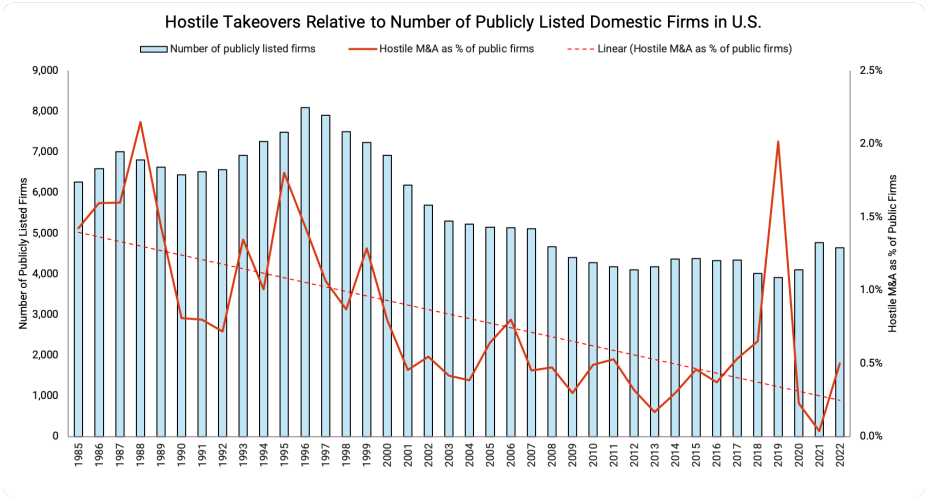


Figure 11: Hostile takeovers as percentage of publicly listed U.S. companies. Source: The numbers for publicly listed companies were downloaded from the World Bank Group https://data.worldbank.org/indicator/CM.MKT.LDOM.NO?locations=US.

Public-to-private buyouts. Despite the rise of activism and downturn in hostile takeovers, there has been no decline in disciplinary ownership changes. As Kaplan & Stromberg (2009) note, the private equity sector grew and experienced a boom between 2005 and 2007. Across the period of declining hostile tender offers, public company buyouts increased and sharply during the boom.[26] Extending the data to 2016, Renneboog & Vansteenkiste (2017, Figure 2) find cycles but no downward trend in public company buyouts even though the number of public firms declined. In fact, Ljunqvist et al. (2016, Figure 2) report that public-to-private buyouts significantly contributed to this decline since the mid-1990s. These buyouts reverse the separation of ownership and control in order to re-align incentives and implement major changes (Kaplan & Stromberg 2009, Davis et al. 2019). They are in this sense "disciplinary." The upper graph of Figure 12 compares the numbers of public-to-private buyouts and hostile takeovers (both normalized by the number of publicly listed domestic firms). The drift in the ratio of the two numbers illustrates that disciplinary control changes have become gradually decoupled from hostile tender offers over time.[27]

[26]This is notwithstanding that much of overall private equity activity involves private target firms. At the same time, there have also been many divisional buyouts and spin-offs which, aside from public-to-private buyouts, also constitute (disciplinary) control changes in the sphere of public firms.

[27]It is not improbable for public company buyouts to occur in a context of hostility. While hostile tender offers have become rare, hostile governance interventions still exist. Activism involves hostile threats and

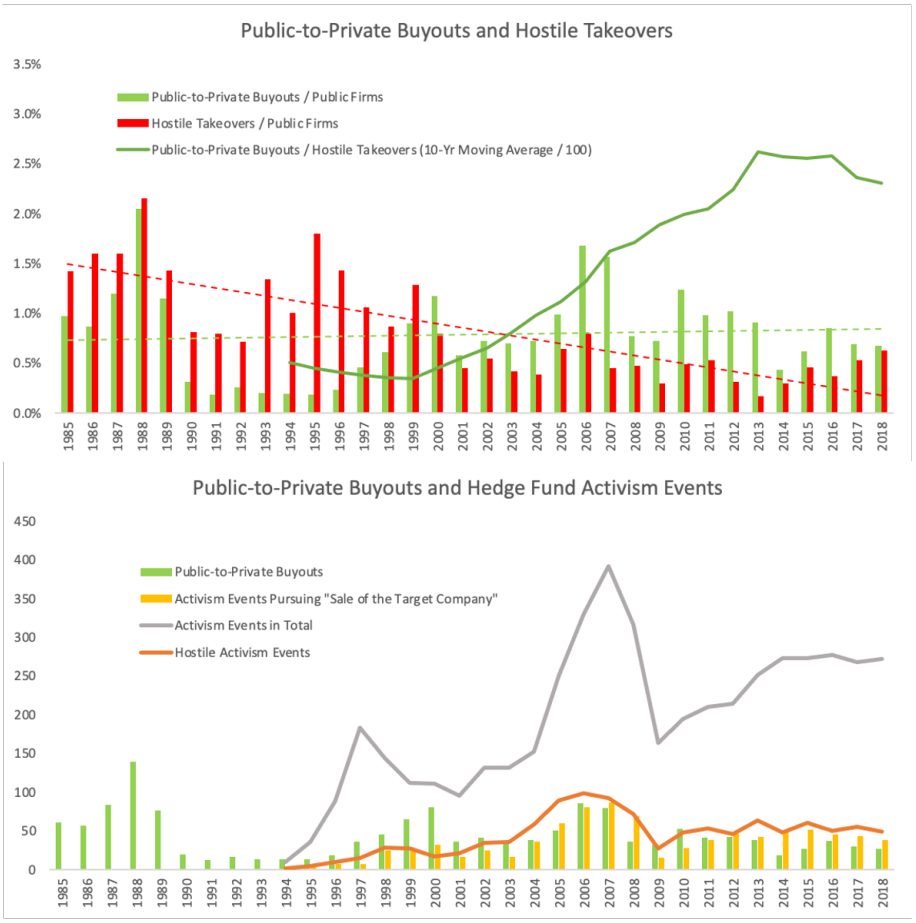


Figure 12: Public-to-Private Buyouts, Hostile Takeovers, and Hedge Fund Activism. Source: The numbers for public-to-private buyouts and hedge fund activism were generously provided by Renneboog & Vansteenkiste (2017) and Brav et al. (2022).

Takeover activism. Brav et al. (2021, Table 1) report that "Sale of target company" and "Governance" were the initially stated objective for, respectively, about 18.5% and 35.5% of activist campaigns.[28] In the study by Fos (2017) dissidents state governance objectives and the possible sale of the target company in about 39% and 29% of proxy fights. Focusing on

tactics (e.g., Fos 2017, Gantchev 2013, Brav et al. 2008)—to such a degree that it has sparked controversy like the 1980s takeovers and firms have begun to use anti-activism pills (Eldar et al. 2023). Against the backdrop of such activism, it would be surprising if public-to-private buyouts occurred in a bubble of amicability.

[28]Quite often governance-motivated campaigns ultimately lead to a sale of the target firm even when this outcome is not explicitly declared as an initial objective (Greenwood & Schor 2009). In Brav et al. (2022), the "Sale of target company" category includes all campaigns in which the activist funds explicitly pursue a sale of the target to a third party or try to acquire the target themselves.

takeover activism Greenwood & Schor (2009), Becht et al. (2017) and Boyson et al. (2017) show that it is among the most profitable campaign categories and a dominant source of the aggregate returns to hedge fund activism.

