

*CARESS Working Paper 01-12*  
Takeovers, Freezeouts, and Risk Arbitrage

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**Abstract**

This paper develops a dynamic model of tender offers in which there is trading on the target's shares during the takeover, and bidders can freeze out target shareholders (compulsorily acquire remaining shares not tendered at the bid price), features that prevail on almost all takeovers. We show that trading allows for the entry of arbitrageurs with large blocks of shares who can hold out a freezeout—a threat that forces the bidder to offer a high preemptive bid. There is also a positive relationship between the takeover premium and arbitrageurs' accumulation of shares before the takeover announcement, and the less liquid the target stock, the stronger this relationship is. Moreover, freezeouts eliminate the free-rider problem, but front-end loaded bids, such as two-tiered and partial offers, do not benefit bidders because arbitrageurs can undo any potential benefit and eliminate the coerciveness of these offers. Similarly, the takeover premium is also largely unrelated to the bidder's ability to dilute the target's shareholders after the acquisition, also due to potential arbitrage activity.

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# I. Introduction

More than 90 percent of all tender offers in the U.S. and the U.K. are any-or-all offers immediately followed by a second-step freezeout merger in which the acquiror ends up with full ownership of the target. In a freezeout merger, untendered shares are compulsorily acquired at the tender offer price, once the minimum fraction of shares required to approve a freezeout merger, has been tendered.<sup>1</sup> Freezeout tender offers allow bidders to overcome the Grossman and Hart (1980) free-rider problem in takeovers by making an offer conditioned upon shareholders tendering the minimum fraction of shares required for a freezeout. Shareholders cannot free-ride, because if the offer is successful, the bidder will automatically own enough shares to compulsorily acquire the free-riders' shares.

In a static setting, using take-it-or-leave-it offers conditioned on a freezeout, a bidder is able to extract all the surplus from target shareholders, which is certainly contrary to the results of a vast empirical literature (e.g., Bradley, Desai, and Kim (1988)). The shortcoming of the static framework is that in practice bidders are not able to credibly commit to take-it-or-leave-it offers. This motivates us to study takeovers in a dynamic environment in which offers can be revised and/or extended over time, and there is trading in the target's shares during the takeover.

What is the outcome of a dynamic tender offer conditioned upon a freezeout when trading is allowed? We show that trading while the offer is open, allows arbitrageurs to accumulate blocks of shares, which give them the power to hold out the takeover, because the bidder is unable to obtain the necessary number of shares for a freezeout if blockholders do not tender their shares. Even though arbitrageurs and large shareholders are extremely interested in the success of a takeover, they can *credibly* delay their tendering decision until the bidder offers

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<sup>1</sup>In the U.K. and several other European countries, such as Sweden, the fraction required for a freezeout merger is equal to 90 percent of the shares. In the U.S., the required fraction depend both on state regulation and corporate charters. Before the Model Business Corporate Act of 1962, most states had a 2/3 supermajority requirement. After passage of the Act, most of the states, including Delaware, adopted a simple majority requirement. Some states, such as New York, Ohio, and Massachusetts, retained the 2/3 supermajority requirement. In addition, several U.S. firms—around 18 percent of the 1,500 large capitalization firms profiled by the Investor Responsibility Research Center in 1995—have amended their charters to include supermajority merger provisions. The data on the number of freezeout tender offers is from the Securities Data Company (SDC).

of shares that the bidder needs to acquire in the offer. Intuitively, the supply curve is upward sloping because the greater is the number of shares demanded by the bidder, the larger is the number of shareholders who can form hold-out blocks. Moreover, when there is a large number of arbitrageurs with hold-out power, they can credibly demand a larger share of the takeover gains in exchange for tendering their shares, which imply that the supply curve is upward sloping (see also Stulz (1988), Stulz, Walkling, and Song (1990), and Burkart, Gromb, and Panunzi (1998)).

Moreover, there is a positive relationship between the equilibrium takeover premium and arbitrageurs' accumulation of shares *before* the tender offer. Although arbitrageurs can enter after the announcement of the offer, their entry at this stage is uncertain and happens with probability less than one. Therefore, the more arbitrageurs are present at the announcement, the more hold-out power shareholders have to force a higher premium. Furthermore, this relationship is weaker the more liquid the stock is, because it is then more likely that new arbitrage blocks can be formed during the tender offer. Consistent with the implications of the model, Jindra and Walkling (1999) find that there exists a positive and significant relationship between arbitrage activity before the announcement of the offer (proxied by a measure of abnormal trading volume) and the takeover premium.

The model also predicts that there should be a positive relationship between arbitrage activity *after* the announcement of the offer and revisions in the bid measured by the ratio of the closing and opening bid.<sup>2</sup> Larcker and Lys (1987) provide evidence that in several transactions where arbitrageurs accumulated over five percent of the shares after the announcement of the offer, the takeover premium increased by more than 9 percent. This evidence is consistent with our interpretation that arbitrageurs use their power to hold out the transaction in order to force the bidder to increase the takeover premium.

Another contribution of this paper is to develop a comprehensive characterization of the structure of tender offers. Tender offers are composed of a mix of strategic elements that usually appear prominently in the front page of virtually every offer of purchase: the bid price, the maximum number of shares sought in the offer, the acceptance condition, as well

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<sup>2</sup>Franks and Harris (1989) report that offers are revised in over 9 percent of the uncontested (single-bidder) takeovers in the U.K.

shareholders enjoy a very weak level of protection. A bidder can only takeover the target with a bid price *greater* than the price at which a majority of shareholders are willing to tender. Since corporate charters may require less shares for acquisition of control than for a freezeout merger, the takeover premium may be somewhat lower when the bidder can considerably dilute shareholders post-acquisition, because of the somewhat reduced hold-out power of shareholders—the upward-sloping supply curve relation. Interestingly, though, whenever the charter specifies a similar fraction of shares for a freezeout merger and acquisition of control, which is, for example, common for firms incorporated in Delaware, then the takeover premium should not depend at all on the level of dilution. Therefore, the model provides a novel relationship between the takeover premium and the level of dilution, that is in contrast with other takeover models with dilution in the literature, such as Grossman and Hart (1980) and Burkart, Gromb, and Panunzi (1998).