Investor activism has risen since the mid-1990s. Figure 1 in Brav et al. (2021) shows that the number of activist campaigns (activist hedge funds) grew from below 10 in 1994 to around 200 (175) in 2018 against the backdrop of the decrease in the number of public firms. Thus, the share of public firms targeted by activism has risen substantially, and in roughly 20% to 40% of the cases the activist addressed issues related to the governance and ownership of the firm. The lower graph of Figure 12 plots the number of activist campaigns over time, including for those subsets that had the objective of a sale of the target or involved hostility, next to the number of public-to-private buyouts. While these numbers do not prove a direct link, they hint at the possibility that buyout funds feed off the activities of hedge funds that seek governance and control changes in their target firms. This viewpoint is widespread among practitioners. For example, private equity pioneer Thomas H. Lee is quoted by the New York Times (Sorkin 2007) thanking

> Carl Icahn, Nelson Peltz, Jana Partners, Third Point... for teeing up deals because they're coming in there and shaking up the management and many times these companies are being driven into some form of auction.

Because of such interactions, "activism has been dubbed 'the new M&A' " (Campbell 2014). To some commentators, the links between private equity and activism characterize the market for corporate control to such an extent that the relationship is referred to as a *symbiosis* or a *convergence* and are viewed as the result of the growing capital flow into control-oriented investment strategies (e.g., Billings & Gump 2005, Sorkin 2007, Barker 2007, Klein et al. 2020, Goldfarb 2020).[29]

Role specialization. One must be careful not to map the roles of large shareholder L and outside bidder B in our model too narrowly into activist hedge funds and private equity

[29]Practitioners view this as an ongoing, permanent change (see, e.g., the conclusion in Glass & Polonyk 2019). Most discussions focus on the overlap and complementarity of private equity and hedge fund activism, but there have also been signs of conflict because of intensified competition among control-oriented investors in the now more "saturated" market for corporate control (e.g., Moeser 2019, Crawford & Gruenberg 2020). The emergence of such conflicts is interesting but they are not a focus of our paper.

funds. This taxonomy was not yet established in the early phases of the market for corporate control and what is nowadays known as activist hedge funds only started emerging in material numbers in the early 1990s. The better starting point for mapping our model into reality is to recognize that the pioneers of control-oriented investing were aware of the choice between acquiring a firm and putting it into play.[30] In his manifesto from 1976, Carl Icahn wrote:

> 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.

Although these options were known, our theory puts forward that in the ("thin") early-stage market, tender offers were often the chosen course of action, and a clear distinction between investors *specialized* in mainly acquiring *or* mainly waging proxy fights and putting firms in play was not yet meaningful.[31] Such a distinction only emerged over time, and in our model, it is in the "mature market stage" that Ls transition more to the sell side with Bs on the buy side. For parameters under which firms are matched with multiple Bs in the mature stage and the block of each L is small, our model in fact predicts that Ls nearly always put their firms in play, such that mapping Ls and Bs to activist funds and buyout funds is fitting. We would argue that the emergence of specialized activist funds and buyout funds corresponds to this mature stage prediction. In the sample of Brav et al. (2021), activists aim to make a takeover bid for the target firm in only 3.2% of all activist campaigns, while in the sample of Boyson et al. (2017), merely 15% of takeover bids are made by activist shareholders rather than outside bidders.

Alternative explanations. A different narrative for the observed trends is based on legal changes. It is in our view incomplete. The emergence of takeover defenses made disciplinary control changes costlier, as the defenses must be removed first. The reform of shareholder

[30] It is safe to say that both private equity funds and activist hedge funds have their roots in the activities of the raiders of the 1980s. This link is not just a conceptual one but involves direct interpersonal connections and networks spanning across buyouts and activism, as highlighted, e.g., in Chapters 1 and 2 of Orol (2007).

[31] This is not to argue that there were no instances in which large shareholders put target firms into play, sometimes to strategic acquirers acting as "white knights." The point is that tender offers were, compared to today, still a common outcome.

communication laws in 1992 made it easier for shareholders to challenge management, e.g., through proxy fights. These changes paved the way for takeovers to be replaced, or preceded, by activism. However, they do not require a shift from tender offers to merger invites since an activist is not bound to a particular mode of control change in conjunction with removing takeover defenses. Activists can in principle remove them *and* make a takeover bid, as seen in the data in Brav et al. (2021) and Boyson et al. (2017) and implied in Icahn's manifesto.[32] Another caveat is the timing. A majority of firms already had two or more takeover defenses in place by 1990, and the adoption of the best-known provisions (e.g., staggered boards and poison pills) plateaued through the 1990s and declined after 2000 (Karpoff & Wittry 2022), arguably due to activism.[33] By contrast, Figures 10 to 12 sketch a longer, continued transition from tender offers to takeover activism.

We would argue that, at the same time that the growth of the control-oriented investment sector reversed the proliferation of takeover defenses, it also brought about a permanent shift in market thickness and structure that favors takeover activism over direct takeovers. This matches the reduced spread of takeover defenses and yet continuing paucity of hostile tender offers. This line of thought also resonates with the observation that takeover processes have become more sell-side driven since the 1990s but, in spite of takeover defenses, nevertheless remained competitive (Liu & Mulherin 2019, Brown et al. 2022).[34] While takeover defenses *ceteris paribus* dampen takeover activity, in our theory, both the returns to control-oriented investment and the efficacy of the market for corporate control continue to grow over time. The reason is that strategic complementarities between activism and private equity promote entry and shift the market toward sell-side driven takeover activism as a more effective mode of control change.

Another proposed explanation for the decline in hostile tender offers is that other cor-

[32] As Karpoff & Wittry (2022) write, "takeover defenses are not acquisition showstoppers that impose a corner solution of zero takeovers" (p.10).

[33] On a different note, the evolution of the market in our theory makes being a control-oriented blockholder more profitable relative to a world with only direct takeovers. Therefore, deterring control changes would require firms to adopt more potent "takeover defenses" to reduce the gains from equity stakes that enable takeover activism. Eldar et al. (2023) documents an increased use of poison pills with low trigger thresholds, so-called anti-activism pills, which may precisely play this role of indirectly deterring takeovers.

[34] The fact that many acquisitions of public firms are seller-initiated is explored in Masulis & Simsir (2018) and Eckbo et al. (2020). Gorbenko & Malenko (forthcoming) provide a theory of deal initiation. Concerning disciplinary buyouts (rather than synergistic mergers), our theory also analyzes the choice between a buy-side driven "tender offer" and a sell-side driven "merger invitation."

porate governance mechanisms—such as incentive-based compensation, board monitoring, and especially investor activism—have made disciplinary takeovers obsolete. Holmstrom & Kaplan (2001, p.132f) argue that hostility and leveraged buyouts faded in the 1990s because, in the wake of the pioneering 1980s takeover wave,

> corporations began to emulate the beneficial attributes of leveraged buyouts. This could explain why hostility declined: hostile takeovers were no longer needed, as companies voluntarily restructured and adopted a shareholder value perspective.

Focusing squarely on shareholder activism, Fos (2017) documents that much of the hostility "moved" to (the increased use of) proxy contests that challenged incumbent managements. In similar spirit, Gilson & Gordon (2013, p.867) argue that activist investors "function to monitor company performance and then to present to companies and institutional shareholders concrete proposals for business strategy through mechanisms less drastic than takeovers." In other words, they argue that investor activism offers a "low-cost-low stakes" alternative that made costlier interventions, such as takeovers, superfluous in many cases. This either-or-view of investor activism as a substitute for a takeover also shapes Goshen & Steel (2022)'s comparative discussion of the two governance mechanisms. The scope of non-takeover activism is evidenced by campaigns that do not seek the sale of the target firm (cf. Figure 12). At the same time, however, the overall statistics on public-to-private buyouts and takeover activism do not show a substitution away from disciplinary ownership changes. Since firms are acquired in takeover activism, the cumulative intervention costs and stakes are ultimately comparable to those in hostile takeovers. Rather than a substitute, activism is in these cases a mechanism that facilitates the market for corporate control (Denes et al. 2017).

Last, we want to note that a mere increase in capital at the disposal of control investors, without the market frictions in our model, does not per se create a shift to takeover activism. On the contrary, the growth of the demand side and of the potential for bidding competition would render it optimal for control investors to enter as large shareholders to gain a "toehold" advantage in the bidding process (cf. Section 3.4). One would then merely see the scale effect: an increase in direct takeovers by toehold bidders and a decrease in control-investor profits. In practice, direct takeovers have become rarer and most targets are now acquired by outside bidders with no toeholds.

6 Concluding Remarks

We provide a model of the market for corporate control that allows large shareholders to make a tender offer or to put the firm in play, that is, to broker a sale to an outside bidder. We show in a single-firm setting that the option to be on the sell side gives rise to an efficient allocation of control by overcoming two fundamental governance problems: free-riding and asymmetric information. We then embed our single-firm model into a market model to study the evolution of the market of corporate control. After an early phase with buy-side driven tender offers, the market shifts gradually towards sell-side driven mergers.

Our theory offers an explanation for secular changes in the market for corporate control: the decline of hostile takeover bids and the concurrent rise of takeover activism. This trend is typically attributed to legal changes. But as we show, it emerges endogenously as the capital available to investors who seek to implement control changes in underperforming firms grows. The reason is that the combination of asymmetric information and free-rider problem is most effectively overcome when active investors begin to populate both sides of the market—as activist investors who acquire firms themselves or put them in play and as outside bidders who stand ready to acquire firms that have been put in play. The strategic complementarities between these control-oriented investment strategies are being increasingly exploited as the market matures, and drive the unique "industrial organization" of the market for corporate control.

These predictions are consistent with the symbiotic relationship between private equity and hedge fund activism that has evolved in the market for corporate control. There are other issues that this development raises. Instances where buyout firms sponsor activist campaigns (Gandel 2015), activists team up with buyout firms to acquire the target (Beltran 2020), or investment firms simultaneously manage activist funds and buyout funds (Louch 2019) raise concerns about insider trading and anti-competitive practices, which are beyond the scope of this paper and are left for future research. That said, discussions about how these investors "organize" the market of corporate control should consider the coordination and information frictions that need to be overcome to proactively reallocate control in public firms.

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Main Proofs

Proof of Lemma 1

See proof of Theorem 1 in Shleifer & Vishny (1986) and footnote 14. □

Proof of Proposition 1

Step 1: *In any equilibrium, there is a cutoff* $\hat{V} \in (0,1)$ *such that all* $V < \hat{V}$ *extend a merger invitation and all* $V \geq \hat{V}$ *make a tender offer.*

If all types were to pool on tender offer P_T, the free-rider condition would imply $P_T \geq \mathbb{E}[V]$ such that $V = 0$ (and, by continuity, slightly higher types) make a strict loss. Conversely, if all types extend a merger invitation, $\alpha[\rho P_L + (1-\rho)P_B] \leq \alpha P_B \leq \alpha \mathbb{E}[V]$. Hence, $V = 1$ (and, by continuity, slightly lower types) have a profitable deviation to a tender offer of $P = 1$. All shareholders would tender at $P_T = 1$ such that this deviation yields $\alpha 1 > \alpha \mathbb{E}[V]$.

In equilibrium, all successful tender offers need to have the same price. If offers P_T and P_T' with $P_T' > P_T$ were successful, it would be strictly profitable to deviate to P_T. The bargaining protocol for the merger invitations directly implies $P_B = 0$. Furthermore, all offers by L accepted in equilibrium must have the same price P_L. If offers P_L and P_L' with $P_L' < P_L$ were accepted, it would be strictly profitable to deviate to P_L.

For fixed (unique) prices (P_T, P_B, P_L) accepted in equilibrium, L's payoff difference is given by $\Delta(V, P_T, P_B, P_L) := (1-\alpha)(V - P_T) + \alpha V - \alpha[\rho P_L + (1-\rho)P_B]$ which is strictly and continuously increasing in V. Hence, there is unique $\hat{V}$ such that all $V \geq \hat{V}$ prefer a tender offer and all $V < \hat{V}$ prefer a merger invitation. In addition, type $V = 1$ makes a tender offer because $P = 1$ is accepted and $\Delta(V = 1, P_T = 1, P_B, P_L) = \alpha 1 - \alpha[\rho P_L + (1-\rho)P_B)] \geq \alpha 1 - \alpha \mathbb{E}[V] > 0$. Type $V = 0$ extends a merger invitation because $\Delta(V = 0, P_T, P_B, P_L) < 0$ and $\alpha[\rho P_L + (1-\rho)P_B] > 0$ provided $P_L > 0$. $P_L = 0$ can only hold if all types $V \in (0, \hat{V}]$ do nothing which is inconsistent with credible off-equilibrium beliefs by Grossman & Perry (1986). Any type $V \in (0, \hat{V}]$ would like to deviate to any $P_L > 0$ if it was accepted by B. Since such a deviation is profitable for all $V \in (0, \hat{V}]$, and possibly some $V \in (\hat{V}, 1]$, the bidder accepts any $P_L < \mathbb{E}[V | V \leq \hat{V}]$ under credible off-equilibrium beliefs by Grossman & Perry (1986). Hence, $\hat{V} \in (0,1)$.

Step 2: *In any equilibrium,* $P_T = \mathbb{E}[V|V \geq \hat{V}]$, $P_L = \mathbb{E}[V|V \leq \hat{V}]$ *and* $P_B = 0$.

Suppose $P_T > \mathbb{E}[V|V \geq \hat{V}]$ in an equilibrium with cutoff $\hat{V} \in (0,1)$. Deviating to $P_T' = \mathbb{E}[V|V \geq \hat{V}]$ is profitable for all $V \geq \hat{V}$ if shareholders tender at P_T'. By continuity and monotonicity, it is also profitable for some non-empty interval $[V', \hat{V})$ of types with $V' > 0$. Hence, credible off-equilibrium beliefs imply $\mathbb{E}[V|P_T'] = \mathbb{E}[V|V \geq V'] < P_T' = \mathbb{E}[V|V \geq \hat{V}]$ and the tender offer P_T' succeeds. Hence, $P_T = \mathbb{E}[V|V \geq \hat{V}]$ in equilibrium.

Similarly, suppose $P_L < \mathbb{E}[V|V \leq \hat{V}]$ in an equilibrium with cutoff $\hat{V} \in (0,1)$. Deviating to $P_L' = \mathbb{E}[V|V \leq \hat{V}]$ is profitable for all $V \leq \hat{V}$. By continuity and monotonicity, it is also profitable for some interval $(\hat{V}, V']$ of types with $V' < 1$. Hence, credible off-equilibrium beliefs imply $\mathbb{E}[V|P'] = \mathbb{E}[V|V \leq V'] > P_L' = \mathbb{E}[V|V \leq \hat{V}]$ and B accepts P_L'. Hence, $P_L = \mathbb{E}[V|V \leq \hat{V}]$ in equilibrium. Obviously, L always accepts $P_B = 0$.