The remainder of the paper is organized as follows. Section II describes the model. Section III solves for the equilibrium of the dynamic tender offer game with trading and analyzes the role of arbitrageurs and large shareholders in takeovers. Section IV characterizes the structure of tender offers. Section V discusses the empirical implications of the model, and the conclusion follows. The appendix contains the proofs of propositions.

## II. The Tender Offer Model

We first describe the takeover laws that lay out the rules of the game, and motivate the dynamic tender offer game with trading that is proposed next.

### A. Takeover Laws: the Rules of the Game

In the U.S., takeovers are regulated by the Williams Act, enacted into federal law in July 1968, and also regulated by corporate laws that are under state jurisdiction. The purpose of the Williams Act is to provide target shareholders full and fair disclosure of information and sufficient time to evaluate and act upon the information. In the U.K., the Takeover Panel, created in March 1968, is the regulatory body that administers the City Code on Takeovers and Mergers. Similar to the Williams Act, the Code was designed to ensure good business

rights and receive a value appraised by the courts for their shares.<sup>9</sup> We will see that the ability to conduct a second-step freezeout merger is a powerful mechanism for discouraging free-riding and influences the price paid during the tender offer and the response of shareholders to the tender offer.

We will refer to the percentage of votes required to approve the second-step merger as the freezeout parameter  $f$  throughout the paper. In the U.K. and several other European countries, such as Sweden, the fraction required for a freezeout merger is equal to 90 percent. In the U.S., however, the fraction of shares required for a freezeout varies significantly among states and has undergone several changes. Before 1962, the great majority of states in the U.S. had a  $2/3$  supermajority requirement. The Model Business Corporate Act of 1962 reduced the percentage required to a simple majority. In 1967, Delaware adopted the simple majority provision, and other major states, such as California, Michigan and New Jersey, followed suit. However, several large states, such as New York, Ohio, and Massachusetts, still maintain the  $2/3$  supermajority requirement. Notice also that several firms incorporated in states with a simple majority requirement, such as Delaware, have amended their charters, adopting supermajority merger provisions. Indeed, 267, or 18 percent, of the 1,500 large capitalization companies profiled by the Investor Responsibility Research Center in 1995, had adopted supermajority merger requirements (ranging from  $2/3$  to 80 percent of the shares).

The other important parameter for our model is the minimum fraction of shares the bidder needs to obtain in the tender offer to gain control of the target—the control acquisition parameter  $k$ . In the U.K., all bids must be conditional upon the bidder's acquiring, pursuant to the offer, over 50 percent of the voting share capital.<sup>10</sup> Although in the U.S., there is no such rule, all offers considered in the paper will be conditional upon the bidder acquiring at least 50 percent of the shares. Unconditional offers, though, are not allowed in our framework.<sup>11</sup> However, the bidder may well choose to condition the tender offers upon a

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<sup>9</sup>This valuation is based on the fair value of the shares exclusive of the gains in value created by the bidder. Corporations and state corporate laws also commonly have fair price provisions that require the same price be paid to shareholders in both the tender offer and the second-step merger transaction. We will address the effect of such fair price provisions in the paper.

<sup>10</sup>Rule 21 of the Code (see Johnston (1980)).

<sup>11</sup>This is without much loss of generality because truly unconditional offers are very uncommon. A bidder

is able to hold out or veto the success of an offer conditioned on  $f$  shares by not tendering his shares, even if all the other shareholders decide to tender (excluding the  $\alpha$  shares that, by definition, are not tendered). Large shareholders with blocks of size  $\beta$  will be called *arbitrageurs*, and such blocks can be formed as a result of trading activity either before the tender offer is announced, perhaps based on insider information, or during the tender offer, as described next.

The *tender offer game* is an infinite horizon repeated game with three stages at each period. Every period starts with the *offering stage*, in which an offer is proposed. Shareholders then play the *tendering game*, in which they choose to tender, simultaneously, a fraction of their shares. The takeover succeeds if the fraction of shares tendered is  $T \geq f$  (because the offer was conditioned upon  $f$  shares being tendered) If the takeover does not succeed then there is a delay of  $\Delta t$  units of time, and during this period a *trading session* takes place. The same three-stage game is repeated until the takeover succeeds.<sup>14</sup>

The extensive form of the game is described next.

**Offering stage:** Say that at the beginning of the offering stage, there are  $n$  arbitrageurs (or large shareholders) with at a stake of at least  $\beta = 1 - f - \alpha$  shares. Each arbitrageur has the power to hold out the takeover if any one of them refuses to tender his block of shares, given that an exogenous fraction of shares  $\alpha$  is not tendered. At the beginning of the offering stage, the bidder and the  $n$  arbitrageurs with veto power are chosen at random with equal probability  $\frac{1}{n+1}$  to propose an offer (they are chosen with equal probability because each one of them have equal bargaining power).<sup>15</sup> Let the bidder's offer be  $p = p_B$  and the arbitrageurs' offer be  $p = p_A$ .<sup>16</sup> After the bidder proposes an offer, shareholders play the tendering game, in which they decide whether to accept or reject the bidder's offer. If shareholders accept the offer in the tendering game, the takeover succeeds, and if they reject, there is a delay of  $\Delta t$ , and during this period there is a trading session. Similarly, after an arbitrageur proposes an offer, the bidder either accepts or rejects his offer. If the bidder

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<sup>14</sup>The ability of acquirors to change the offer over time motivates the use of a dynamic game. Also, provisions that regulate the minimum duration of the offer and its revisions, give shareholders time to trade before the expiration of the offer.

<sup>15</sup>This is similar to several other bargaining models, such as Gul (1989), Hart and Mas-Colell (1996).

<sup>16</sup>The rules that ensure equal treatment of shareholders eliminate the possibility of any price discrimination during the offer; therefore, all offers are extended to all shareholders.

starting with the new ownership structure that resulted from the previous trading session.