Step 3: *There is a unique equilibrium with cutoff* $V_1^* \in (0,1)$.

For a given $\hat{V}$, $\Delta(V; \hat{V}) = (1-\alpha)(V - \mathbb{E}[V|V \geq \hat{V}]) + \alpha V - \alpha\rho\mathbb{E}[V|V \leq \hat{V}]$ strictly increases in V. Since $\Delta(V = 0; \hat{V} = 0) = -(1-\alpha)\mathbb{E}[V] < 0$ and $\Delta(V = 1; \hat{V} = 1) = \alpha 1 - \alpha\rho\mathbb{E}[V] > 0$, there exists a cutoff $\hat{V}$ such that $\Delta(\hat{V}; \hat{V}) = (1-\alpha)(\hat{V} - \mathbb{E}[V|V \geq \hat{V}]) + \alpha\hat{V} - \alpha\rho\mathbb{E}[V|V \leq \hat{V}] = 0$. This cutoff is also unique since $(\hat{V} - \mathbb{E}[V|V \geq \hat{V}]) = (-1)MRL(\hat{V})$, where $MRL(\hat{V}) = \mathbb{E}[V|V \geq \hat{V}] - \hat{V}$ is the mean residual life function which is monotonically decreasing if f is log-concave (Bagnoli & Bergstrom 2005). Since $\alpha(\hat{V} - \mathbb{E}[V|V \leq \hat{V}])$ is increasing due to log-concavity (Bagnoli & Bergstrom 2005), so is $\alpha\hat{V} - \alpha\rho\mathbb{E}[V|V \leq \hat{V}]$. Thus, there exists a unique cutoff V_1^* such that $\Delta(V_1^*, V_1^*) = 0$ and equilibrium prices are $P_T = \mathbb{E}[V|V \geq V_1^*]$, $P_B = 0$, and $P_L = \mathbb{E}[V|V \leq V_1^*]$.

Step 4: *Given the conjectured cutoff equilibrium* V_1^**, neither* L *nor* B *want to deviate from the conjectured equilibrium prices* $P_T = \mathbb{E}[V|V \geq V_1^*]$, $P_B = 0$ *and* $P_L = \mathbb{E}[V|V \leq V_1^*]$.

Suppose L deviates to a lower tender offer $P_T' \in (0, \mathbb{E}[V|V \geq V_1^*])$ and it succeeds. Hence, all $V \geq V_1^*$ deviate to P_T'. By continuity, there is a $V' < V_1^*$ such that this deviation is also strictly profitable for all $V \in (V', V_1^*]$. Credible off-equilibrium beliefs imply that $\mathbb{E}[V|P_T'] = \mathbb{E}[V|V > V']$ such that the free-rider condition then requires that $P_T' \geq \mathbb{E}[V|V > V']$. Because P_T' is profitable for types $V \in (V', V_1^*]$, it has to hold that $V' \geq (1-\alpha)\mathbb{E}[V|V > V'] + \alpha\rho\mathbb{E}[V|V \leq V_1^*]$. Since $V' < V_1^*$ it must also hold that $V' > (1-\alpha)\mathbb{E}[V|V > V'] + \alpha\rho\mathbb{E}[V|V \leq V']$. Because $\Delta(0,0) < 0$ an $\Delta(V'; V') > 0$, by continuity, there has to be a

$V'' < V' < V_1^*$ such that $\Delta(V'', V'') = 0$. This is a contradiction because $\Delta(V, V) = 0$ can hold only at the unique cutoff V_1^*. Hence, there are no profitable deviations to $P_T' < P_T^*$. Obviously, L never wants to deviate to any higher tender offer since P_T^* succeeds.

Suppose L deviates to $P_L' > \mathbb{E}[V|V \leq V_1^*]$ and B accepts. By continuity, this deviation is profitable for all $V \in [0, V']$ where $V' > V_1^*$ Hence, credible off-equilibrium beliefs imply $\mathbb{E}[V|P_L'] = \mathbb{E}[V|V \leq V']$. Further, B's acceptance requires $P_L' \leq \mathbb{E}[V|V \leq V']$. Deviation is most profitable if $\rho = 1$ which we assume henceforth. Thus, for a profitable deviation there has to be a $V' > V_1^*$ such that $V' - (1-\alpha)\mathbb{E}[V|V > V_1^*] - \alpha\rho\mathbb{E}[V|V \leq V'] < 0$. Hence, $\Delta(V'; V') < 0$. Because $\Delta(1, 1) > 0$ and $\Delta(V'; V') < 0$, by continuity, there has to be a $V'' > V' > V_1^*$ such that $\Delta(V'', V'') = 0$. Hence, there are no profitable deviations to $P_L' > P_L^*$. Also, L never wants to deviate to any lower merger offer since P_L^* is accepted. □

Proof of Proposition 2

At $n = 0$, $\mathbb{E}[\Pi^L(V)] = \mathbb{E}[\Pi^L(V)|V^* = V_0^*] > 0 = n_L\mathbb{E}[\Pi^B(V)|V^* = V_1^*] = \mathbb{E}[\Pi^B(V)]$ such that the first entrant is a L. By continuity and $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_0^*]$, there is a $\underline{n} > 0$ such that $\underline{n}\ \mathbb{E}[\Pi^B(V)|V^* = V_1^*] = \mathbb{E}[\Pi^L(V)|V^* = V_0^*]$. Hence, for all $n < \underline{n}$, only L's enter. For $n \geq \underline{n}$ and as long as $n_L \in [\underline{n}, 1)$ and $n_B < 1$, control investors must be indifferent between entering as a L or a B, i.e.,

$$\mathbb{E}[\Pi^L(V)|V^* = V_0^*] + n_B\ (\mathbb{E}[\Pi^L(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_0^*]) = n_L\ \mathbb{E}[\Pi^B(V)|V^* = V_1^*] \tag{10}$$

From $n = n_L + n_B$, it follows that $n_B^* = \frac{n\ \mathbb{E}[\Pi^B(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*]}{\mathbb{E}[\Pi^L(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*] + \mathbb{E}[\Pi^B(V)|V^*=V_1^*]}$, and $n_L^* = \frac{n\ (\mathbb{E}[\Pi^L(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*]) + \mathbb{E}[\Pi^L(V)|V^*=V_0^*]}{\mathbb{E}[\Pi^L(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*] + \mathbb{E}[\Pi^B(V)|V^*=V_1^*]}$.

Case *I*: For $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] < \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$, indifference condition (10) implies that $n_B < 1$ and $n_B < n_L\ \forall n$. At $n_L^* = 1$, the total mass of control investors is $1 + \frac{\mathbb{E}[\Pi^B(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*]}{\mathbb{E}[\Pi^L(V)|V^*=V_1^*] - \mathbb{E}[\Pi^L(V)|V^*=V_0^*]} = n := \overline{n} < 2$. For all $n \geq \overline{n}$, the control investor's indifference condition is given by

$$\mathbb{E}[\Pi^L(V)|V^* = V_0^*] + n_B\ (\mathbb{E}[\Pi^L(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_0^*]) = \mathbb{E}[\Pi^B(V)|V^* = V_1^*]. \tag{11}$$

As a result, all new entrants become Ls and $n_B^* = \frac{\mathbb{E}[\Pi^B(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_0^*]}{\mathbb{E}[\Pi^L(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_0^*]}$, and $n_L^* = \frac{n\ (\mathbb{E}[\Pi^L(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_0^*])+\mathbb{E}[\Pi^L(V)|V^*=V_0^*]-\mathbb{E}[\Pi^B(V)|V^*=V_1^*]}{\mathbb{E}[\Pi^L(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_0^*]}$.