All players in the model are assumed risk-neutral and have a cost of capital  $r$ .<sup>18</sup> Therefore, they discount payoffs by  $\delta = e^{-r\Delta t} < 1$  after an offer is rejected, and there is a delay of  $\Delta t$ . If the takeover never succeeds, the payoffs of all players are zero (the status quo payoff). If the takeover succeeds at period  $t$  with an offer equal to  $p$  and a total of  $T$  shares is tendered, the payoffs are as follows: If the bidder freezes out shareholders, then his payoff is equal to  $\delta^{t-1}(1-p)$ ; if he does not freeze out, his payoff is equal to  $\delta^{t-1}T(1-p)$ . The payoff of a shareholder who tenders  $t$  shares and keeps  $(1-t)$  shares is equal to  $\delta^{t-1}p$  if there is a freezeout, or otherwise is equal to  $\delta^{t-1}[pt + (1-t)]$ .<sup>19</sup>

Our goal is to characterize the equilibrium of the game. The equilibrium concept used is stationary subgame perfect Nash equilibrium (SPE) where the number of arbitrageurs owning blocks of shares are the states.

### III. Tender Offers and Arbitrage

In this section, we start the analysis of *any-or-all offers* conditioned upon  $f$  shares being tendered with an immediate second-step freezeout, which is the most commonly used type of offer. By definition, these offers specify no maximum and accept all shares tendered, or none if a minimum of  $f$  shares are not tendered. Also, the bidder is committed to obtain promptly all untendered shares in a follow up freezeout merger, paying shareholders who did not tender the same consideration paid to shareholders who tendered.

Freezeouts tender offers are a powerful tool that bidders can use in a takeover. If the bidder could credibly make a take-it-or-leave-it bid conditioned on a freezeout, then such a bid would not only eliminate the free-rider problem, but also allow the bidder to extract all the surplus from shareholders.

For example, consider the static setup used in Grossman and Hart (1980), where a bidder

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<sup>18</sup>We assume in the model that arbitrageurs and bidders have the same cost of capital. The model can easily be changed to accommodate the case in which arbitrageurs have a higher cost of borrowing than the bidder.

<sup>19</sup>Note that, unlike Harrington and Prokop (1993), all shares tendered are purchased at the final bid price  $p$ , including shares that may have been tendered early on, before an increase in the bid price. This is in accordance with Rule 14d-10 in the U.S., and Rule 22 in the U.K.

with shareholders and offers can be revised and/or extended over time until accepted by shareholders.

## A. The Dynamics of Tender Offers

What is the outcome of the dynamic tender offer game? We will show that in equilibrium, shareholders will trade their shares in order to concentrate the ownership structure in the hands of arbitrageurs with the ability to hold out the tender offer. This more concentrated ownership structure allows target shareholders to leverage their rights and increase their bargaining power vis á vis the bidder, forcing the bidder to increase the takeover premium despite his freezeout rights.

Consider that the bidder makes an offer conditioned upon  $f$  shares being tendered. Shareholders who alone (or as group) own at least a fraction  $1 - f$  of the shares have the ability to veto the takeover when individually (or acting in a cooperative or concerted manner) they strategically do not tender into the offer. We refer to those shareholders as arbitrageurs. Observe that even though arbitrageurs with veto power are extremely interested that the takeover succeed, they can strategically delay their tendering decision until the bidder gives them a commensurate share of the takeover gains. To be sure, when the offer is announced there might not be any arbitrageur owning target shares, as all shares might be owed by dispersed shareholders and/or by other passive shareholders (e.g., some types of institutional investors). However, trading while the offer is open, allows the ownership of shares to switch to new shareholders who are active and strategic.

Notice that because some shareholders, for some exogenous reasons, might not tender their shares into the offer, the number of shares that are needed by arbitrageurs to give them hold out power is only  $\beta = 1 - \alpha - f$ , where  $\alpha$  is the fraction of shares that are not tendered. Therefore, the total number of arbitrageurs with veto power can be any integer  $n$  smaller than or equal to the maximum feasible number of blocks of size  $\beta$  that can be formed, which is equal to

$$n_f = \left\lfloor \frac{1 - \alpha}{1 - \alpha - f} \right\rfloor, \quad (2)$$



(1985) can provide camouflage that enables arbitrageurs to profit by trading in the target shares and to accumulate blocks of shares, despite the fact that all information about the tender offer is publicly known to all market participants.

Costly arbitrage activity can occur in our setting, even though arbitrageurs have no ex-ante inside information, in the same way that there can be arbitrage activity in Cornelli and Li (1998): the knowledge of the arbitrageurs' own presence gives them an endogenous informational advantage that can lead to trade with other shareholders (see also Maug (1998)). We extend the analysis of Cornelli and Li (1998) and Kyle and Vila (1991) to a dynamic trading model, such as Kyle (1985), in which there are several arbitrageurs trading blocks of shares during the tender offer.

Our next result shows that the following strategy profile is a competitive Nash equilibrium of the trading game: one arbitrageur places an order to buy a block of  $\beta$  shares with probability  $\phi$  equal to

$$\phi = \left( 1 - \frac{2c}{\pi [p(n+1) - p(n)]} \right)^+ \quad (3)$$

and with probability  $(1 - \phi)$  does not buy any shares—where  $x^+ = \max(0, x)$  and

$$\pi = P(\tilde{\varepsilon} = \beta); \quad (4)$$

other arbitrageurs do not trade any shares; investors/shareholders' demand for shares is equal to  $P(y)$ , a function of the order flow  $y$ , satisfying:  $P(0) = p(n) + c$ ,  $P(\beta) = \phi p(n+1) + (1 - \phi)p(n) + c$  and  $P(2\beta) = p(n+1) + c$ .

Therefore if trading costs are small,  $2c < \pi [p(n+1) - p(n)]$ , the number of arbitrageurs increases to  $n+1$  with probability  $\phi > 0$  and remains equal to  $n$  with probability  $1 - \phi$ . If trading costs are large,  $2c \geq \pi [p(n+1) - p(n)]$ , then  $\phi = 0$ , and the number of arbitrageurs remains equal to  $n$  with probability 1. Notice also that the probability of entry  $\phi$  is non-increasing in the trading costs  $c$  and converges to 1 as trading costs approach zero.