Case *II*: For $\mathbb{E}[\Pi^B(V)|V^* = V_1^*] > \mathbb{E}[\Pi^L(V)|V^* = V_1^*]$, indifference condition (10) implies that n_B must reach 1 before $n_L = 1$. Since B makes zero profit in bidding competition, her expected payoff is $n_L(2 - n_B)\mathbb{E}[\Pi^B(V)|V^* = V_1^*]$ once $n_B \geq 1$ and provided that $n_L < 1$. Since Ls payoff increases due to bidder competition from $\mathbb{E}[\Pi^L(V)|V^* = V_1^*]$ to $\mathbb{E}[\Pi^L(V)|V^* = V_2^*]$, an entrant's indifference condition is

$$\begin{aligned}&(2 - n_B)\mathbb{E}[\Pi^L(V)|V^* = V_1^*] + (n_B - 1)\left(\mathbb{E}[\Pi^L(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_0^*]\right)\\ =&n_L(2 - n_B)\mathbb{E}[\Pi^B(V)|V^* = V_1^*].\end{aligned} \tag{12}$$

Rearranging, plugging in $n_L = n - n_B$ and solving for n_B yields

$$\begin{aligned}n_B^* = &\frac{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*] + n\mathbb{E}[\Pi^B(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_1^*] + \mathbb{E}[\Pi^L(V)|V^* = V_2^*]}{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]} - \frac{\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}\\ &\times \frac{\sqrt{\begin{array}{l}(n-2)^2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]^2 - 2(n-2)\mathbb{E}[\Pi^B(V)|V^* = V_1^*]\mathbb{E}[\Pi^L(V)|V^* = V_1^*]\\ \quad + (\mathbb{E}[\Pi_{LB}^L(V,\rho=1) - \mathbb{E}[\Pi^L(V)|V^* = V_1^*])^2 + 2n\mathbb{E}[\Pi^B(V)|V^* = V_1^*]\mathbb{E}[\Pi^L(V)|V^* = V_2^*]\mathbb{E}[\Pi^B(V)|V^* = V_1^*]^2\end{array}}}{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}\end{aligned} \tag{13}$$

and

$$\begin{aligned}n_L^* = &\frac{\mathbb{E}[\Pi^L(V)|V^* = V_2^*] - \mathbb{E}[\Pi^L(V)|V^* = V_1^*]}{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}\\ &- \frac{\mathbb{E}[\Pi^B(V)|V^* = V_1^*](n-2) + \sqrt{\begin{array}{l}(n-2)^2 + \frac{(\mathbb{E}[\Pi^L(V)|V^*=V_2^*]-\mathbb{E}[\Pi^L(V)|V^*=V_1^*])^2}{\mathbb{E}[\Pi^B(V)|V^*=V_1^*]^2}\\ \quad + \frac{4\mathbb{E}[\Pi^L(V)|V^*=V_1^*]+2n\mathbb{E}[\Pi^L(V)|V^*=V_2^*]-2n\mathbb{E}[\Pi^L(V)|V^*=V_1^*]}{\mathbb{E}[\Pi^B(V)|V^*=V_1^*]}\end{array}}}{2\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}\end{aligned} \tag{14}$$

as the unique admissible solutions. Both n_B^* and n_L^* strictly increase in n. As a result, there is a n' such that $n_L^*(n') = 1$ and $n_B^*(n') > 1$. For all $n' \geq n$, the equilibrium conditions are $(n_B - 1)\mathbb{E}[\Pi^L(V)|V^* = V_2^*] + (2 - n_B)\mathbb{E}[\Pi^L(V)|V^* = V_1^*] = (2 - n_B)\ \mathbb{E}[\Pi^B(V)|V^* = V_1^*]$ and $n = n_L + n_B$. Together, these yield newline $n_B^* = \frac{2\ \mathbb{E}[\Pi^B(V)|V^*=V_1^*]-2\mathbb{E}[\Pi^L(V)|V^*=V_1^*]+\mathbb{E}[\Pi^L(V)|V^*=V_2^*]}{\mathbb{E}[\Pi^B(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_1^*]+\mathbb{E}[\Pi^L(V)|V^*=V_2^*]}$ and

$n_L^* = n - \frac{2\ \mathbb{E}[\Pi^B(V)|V^*=V_1^*]-2\mathbb{E}[\Pi^L(V)|V^*=V_1^*]+\mathbb{E}[\Pi^L(V)|V^*=V_2^*]}{\mathbb{E}[\Pi^B(V)|V^*=V_1^*]-\mathbb{E}[\Pi^L(V)|V^*=V_1^*]+\mathbb{E}[\Pi^L(V)|V^*=V_2^*]}$,

where n_B^* is constant in n and n_L^* strictly increases in n. □

Proof of Proposition 3

Obviously if $n_B^* = 0$ and $n_L^* > 0$, $\frac{\#\text{ takeover activism}}{\#\text{ tender offers}} = 0$, which corresponds to $n \leq \underline{n}$ for either case. If $n_B^* \in (0,1]$ and $n_L^* \in (0,1]$, a firm is matched with a B and L with probability $n_L^* n_B^*$. Conditional on such a match, the probability of a merger invitation is $F(V_1^*)$. Conversely, conditional on a match of a firm with both a L and a B, the probability that an outright tender offer occurs is $1 - F(V_1^*)$. With probability $n_L^*(1 - n_B^*)$ a firm is only matched with a L such that a tender offer occurs with probability $1 - F(V_0^*)$. Taken together, the probability of a tender offer is $n_L^* n_B^*(1 - F(V_1^*)) + n_L^*(1 - n_B^*)(1 - F(V_0^*))$. Hence, $\frac{\#\text{ takeover activism}}{\#\text{ tender offers}} = \frac{n_L^* n_B^* F(V_1^*)}{n_L^* n_B^*(1-F(V_1^*))+n_L^*(1-n_B^*)(1-F(V_0^*)} = \frac{n_B^* F(V_1^*)}{n_B^*(1-F(V_1^*))+(1-n_B^*)(1-F(V_0^*))}$, which increases in n_B^* and is constant in n_L^*. If $n_B^* \in (0,1]$ and $n_L^* \geq 1$, every firm is matched with at least one L such that $\frac{\#\text{ takeover activism}}{\#\text{ tender offers}} = \frac{n_B^* F(V_1^*)}{n_B^*(1-F(V_1^*))+(1-n_B^*)(1-F(V_0^*))}$, which again increases in n_B^* and is constant in n_L^*. If $n_B^* \geq 1$ and $n_L^* \in (0,1]$, every firm is matched with at least one B such that $\frac{\#\text{ takeover activism}}{\#\text{ tender offers}} = \frac{n_L^*(n_B^*-1)F(V_2^*)+n_L^*(2-n_B^*)F(V_1^*)}{n_L^*(n_B^*-1)(1-F(V_2^*))+n_L^*(2-n_B^*)(1-F(V_1^*))} = \frac{(n_B^*-1)F(V_2^*)+(2-n_B^*)F(V_1^*)}{(n_B^*-1)(1-F(V_2^*))+(2-n_B^*)(1-F(V_1^*))}$. If $n_B^* \geq 1$ and $n_L^* \geq 1$, every firm is matched with at least one L and one B such that $\frac{\#\text{ takeover activism}}{\#\text{ tender offers}} = \frac{(n_B^*-1)F(V_2^*)+(2-n_B^*)F(V_1^*)}{(n_B^*-1)(1-F(V_2^*))+(2-n_B^*)(1-F(V_1^*))}$. All expressions are constant in n_L^* and increase in n_B^* because $V_2^* > V_1^* > V_0^*$. Since n weakly increases in n across all cases, takeover activism becomes more likely relative to tender offers if n increases. □

Proof of Proposition 4

Suppose $\mathbb{E}[V|\text{invite}] > 0$. If B has acquired the block of L and holds the common posterior $\mathbb{E}[V|\text{invite}]$ with the dispersed shareholders, she can acquire the remaining $1 - \alpha$ shares at $\mathbb{E}[V|\text{invite}]$ (by $A1$) yielding an expected profit of 0 on each of these shares. Since the price paid for the α-block is sunk at the stage of the tender offer, B obtains an expected profit $\alpha\mathbb{E}[V|\text{invite}] > 0$ and, thus, it is a unique best response to take over the firm.

When L decides between a direct takeover and a block trade, her payoff difference is given by $(1-\alpha)(V - \tau_L) + \alpha V - \alpha[\rho p_B + (1-\rho)p_L]$. As one can easily see, if $P = \tau_L$, $P_B = p_B$ and $P_L = p_L$, L's decision between a direct takeover and takeover activism is the same as in the baseline model (see Equation (4)). By steps $1 - 4$ of the proof of Proposition 1, there exists a unique equilibrium characterized by exactly the cutoff V_1^* from Proposition 1 and, indeed, $\mathbb{E}[V|\text{invite}] = \mathbb{E}[V|V \leq V_1^*] > 0$. □

Proof of Proposition 5

Suppose L issues a tender offer whenever $V \geq \overline{V}_1^*$ and sells her block to B otherwise. Given the conjectured equilibrium cutoff $\overline{V}_1^*$, the free-rider condition B faces becomes $\tau_B \geq \mathbb{E}[V|\tau_B, V \leq \overline{V}_1^*]$. If B has acquired the α-block, B's profits from a tender offer are $V - (1-\alpha)\tau_B$. Hence, for a fixed τ_B, B's payoff is monotonically increasing in V such that all and only types above some cutoff $\underline{V}_1^*$ conduct a tender offer. By credible off-equilibrium beliefs and the same arguments as in the proof of Proposition 1, $\tau_B = \mathbb{E}[V|V \in [\underline{V}_1^*, \overline{V}_1^*]]$. Denote $\Delta_B(\underline{V}_1^*) = \underline{V}_1^* - (1-\alpha)\mathbb{E}[V|V \in [\underline{V}_1^*, \overline{V}_1^*]] = 0$, then there is a unique $\underline{V}_1^* \in (0, \overline{V}_1^*)$ since $\Delta_B(0) < 0$, $\Delta_B(\overline{V}_1^*) > 0$ and $\Delta_B(\underline{V}_1^*)$ strictly increases by log concavity (because truncations preserve log-concavity).

Now consider L's initial decision. Since, by Proposition 1 (step 2), all L types conduct a takeover (block-sale) need to pool on the same τ_L (p_L). Further, because L's outside option of the block trade is 0, $p_B = 0$. Thus, L's payoff difference is $V - (1-\alpha)\tau_L - \alpha\rho p_L$ and, thus, is strictly increasing in V for fixed prices, verifying our conjecture that L's decision is characterized by a cutoff $\overline{V}_1^*$. By credible off-equilibrium beliefs, $p_L = \mathbb{E}[V\ \mathbb{1}_{V \in [[\underline{V}^*, \overline{V}_1^*)} | V \leq \overline{V}_1^*]$ which is B's expected profit from owning the block. L's cutoff $\overline{V}_1^*$ is the solution to her payoff difference from a tender offer and a block sale: $(1-\alpha)(\overline{V}_1^* - \mathbb{E}[V|V \geq \overline{V}_1^*]) + \alpha\overline{V}_1^* - \alpha\Big(\rho\mathbb{E}[V\ \mathbb{1}_{V \geq \underline{V}_1^*(\overline{V}_1^*)} | V \leq \overline{V}_1^*]\Big) = 0$. Note that $\underline{V}_1^*(\overline{V}_1^*)$ is a strictly increasing function in $\overline{V}_1^*$. As a result, by log-concavity, $\alpha[\overline{V}_1^* - \rho\mathbb{E}[V\ \mathbb{1}_{V \in [\underline{V}_1^*, \overline{V}_1^*)} | V \leq \overline{V}_1^*]]$ strictly increases in $\overline{V}_1^*$ such that, by the arguments in Proposition 1, there is a unique cutoff $\overline{V}_1^* \in (0,1)$ which concludes the proof. Last, $\overline{V}_1^* > V_0^* > \underline{V}_1^*$ follows by log-concavity and a simple comparison of the following (implicit) equations: $(1-\alpha)(\overline{V}_1^* - \mathbb{E}[V|V \geq \overline{V}_1^*]) + \alpha\overline{V}_1^* - \alpha\rho\mathbb{E}[V\ \mathbb{1}_{V \geq \underline{V}_1^*(\overline{V}_1^*)} | V \leq \overline{V}_1^*] = 0$, $(1-\alpha)(V_0^* - \mathbb{E}[V|V \geq V_0^*]) + \alpha V_0^* = 0$, and $(1-\alpha)(\underline{V}_1^* - \mathbb{E}[V|V \in [\underline{V}_1^*, \overline{V}_1^*)]) + \alpha\underline{V}_1^* = 0$. □

Proof of Proposition 6

Consider an outside bidder $i \in \{1, \ldots, n-1\}$. Her payoff difference between a takeover and selling the block to the next bidder is $(1-\alpha)(V - \tau_i) + \alpha V - \alpha[\rho p_i^{ask}]$. Hence, by monotonicity and because tender offer and block price will be type-independent by previous arguments from Proposition 1, i's decision can again be characterized by a cutoff V_i. For larger types, i opts for a tender offer, whereas she negotiates a block trade for lower ones. Given the cutoff structure, by credible off-equilibrium beliefs, $\tau_i = \mathbb{E}[V|V \in [\underline{V}_i, \underline{V}_{i-1})]$ and p_i^{ask} is the

expected value of the block to the next bidder $i+1$ whereas $p_{i+1}^{bid} = 0$ as i's outside option is 0.