The demand schedule of traders is such that shares are priced competitively and efficiently, given the information about the order flow and given their knowledge of the equilibrium strategies used by arbitrageurs. So, for example, when the order flow is  $y = 0$ , traders know for sure that no arbitrageurs are buying blocks, and thus shares are worth  $p(n)$ , and

### C. The Stationary Perfect Equilibrium

We will obtain the stationary perfect equilibrium by investigating the conditions imposed by stationarity and subgame perfectness on the equilibrium strategies. What are the conditions that must be satisfied by a stationary perfect equilibrium?

The analysis of the *trading game* revealed that there is a Nash equilibrium of the trading game in which the number of arbitrage blocks increases to  $n + 1$  with probability  $\phi(n)$  and remains equal to  $n$  with probability  $1 - \phi(n)$ , where

$$\phi(n) = \left(1 - \frac{2c}{\pi[p(n+1) - p(n)]}\right)^+ . \quad (6)$$

The expected value of shares before the trading session is then  $\phi(n)p(n+1) + (1 - \phi(n))p(n)$ , because shares are worth  $p(n+1)$  if a new arbitrageur enters, and  $p(n)$  otherwise.

At the *tendering stage* shareholders, including dispersed and large shareholders, tender all their shares if and only if the offer is greater than or equal to

$$p_B(n) = \delta [\phi(n)p(n+1) + (1 - \phi(n))p(n)] , \quad (7)$$

because if the takeover fails, there is a delay of  $\Delta t$ , where  $\delta = e^{-r\Delta t}$ , after which there is a trading session in which the expected value of shares is  $\phi(n)p(n+1) + (1 - \phi(n))p(n)$ . Observe that because the offer is conditioned on a freezeout, shareholders do not take into account the possibility of free-riding when deciding whether or not to tender their shares. Similarly, the bidder accepts the arbitrageurs' offer if and only if it is lower than or equal to  $p_A(n)$  given by

$$1 - p_A(n) = \delta [\phi(n)(1 - p(n+1)) + (1 - \phi(n))(1 - p(n))] , \quad (8)$$

because if the offer is rejected, there is a delay of  $\Delta t$ , after which the bidder gets  $(1 - p(n+1))$  if a new arbitrageur enters or  $(1 - p(n))$  if he does not.

At the *offering stage*, the bidder's optimal offer is  $p_B(n)$  equal to the minimum that shareholders are willing to accept, and the arbitrageurs' optimal offer is  $p_A(n)$  equal to the maximum that the bidder is willing to accept. The stock price  $p(n)$  at the beginning of the offering stage must then satisfy

$$p(n) = \frac{np_A(n) + p_B(n)}{n+1} , \quad (9)$$

Notice that for  $n \geq \underline{n}$ , shares are worth  $p(n) = v(n)$ , and the marginal gain associated with the entry of a new arbitrageur is a decreasing function of the number of arbitrageurs. The value  $\underline{n}$  is obtained as the minimum  $n$  such that it is *not* profitable for a new arbitrageur to enter, which is equivalent to  $2c = \pi [v(\underline{n} + 1) - v(\underline{n})] = \frac{1}{\underline{n}(\underline{n}+1)}$ . When the number of arbitrageurs is smaller than  $\underline{n}$ , then arbitrageurs can profitably enter. The possibility of arbitrageurs entering drives the stock price to  $p(n) = \delta (p(n+1) - \frac{2c}{\pi}) + (1 - \delta) v(n)$ , which is higher than the price if no new arbitrageur entered (equal to  $v(n)$ ).

We prove in the following proposition that the following strategy profile is an SPE equilibrium. Consider any subgame starting with  $n$  arbitrageurs: (i) At the *offering stage*, the bidder makes an offer  $p_B(n)$  conditioned on  $f$  shares when it is his turn to propose, and shareholders with  $\beta$  or more shares offer  $p_A(n)$  when it is their turn to propose. (ii) At the *tendering stage*, shareholders, including dispersed and large shareholders, tender all their shares if the offer is greater than or equal to  $p_B(n)$ , and do not tender any shares otherwise. Also, the bidder's response to an arbitrageur's offer is to accept any offer of arbitrageurs lower than or equal to  $p_A(n)$  and to reject any offer above  $p_A(n)$ . (iii) At the *trading session*, one arbitrageur with no blocks places orders to buy blocks of  $\beta$  shares with probability  $\phi(n)$  and does not buy any shares with probability  $1 - \phi(n)$ ; all other arbitrageurs do not trade any shares, and investors' demand schedule is equal to  $P_n(y)$ .

These results are proved in the following proposition.

**Proposition 2** (*Takeovers and arbitrage with freezeouts*) *Let the cost of trading per share be equal to  $c > 0$ , and noise traders' demand for shares be  $\tilde{\varepsilon}$  equal to  $\beta$  shares with positive probability  $\pi$ , and zero otherwise. Let  $\underline{n}$  and  $v(n)$  be given by expressions (10) and (12). Then there exists a stationary perfect equilibrium in which an any-or-all offer conditioned upon  $f$  shares being tendered with a second-step freezeout succeeds with probability 1. Furthermore, for  $\delta$  arbitrarily close to 1, the equilibrium bid price depends on the number of arbitrageurs  $n$  at the announcement of the offer as follows:*

- (i) *If  $n \geq \underline{n}$ , the equilibrium bid is  $p(n) = v(n)$ , where  $v(n)$  is increasing in  $n$ .*
- (ii) *If  $n < \underline{n}$ , the equilibrium bid is  $p(n) = p(\underline{n}) + [n - \underline{n}] \frac{2c}{\pi} > v(n)$ , increasing in the number  $n$  of arbitrageurs.*

*Therefore, insider trading activity before the announcement of the tender offer drives up the*

threat of entry is strong enough to make the bidder pay a high preemptive bid.<sup>21</sup>

Consistent with the implications of the model, Jindra and Walkling (1999) find that there exists a positive and significant relationship between arbitrage activity before the announcement of the offer (proxied by a measure of abnormal trading volume) and the takeover premium. Furthermore, Larcker and Lys (1987) have some evidence that seems to support that there is a positive relationship between arbitrage activity after the announcement of the offer and revisions in the bid. They show that arbitrageurs often accumulate shares after the announcement of the offer, and that in transactions where arbitrageurs enter, the takeover premium increases. We postpone a more detailed discussion of the empirical evidence related to takeovers and arbitrage until Section V.

## D. The Supply Curve of Shares

We have so far restricted our attention to cases where the acceptance condition is equal to the freezeout parameter. However, the bidder could have chosen to make an offer conditioned on getting majority control and not an offer conditioned on a freezeout, which is in general a more stringent condition when there is a supermajority merger requirement.

However, we show that whenever the tender offer is conditioned on a fraction lower than the freezeout requirement, shareholders take into account the possibility of free-riding when deciding whether to tender their shares, and the bidder can only profit on gains in his toehold. As Harrington and Prokop (1993) showed, the free-rider problem of Grossman and Hart (1980) is even more pronounced in the dynamic case than in the static one. In a dynamic setting, it becomes even harder to convince shareholders to tender, because they know that if the offer fails in the current period, it can be extended for an additional period, and if the offer succeeds, they gain more by not tendering their shares. The results of Harrington and Prokop also hold for the game considered here: if the corporation has a large number of shares traded, the bidder can only profit on gains in his toehold when not using offers conditioned on a freezeout (see also Persons (1998)).

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<sup>21</sup>The existence of unsuccessful takeovers can be reconciled with a model in which there is some exogenous variable that influences the success of the offer. Also, a model of bargaining with incomplete information about valuations allows for the possibility of delays in the takeover and entry of arbitrageurs in equilibrium.

the introduction of the freezeout laws in 1985, the freezeout parameter was  $2/3$ , and likewise for Delaware before 1967. According to our previous results, shareholders have  $\frac{3}{4}$  of the bargaining power. Therefore, the equilibrium bid is  $\frac{3}{4}$  of the total takeover gains, and the bidder's profit is  $\frac{1}{4}$  of the gains. In Delaware after 1967, a simple majority of the votes was required for a freezeout; there can be two blockholders with veto power, with a stake of 40 percent, the tender offer price is  $\frac{2}{3}$ , and the bidder's profits is  $\frac{1}{3}$  of the takeover gains.

The examples above illustrate that with freezeout parameter values prevailing in the U.S., the model generates a distribution of gains between bidder and target shareholders, that is skewed toward the target (see also Bergstrom et al. (1993)), despite the fact that we assumed that there is no competition for the target (bidders' profits in contested offers are, obviously, likely to be lower than without competition).<sup>23</sup>

## IV. The Structure of Tender Offers

In this section, we analyze the structure of tender offers chosen by bidders. So far, we have restricted our attention to any-or-all bids with an immediate second-step freezeout merger in which the consideration paid to shareholders who are frozen out, is equal to the bid price. Can the bidder benefit from using front-end loaded bids such as two-tier or partial offers? What is the outcome of takeovers in which the bidder can dilute target shareholders post-acquisition? What if the bidder is not able to commit to the acceptance condition? Our goal is to understand what determines the *joint* choice of the most important strategic elements of a tender offer: the bid price, the maximum number of shares sought in the offer, the acceptance condition, as well as the choice of whether or not to undertake a second-step merger.<sup>24</sup> The analysis yields a novel characterization of the structure of tender offers with several surprising results that are consistent with existing empirical findings.

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<sup>23</sup>Bradley, Desai, and Kim (1988) suggest that bidders' profits are on average only 10 percent of total synergy gains. Their estimate include contested offers, which occur in approximately 29 percent of the cases. Also, Roll (1986) proposes that many acquirors exhibit irrational behavior and overpay and/or overestimate the value of targets, and many acquirors overpay for acquisitions motivated by empire building (see Jensen (1986)).

<sup>24</sup>These four features are the ones that usually appear conspicuously in the front page of offers to purchase in the U.S. and U.K.

(1980) and Burkart, Gromb, and Panunzi (1998).

### A. Commitment to the Acceptance Condition

So far, we have seen that offers with a minimum tender condition equal to  $f$  can be an effective way to address the free-rider problem. We have, though, always assumed that the bidder was able to commit to the acceptance condition. This commitment means that even if slightly less than  $f$  shares were tendered in an offer, the bidder would not be allowed to waive the minimum condition and accept the tendered shares for payment. Nevertheless, Holmstrom and Nalebuf (1992) have argued that conditional offers might not be a credible way to solve the free-rider problem, if the bidder were not able to credibly commit to the acceptance condition. The equilibrium where all shareholders tender in an any-or-all offer with an acceptance condition equal to  $f$ , could unravel if the bidder could not commit to the conditionality of the offer: a dispersed shareholder might not tender if he believes that the bidder would take over anyway, even if less than  $f$  shares were tendered, because he would be better off keeping his shares in this event, and he would not be worse off if the bidder obtained more than  $f$  shares and immediately followed up with a freezeout of shareholders who did not tender at the same bid price.

Would any-or-all offers conditioned on a freezeout unravel without the ability to commit to the acceptance condition? Possibly taking into account the importance of the acceptance condition, the SEC in the U.S., and the Takeover Panel in the U.K. have created rules that allow bidders to credibly commit to it.<sup>25</sup> For example, the SEC interprets the waiver of an acceptance condition near the end of a tender offer as a material change in the terms of the offer, that requires further extension of the offer for at least 5 business days after the waiver. While the commitment rules of the SEC and the Takeover Panel address the problem raised by Holmstrom and Nalebuf (1992) they raise another interesting question. How critical is the rule that allows bidders to commit to the acceptance condition?

Somewhat surprisingly, we show that this rule is not necessary for the success of any-or-all freezeout offers, and the outcome is unchanged with or without the rule. Therefore, the issue

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<sup>25</sup>See SEC Rel. No. 34-23421, CCH Fed. Sec. L. Rep. ¶84,016. See Johnston (1980) for similar rules in the U.K.

the bid is conditioned upon a minimum of  $f$  shares being tendered, and the tender offer is followed up by a second-step freezeout merger in which the remaining shares are taken-up at a lower back-end price.<sup>26</sup> The relevant price for shareholders in a two-tier offer is the blended price, which is the weighted average of the price paid in the front-end and the back-end where the weight is the fraction of shares receiving each price.