Consider the last bidder n in the chain. Given that bidder n is offered the block by bidder $n-1$, she faces the same problem as L in Shleifer & Vishny (1986) with V distributed according to the truncation of F at V_{n-1}. Hence, n values the block at $\alpha\mathbb{E}[V\,\mathbb{1}_{V\in[V_n,V_{n-1})}\,|V \leq V_{n-1}]$ because she realizes a takeover if and only if V is larger than some cutoff $V_n \in (0, V_{n-1})$ at tender offer $\tau_i = \mathbb{E}[V|V \in [V_n, V_{n-1})]$ (by credible off-equilibrium beliefs). Bidder $n-1$ then, in turn, values the block offered to her by bidder $n-2$ at $\alpha\mathbb{E}[V\mathbb{1}_{V\in[V_{n-1},V_{n-2})}|V \leq V_{n-2}] + \rho\alpha\mathbb{E}[V\,\mathbb{1}_{V\in[V_n,V_{n-1})}\,|V \leq V_{n-2}]$. Hence, in the conjectured equilibrium, some arbitrary bidder $(i+1) \in \{1,\ldots,n-1\}$, who is offered the block by bidder i, values the block at

$$\alpha\mathbb{E}[V\mathbb{1}_{V\in[V_{i+1},V_i)}|V \leq V_i] + \rho\alpha\mathbb{E}[V\,\mathbb{1}_{V\in[V_{i+2},V_{i+1})}\,|V \leq V_i] + \rho^2\alpha\mathbb{E}[V\,\mathbb{1}_{V\in[V_{i+3},V_{i+2})}\,|V \leq V_i]$$
$$+\cdots+\alpha\rho^{n-1-i}\mathbb{E}[V\mathbb{1}_{V\in[V_{n-1},V_{n-2})}|V \leq V_i] = \sum_{j=i}^{n-1}\rho^{j-i}\,\mathbb{E}[V\,\mathbb{1}_{V\in[V_{j+1},V_j)}\,|V \leq V_i] \tag{15}$$

which is the maximal price i can ask L for such that, by credible off-equilibrium beliefs, $p_i^{ask} = \sum_{j=i}^{n-1}\rho^{j-i}\,\mathbb{E}[V\,\mathbb{1}_{V\in[V_{j+1},V_j)}\,|V \leq V_i]$. Hence, plugging in block prices and tender offers, the cutoffs are implicitly defined by

$$\begin{cases} (1-\alpha)(V_1 - \mathbb{E}[V|V \geq V_1]) + \alpha V_1 - \alpha\rho\sum_{j=1}^{n-1}\rho^{j-1}\,\mathbb{E}[V\,\mathbb{1}_{V\in[V_{j+1},V_j)}\,|V \leq V_1] = 0 \\ \vdots \\ (1-\alpha)(V_i - \mathbb{E}[V|V \in [V_i, V_{i-1}]]) + \alpha V_i - \alpha\rho\sum_{j=i}^{n-1}\rho^{j-i}\,\mathbb{E}[V\,\mathbb{1}_{V\in[V_{j+1},V_j)}\,|V \leq V_i] = 0 \\ \vdots \\ (1-\alpha)(V_n - \mathbb{E}[V|V \in [V_n, V_{n-1}]]) + \alpha V_n = 0. \end{cases}$$

By log concavity of $f(V)$ and the arguments of Proposition 1, each equation i has a unique solution $V_i \in (0,1)$ for a given vector of $(V_1,\ldots,V_{i-1},V_{i+1},\ldots,V_n) \in [0,1]^{n-1}$. We now argue that the system of n equations has a unique solution vector $(V_1, V_2, \ldots, V_n) \in (0,1)^n$. Consider the last of the n equations ($(1-\alpha)(V_n - \mathbb{E}[V|V \in [V_n, V_{n-1}]]) + \alpha V_n = 0$). By log-concavity of $f(V)$ and the arguments of Proposition 1, this equation has a unique, interior solution for any V_{n-1}. Then, by the same arguements, for any value of $V_{n-2} \in (0,1)$, the next to last equation $(n-1)$ has a unique, interior solution. Iterating forward, the first equation

has a unique solution given the boundary condition of $V_0 = 1$. Last, we need to establish that $1 > V_1 > V_2 > \cdots > V_n > 0$. Observe that for any $V_{n-1} \in (0,1)$, the last equation implies that $V_n = (1-\alpha)\mathbb{E}[V|V \in [V_n, V_{n-1}]] < V_{n-1}$. Again, iterating forward shows for any i that $V_i = (1-\alpha)\mathbb{E}[V|V \in [V_i, V_{i-1}]]) + \alpha\rho \sum_{j=i}^{n-1} \rho^{j-i}\, \mathbb{E}[V\ \mathbb{1}_{V\in[V_{j+1},V_j)}\ |V \leq V_i] < V_{i-1}$, which concludes the proof. $\square$

Proof of Proposition 7

We start by establishing that $\left(V_n\right)_{n\in\mathbb{N}}$ strictly decreases in n. Suppose this was not the case, then for some $n \in \mathbb{N}$ it has told that $V_n^n \leq V_{n+1}^{n+1}$, where the superscript ℓ in V_n^ℓ denotes the length of the bidder chain, whereas the subscript denotes, as before, the particular element. Because the cutoff for the last bidder in the chain is determined by $(1-\alpha)(V_n - \mathbb{E}[V|V \in [V_\ell^\ell, V_{\ell-1}^\ell]]) + \alpha V_\ell^\ell = 0$, where $V_n^n \leq V_{n+1}^{n+1}$ implies that $V_{n-1}^n \leq V_n^{n+1}$. Furthermore, because the next to last bidder in the chain is determined by $h_{\ell-1}^\ell \equiv (1-\alpha)(V_{\ell-1}^\ell - \mathbb{E}[V|V \in [V_{\ell-1}^\ell, V_{\ell-2}^\ell]]) + \alpha V_{\ell-1}^\ell - \alpha\rho\ \mathbb{E}[V\ \mathbb{1}_{V\in[V_\ell^\ell, V_{\ell-1}^\ell)}\ |V \leq V_{\ell-1}^\ell] = 0$, and because $h_{\ell-1}^\ell$ strictly increases in $V_{\ell-1}^\ell$ (by log-concavity) and strictly decreases in $V_{\ell-2}^\ell$, $\frac{\partial V_{\ell-1}^\ell}{\partial V_{\ell-2}^\ell} = -\frac{\frac{\partial h_{\ell-1}^\ell}{\partial V_{\ell-2}^\ell}}{\frac{\partial h_{\ell-1}^\ell}{\partial V_{\ell-1}^\ell}} > 0$ so that $V_{n-1}^n \leq V_n^{n+1}$ can only hold if $V_{n-2}^n \leq V_{n-1}^{n+1}$. Iterating forward yields that $V_1^n \leq V_2^{n+1}$ can only hold if $1 = V_0^n \leq V_1^{n+1}$ which yields a contradiction as $V_1^{n+1} < 1$ for all $\rho < 1$.

Because $\left(V_n\right)_{n\in\mathbb{N}}$ decreases monotonically in n and is bounded below by 0, it converges. On the way to a contradiction, suppose $\lim_{n\to\infty} V_n = b > 0$. Now consider the sequence of $\left(V_{n-1}\right)_{n\in\mathbb{N}}$ which also decreases monotonically in n and is bounded below by b so that it has to converge to some $B_1 \geq b$. If $\lim_{n\to\infty} V_{n-1} = b$, then $\lim_{n\to\infty} V_n = (1-\alpha)\mathbb{E}[V|V \in [V_n, b]] < b$ which yields a contradiction. Thus, it has to hold that $B_1 > b$. Now consider two sequences $\left(V_{n-k}\right)_{n\in\mathbb{N}}$ and $\left(V_{n-k-1}\right)_{n\in\mathbb{N}}$ for some arbitrary $k \in \{2, \ldots, n-2\}$. Both sequences decrease monotonically in n and are bounded below by b so that they have to converge to some $B_k > b$ and $B_{k-1} \geq B_k$, respectively. $|V_{n-k-1} - V_{n-k}|$ has to converge to zero as otherwise, in the limit, $\sum_{i=1}^{\infty} |V_{i-1} - V_i| > 1$ (we define $V_0 = 1$), yielding a contradiction. However, if