The potential strategic benefit of two-tiered offers, inducing shareholders to tender and solving the free-rider problem, is straightforward. However, two-tiered offers are controversial, because they not only solve the free-rider problem, but also have the potential to coerce shareholders to tender even if they do not want to. Two-tiered offers can create a stampede of dispersed shareholders tendering their shares, because they will be concerned about receiving the lower back-end price if they do not tender, and the offer is successful. Can a two-tiered offer really coerce shareholders to tender their shares?

This line of reasoning neglects the potential for arbitrageurs to profit from eliminating the coerciveness of the offer. Intuitively, if a two-tiered offer with a low blended price is going to be accepted anyway, because shareholders will be forced to tender, then the stock price should reflect that and should therefore be very close to the blended price. Arbitrageurs could then buy shares in the open market at the blended price, accumulating large stakes. As we have argued before, as long as arbitrageurs accumulate at least a block  $\beta$ , they can prevent the bidder from freezing out shareholders at the back-end price, even if all other dispersed shareholders are coerced to tender their shares. Arbitrageurs will then use their power to hold out the two-tiered offer in order to demand from the bidder a higher blended price that reflects their fair share of the takeover gains. We show that, regardless of whether the bidder uses a two-tiered or an any-or-all offer the outcome of the takeovers is the same.

**Proposition 5** (*Two-tiered offers*) *There is no additional strategic benefit for the bidder in using two-tiered offers rather than using any-or-all offers with freezeouts. The equilibrium blended price when the bidder uses two-tiered offers is the same as the equilibrium bid when the bidder uses any-or-all offers with freezeouts. In equilibrium, arbitrageurs protect share-*

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<sup>26</sup>In order for a two-tiered offer to be effective, in the takeover with no dilution case, it is necessary that the minimum tender condition is equal to  $f$ , which in many cases, when  $k = f$ , is identical to conditioning upon obtaining a majority of the shares.

introduced by the acquiror, and therefore the stock price post-acquisition is equal to  $1 - d$ . The acquiror's payoff, given that he purchases a total of  $T$  shares at a bid price  $p$ , is  $T(1 - d - p) + d$ , equal to the security benefits of  $T$  shares owned by the bidder, plus his private benefits  $d$ , subtracted from the cost of acquiring  $T$  shares.

According to Grossman and Hart (1980), the equilibrium takeover bid would be equal to the post-takeover value with dilution,  $p = 1 - d$ , and bidders would be able to profit in a takeover even though they did not own any previous stake in the target. This offer could be structured either as an any-or-all offer or a partial offer conditioned only upon the bidder's obtaining at least a majority  $k$  of shares. Interestingly though, this need not be the equilibrium if the bidder is able to freezeout shareholders. Suppose, for example, that target shareholders enjoy a good enough level of protection against dilution, such that  $d < 1 - p(f)$ , where  $p(f)$  is given by equation (15). As we have seen before,  $p(f)$  is the expression of the bid price at which the bidder could acquire the target with an any-or-all offer conditioned on a second-step freezeout. Then, since  $p(f) > 1 - d$ , it is in the bidder's best interest to acquire the target with a freezeout offer, rather than a bid  $1 - d$  that is not conditioned upon at least  $f$  shares being tendered. Consequently, for low levels of dilution, the bid is determined not by the precise amount that can be diluted, but rather by the supermajority requirement for a freezeout merger.

Surprisingly, even if target shareholders do not enjoy much protection against dilution by a controlling shareholder, the takeover premium is not reduced beyond a certain lower bound. Suppose, for example, that the bidder can dilute the target shareholders post-acquisition by more than  $d > 1 - p(k)$ , where  $p(k)$  is given by equation (15) with the majority fraction  $k$  replacing  $f$ . Of course, in this case, the equilibrium bid under Grossman and Hart (1980) is equal to  $1 - d < p(k)$ . However, in our model, the bidder would not be able to take over the target with a bid lower than  $p(k)$ . In equilibrium, the bidder makes an any-or-all bid  $p(k)$ , conditional only upon the acquisition of control. Intuitively, the bid must be at least equal to  $p(k)$  because it would otherwise not receive the necessary minimum number of shares  $k$ . Arbitrageurs with a stake of size  $1 - k - \alpha$  can block the bidder from acquiring a controlling stake  $k$ . As we have seen before, these shareholders have veto power and can extract from the bidder an offer price of at least  $p(k)$ . Even though the bidder is able to



control, is equal to  $[p(f) - p(k)]$ , because target shareholders receive a minimum fraction equal to  $p(k)$  of the total economic gains generated by the takeover, regardless of their level of protection in the post-acquisition stage. Note that, if both the freezeout and control acquisition parameters are the same ( $k = f$ ), as is common, for example, for most companies incorporated in Delaware, then the takeover premium is completely independent of the level of dilution.

We believe that one important empirical implication of our model is that there should not be a very significant relationship between the takeover premium and the level of dilution post-acquisition of the target. This implication is substantially different than other takeover models with dilution in the literature, such as Grossman and Hart (1980), Burkart et al. (1998), and Bebchuk (1989).

The following example illustrates an application of the result. Consider a hostile acquisition of a target with freezeout parameter equal to  $2/3$ , control acquisition parameter equal to 50 percent, and insider owning  $\alpha = 10\%$ . As we have seen before,  $p(f) = \frac{3}{4}$ , and  $p(k) = \frac{2}{3}$ . Thus, if the dilution level is less than 25 percent, then a bidder would not obtain any extra profits from diluting shareholders, and the takeover bid would be at  $p(f) = \frac{3}{4}$ , conditioned upon  $f$  shares with a second-step freezeout. For dilution levels  $d$  between 25 and 33 percent, the bidder can obtain extra profit equal to  $d - 0.25$  because of his ability to dilute  $d$ . For even higher levels of dilution, the bid price is fixed at the lower bound  $p(k) = \frac{2}{3}$ , and offers are conditioned upon only  $k$  shares, and thus the most extra profit that the bidder can obtain from his ability to dilute target shareholders, is equal to 8 percent. For markets such as the U.S., where the evidence shows that the minority shareholders enjoy significant levels of protection, the ability to dilute is not likely to play a major role.<sup>27</sup>

Nevertheless, for many other markets around the world, the ability to dilute may play a role in takeovers. In the U.K., for example, even though the freezeout parameter is 90 percent, the ability of bidders to dilute the target post-acquisition after acquiring only 50 percent of the shares may help them succeed with a lower premium. For example, if the freezeout parameter is 90 percent, insiders with  $\alpha = 10\%$  can thwart a hostile bidder from

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<sup>27</sup>For example, Barclay and Holderness (1989) suggest that large controlling blocks can get, on average, only 5% in private benefits.