$\lim_{n\to\infty} V_{n-k} = \lim_{n\to\infty} V_{n-k-1} = B_k$, it follows that

$$\begin{aligned} V_{n-k} &= (1-\alpha)\mathbb{E}[V|V \in [V_{n-k}, V_{n-k-1}]] + \alpha\rho \sum_{j=i}^{n-1} \rho^{j-(n-k)}\ \mathbb{E}[V\ \mathbb{1}_{V\in[V_{j+1},V_j)}\ |V \leq V_{(n-k)}] \\ &< (1-\alpha)\mathbb{E}[V|V \in [V_{n-k}, V_{n-k-1}]] + \alpha\mathbb{E}[V|V \leq V_{(n-k-1)}] \overset{n\to\infty}{=} (1-\alpha)B_k + \alpha B_k < B_k \end{aligned}$$

which yields a contradiction so that we can conclude that $\lim_{n\to\infty} V_n = 0$. $\square$

A Online Appendix

A.1 Bidder Heterogenity

Suppose again that there are $n \geq 2$ potential outside bidders and one large shareholder L. We now add to the common value improvement $V \sim F[0,1]$ an idiosyncratic, bidder-specific component θ_i, privately observed by each outside bidder $i \in \{1, \ldots, n\}$. Due to her experience with the target company, V is still the large shareholder's private information. We assume that θ_i are independently (also from V) distributed according to some cdf $G[0,1]$. The bidder specific component may stem from the fact that, in contrast to L, the outside bidders are often non-financial bidders who have the potential to realize additional synergies or private equity funds with specific expertise. If invited, outside bidders again compete in a second price auction. By standard arguments, i's optimal bid is given by $b_i = \mathbb{E}[V|invite] + \theta_i$. Hence, L's choice between a tender offer and merger invitation becomes

$$\Delta(V^*, \mathcal{P}^*(V^*)) = V^* - (1-\alpha)\mathbb{E}[V|V \geq V^*] - \alpha\mathbb{E}[V|V \leq V^*] - \alpha\mathbb{E}[\theta_2^{(n)}], \tag{16}$$

where $\mathbb{E}[\theta_2^{(n)}]$ is the expected second order statistic of n independent draws from $G[0,1]$. Since $\mathbb{E}[\theta_2^{(n)}]$ is fixed from L's perspective, the cutoff structure of the equilibrium prevails.

Lemma 2. *When bidders are heterogeneous, the likelihood of takeover activism increases in the number of bidders.*

Proof. Let

$$\xi(n, V^*) := V^* - (1-\alpha)\mathbb{E}[V|V \geq V^*] - \alpha\mathbb{E}[V|V \leq V^*] - \alpha\mathbb{E}[\theta_2^{(n)}] = 0.$$

Because $\mathbb{E}[\theta_2^{(n)}]$ is independent of V and $\xi(n, V^*)$ strictly increases in V^* by log-concavity, there is an implicit function $V^*(n)$ such that $\frac{\partial V^*(n)}{\partial n} > 0$. Note that $\lim_{n\to\infty} \mathbb{E}[\theta_2^{(n)}] = 1$ such that $V^*(n = \infty) > 1$ since $\xi(\infty, 1) = \alpha(1 - \mathbb{E}[V] - 1) < 0$, and by log-concavity. By continuity, we can conclude that there is a $\overline{n} < \infty$ such that $V^* \geq 1$ for all $n \geq \overline{n}$ and no direct tender offers ever take place. □

Example. Suppose we a sample of 2 transactions, $F = G = \mathcal{U}[0,1]$, $\alpha = 0.1$. The first firm has one L and $n = 2$ outside bidders. One can easily see that in this case $V^* = 1$ and,

even for only 2 outside bidders, no direct tender offer ever occurs. The expected merger price P^*_{merger} is $\mathbb{E}[V] + \mathbb{E}[\theta_2^{(n)}] = 1$. The second firm has one L and no outside bidder. One can easily see that in this case $V^* = \frac{1-\alpha}{1+\alpha} = \frac{0.9}{1.1}$ such that tender offer is $P^* = \frac{1}{1.1} < 1$.

Hence, the tender offer is smaller than the expected merger price, i.e., $P* = \frac{1}{1.1} < 1 = P^*_{merger}$. Further, the expected increase in firm value is also larger for takeover activism since $\mathbb{E}[V|V \geq V^*] = \frac{1}{1.1} < 1$ is smaller than the expected value improvement for a merger is $\mathbb{E}[V] + \mathbb{E}[\theta_1^{(n)}] > 1$.

A.2 Expected Profits

Expected Profits as a function of n

- If $n \leq \overline{n}$, only Ls enter such that profits are given by $\mathbb{E}[\Pi^L(V)|V^* = V_0^*] > 0$ and are, thus, independent of n.

- If $n \in (\underline{n}, \overline{n})$ and Case I prevails, we know $n_L^* < 1$ and $n_B^* < 1$. Hence, profits are given by

$$\underbrace{\mathbb{E}[\Pi^L(V)|V^* = V_0^*] + n_B \left(\mathbb{E}[\Pi^L(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_0^*]\right)}_{L' \text{sexpected profit}} = \underbrace{n_L \, \mathbb{E}[\Pi^B(V)|V^* = V_1^*]}_{B' \text{sexpected profit}}$$

  Clearly, LHS is increasing in n_B and RHS is increasing in n_L. As n increases, either n_B or n_L needs to increase strictly. To keep indifference, both **L's and B's expected profit must increase.**

- For Case I, if $n \geq \overline{n}$, then, we know $n_L^* \geq 1$ and $n_B^* < 1$. Hence, profits are given by

$$\underbrace{\mathbb{E}[\Pi^L(V)|V^* = V_0^*] + n_B \left(\mathbb{E}[\Pi^L(V)|V^* = V_1^*] - \mathbb{E}[\Pi^L(V)|V^* = V_0^*]\right)}_{L' \text{sexpected profit}}$$
$$= \underbrace{\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}_{B' \text{sexpected profit}}$$

  Clearly, LHS is increasing in n_B and RHS is constant in n_L. To keep indifference, both **L's and B's expected profit must remain constant**. This also implies that only n_L can increase.

- Case II: n_B^* hits one first. If $n_L^* < 1$ still, entry profits are

$$\underbrace{\mathbb{E}[\Pi^L(V)|V^* = V_1^*] + n_B \ (\mathbb{E}[\Pi^L(V)|V^* = V_2^*] - \mathbb{E}[\Pi^L(V)|V^* = V_1^*])}_{L' \text{sexpected profit}}$$
$$= \underbrace{n_L(2 - n_B)\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}_{B' \text{sexpected profit}}$$

  As n increases, either n_B, or n_L (or both) must increase. If n_B increases, LHS increases which means that RHS also increases, which can only be accomplished through an increase in n_L. If n_L increases, RHS increases (for fixed) n_B such that n_B must increase as well so both sides increase. As a result, in either case, LHS and RHS increase such that both expected profits still increase.

- Case II: n_B^* hits one first. If $n_L^* \geq 1$ as well, entry profits are

$$\underbrace{\mathbb{E}[\Pi^L(V)|V^* = V_1^*] + n_B \ (\mathbb{E}[\Pi^L(V)|V^* = V_2^*] - \mathbb{E}[\Pi^L(V)|V^* = V_1^*])}_{L' \text{sexpected profit}}$$
$$= \underbrace{(2 - n_B)\mathbb{E}[\Pi^B(V)|V^* = V_1^*]}_{B' \text{sexpected profit}}$$

  Here, expected profits do not depend on n_L anymore. Further n_B is constant. Hence, profits are flat.