**Proposition 7** (*Synergistic Takeovers*) *Suppose that the gains from the takeover can only be created if there is a merger of target and bidder, but not if the target is managed as a separate firm. Then the equilibrium bid is at  $p(f)$ , and the bid is structured as an any-or-all offer conditioned upon  $f$  shares being tendered with a second-step freezeout.*

This is a case often neglected in studies of takeovers; however, we believe it has empirical relevance. The result also yields some testable cross-sectional implications. For example, whenever the takeover is of a synergistic type, and there is a supermajority merger requirement (such as 90 percent of the shares in the U.K.), we would expect the bidder to pay a higher premium compared to a takeover in which the bidder can dilute the target significantly, and thus a successful bid requires only a simple majority of the votes.

## V. Empirical Implications

Our results on takeovers and freezeouts are consistent with numerous existing empirical findings. We first discuss the empirical implications related to takeovers and arbitrage and then follow with a discussion of the structure of tender offers.

### A. Takeovers and Arbitrage

Jindra and Walkling (1999) study the relationship between arbitrage activity and the takeover premium. Jindra and Walkling (1999), using a sample of 362 cash tender offers, find that there exists a positive relation between arbitrage and the takeover premium. As a proxy for the presence of arbitrageurs, they use a measure of abnormal volume. They calculate two measures of abnormal volume: one following the methodology proposed by Schwert (1996) and another suggested by Lakonishok and Vermaelen (1990). Jindra and Walkling estimate a regression of the percentage takeover premium on the abnormal volume, and they find a positive coefficient using both measures. The coefficient is highly significant ( $t = 4.78$ ) with Lakonishok and Vermaelen's methodology, and the  $t$ -statistic is only 0.89 with Schwert's methodology.

In addition, Schwert (1996) finds that the runup in the stock price is positively and significantly correlated with the offer premium. According to Meulbrock (1992), almost half

to the expiration of the offer, consistent with our interpretation that arbitrageurs use their power to hold out the transaction to force the bidder to pay a higher price.<sup>29</sup>

## B. The Structure of Tender Offers

In Section IV of the paper, we develop a characterization of the structure of tender offers. One of the results we derived (proposition 4) was that the supply curve of shares, defined as the relation between the equilibrium bid price and the minimum number of shares that the bidder needs to acquire in the offer, is (endogenously) upward sloping. The proposition implies that the takeover premium is an increasing function of the supermajority merger requirement, which is a relationship that, to the best of our knowledge, has not yet been tested.

The proposition also implies that the takeover premium is a decreasing function of the fraction of shares owned by shareholders who do not tender into the offer. Therefore, in a hostile acquisition, the takeover premium is higher, because the insider-controlled shares are not tendered into the offer, which increases the hold-out power of other shareholders to demand a higher premium from the bidder. Stulz, Walkling, and Song (1990) have evidence showing that, indeed, there is a positive and significant relationship between insider ownership and the takeover premium.

We have also seen that front-end loaded bids such as two-tiered offers and partial offers do not provide any strategic benefits to bidders in addition to any-or-all offers. Consistent with our results, Comment and Jarrell (1987) find that the average total premium (based on the blended price) received by shareholders differs insignificantly in executed two-tiered and any-or-all offers: the average premium in any-or-all offers is 56.6 percent above the pre-offer price and is 55.9 percent in two-tiered offers. Additionally, Jarrell and Pousen (1987) have found that fair-price charter amendments have insignificant effects on the stock price of adopting firms.

Interestingly, Comment and Jarrell (1987) provide some indirect evidence which indicates that arbitrage activity is more intense during two-tiered offers than any-or-all offers.

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<sup>29</sup>It is an interesting issue for further research to determine the motives that led the 123 single-bidders in the Franks and Harris (1987) sample to revise their bids.

as the structure of tender offers. The framework is simple and tractable, and the results of the model are consistent with an extensive empirical literature and yield new empirical implications that are yet to be tested.

Arbitrageurs play an important role in determining the takeover premium. For example, the supply curve of shares is endogenously upward sloping, because the greater is the number of shares needed by the bidder, the larger is the number of arbitrageurs who can form hold-out power. Moreover, when there is a large number of arbitrageurs with hold-out power, they can credibly demand a greater takeover premium in exchange for tendering their shares. Likewise, there is a positive relationship between the premium and arbitrageurs' accumulation of shares before and after the announcement of the offer.

We show that bidders do equally well using either any-or-all offers or front-end loaded bids, such as two-tiered and partial offers, and therefore, fair price charter provisions should be innocuous. Furthermore, the ability to moderately dilute target shareholders does not increase the profits of bidders with freezeout rights. The option to dilute shareholders is not valuable in the presence of the freezeout option, and consequently, there should not be any significant relationship between the takeover premium and dilution levels.

Although, this paper focused only on takeovers, there are many other corporate events, such as debt reorganizations of firms in financial distress, in which arbitrageurs play an important role in resolving potential market failures due to free-riding by dispersed shareholders (see Kahan and Tuckman (1993)). The dynamic model with trading developed in this paper may also be helpful in studying these other corporate events.

probability  $1 - \pi$ , when noise traders do not demand any shares, the order flow will be  $y = x < 0$ , and trading will take place at a price equal to  $\underline{p}$ . Of course, there exists a price  $\underline{p}$  smaller than  $p(n-1)$ , so that selling blocks or taking short positions will always be unprofitable for arbitrageurs. Similarly, if an arbitrageur buys more than  $\beta$  shares,  $x > \beta$ , then with probability  $\pi$  the order flow will be  $y > \beta$ , and trading will take place at a price equal to  $\bar{p}$ . Of course, there also exists a price  $\bar{p}$  bigger than  $p(n_f)$ , so that buying more than  $\beta$  shares is unprofitable.

Say now that  $x = \beta$ , so that arbitrageurs profits are:

$$\begin{aligned} E[\Pi(\beta)] &= \beta \left\{ \begin{array}{l} \pi [p(n+1) - (\phi p(n+1) + (1-\phi)p(n) + c)] + \\ (1-\pi) [p(n+1) - (p(n+1) + c)] - c \end{array} \right\} \\ &= \beta \{-2c + (1-\phi)\pi [p(n+1) - p(n)]\}. \end{aligned}$$

Let  $\bar{c} = \frac{1}{2}\pi [p(n+1) - p(n)]$ . If  $c \leq \bar{c}$ , then  $\phi = \frac{\bar{c}-c}{\bar{c}}$ , and thus  $(1-\phi)\pi [p(n+1) - p(n)] = \left(\frac{c}{\bar{c}}\right) 2\bar{c} = 2c$ . Therefore,  $E[\Pi(\beta)] = 0$ , and the arbitrageur is indifferent between entering and buying a block with  $\beta$  shares. Therefore, the strategy of buying a block of  $\beta$  shares with probability  $\phi = \frac{\bar{c}-c}{\bar{c}}$  and with probability  $(1-\phi)$  staying out of the market is a best response to  $P(y)$ . Also, if  $c > \bar{c}$  then  $\phi = 0$ , and thus  $E[\Pi(\beta)] = \beta \{-2c + \pi [p(n+1) - p(n)]\} = \beta \{-2c + 2\bar{c}\} < 0$ . Therefore, the best response for arbitrageurs, given the pricing function  $P(y)$ , is not to enter for sure.

The strategy of not trading is an optimal response for other arbitrageurs who either already own blocks or not, given  $P(y)$  and one arbitrageur is playing the strategy described above. Say that an arbitrageur trades  $x < 0$ . Then, as we have seen above, there is a probability  $(1-\phi)(1-\pi)$  that the order flow is  $y = x < 0$ , in which case the price is  $\underline{p}$  low enough that the arbitrageur incurs losses. Similarly, say that an arbitrageur trades  $x > 0$ . Then, there is a probability  $\phi\pi$  that the order flow is  $y = 2\beta$ , in which case the price  $\bar{p}$  is high enough that the arbitrageur incurs losses, or else  $\phi = 0$ , and it is also not profitable to trade any shares, as argued in the previous paragraph. This proves the first part of the proposition.

We now prove that the investors' demand schedule  $P(y)$  is a best response given the strategy of the arbitrageurs. In other words, the price quoted by traders is equal to the expected value of the shares, given the observation of the order flow,  $P(y) = E[p|y]$ . The

turn to propose, and since this offer is immediately accepted by the bidder, and subsequently all shareholders tender their shares, then the takeover succeeds with probability 1 and shares are worth  $p_A(n)$ : any offer  $p > p_A(n)$  is rejected for sure by the bidder. Shareholders then get,  $\delta[\phi(n)p(n+1) + (1 - \phi(n))p(n)] = p_B(n) < p_A(n)$ ; any offer  $p < p_A(n)$  is accepted by the bidder and shareholders get  $p < p_A(n)$ . Offers that are not conditional on  $f$  shares are also rejected by the bidder.

Therefore, neither the bidder nor arbitrageur want to deviate from the equilibrium strategies at the offering stage.

(ii) At the *tendering stage*, shareholders, including dispersed and large shareholders, tender all their shares if the offer is conditional on  $f$  shares and the price is  $p \geq p_B(n)$ , and do not tender any shares otherwise. Suppose that the takeover fails. Shareholders then get  $\delta[\phi(n)p(n+1) + (1 - \phi(n))p(n)] = p_B(n)$ . Suppose that the takeover succeeds, then all shareholders get  $p$  regardless of whether or not they tendered their shares. Therefore, it is a strictly dominant strategy for arbitrageurs to tender, and it is a weakly dominant strategy for dispersed shareholders to tender whenever  $p \geq p_B(n)$ . Also, the bidder's response to an arbitrageur's offer is to accept any offer of arbitrageurs  $p < p_A(n)$  and reject any offer  $p \geq p_A(n)$ . If the bidder rejects offer  $p$ , then he gets  $\delta\phi(n)\Pi(p(n+1)) + (1 - \phi(n))\Pi(p(n)) = \Pi(p_A(n))$ , and  $\Pi(p) > \Pi(p_A(n))$  if  $p < p_A(n)$  and  $\Pi(p) \leq \Pi(p_A(n))$  if  $p \geq p_A(n)$ .

Therefore, neither the bidder nor the arbitrageur wants to deviate from the equilibrium strategies at the tendering (accept/reject) stage.

(iii) The strategies prescribed at the *trading game* are a Nash equilibrium, by lemma 1, if and only if

$$\phi(n) = \left(1 - \frac{2c}{\pi[p(n+1) - p(n)]}\right)^+, \quad (18)$$

for all integers  $n$ ,  $0 \leq n \leq n_f$ , where  $p(n)$  and  $\phi(n)$  are given by

$$\begin{aligned} p(n) &= v(n), \\ \phi(n) &= 0, \end{aligned} \quad (19)$$

the *tendering stage*, dispersed shareholders tender all their shares, and arbitrageurs tender if the offer is greater than or equal to  $p_B(n)$ , and do not tender any shares otherwise. The insider's strategy is to tender  $\alpha$  shares if and only if the bid is greater than or equal to  $p_B(n)$  (note that even in a hostile takeover, the insiders would eventually tender in order not to get the back-end price). Also, the bidder's response to an arbitrageur's offer is to accept any offer of arbitrageurs with a blended price lower than or equal to  $p_A(n)$  and reject any offer above  $p_A(n)$ . Let  $p(n)$  be as in equation 9 if  $n > 0$  and  $p(0) = 0$ . (iii) At the *trading session*, one arbitrageur with no blocks places orders to buy blocks of  $\beta$  shares with probability  $\phi(n)$  and does not buy any shares with probability  $1 - \phi(n)$ , where

$$\phi(n) = \left(1 - \frac{2c}{\pi[p(n+1) - p(n)]}\right)^+; \quad (21)$$

all other arbitrageurs do not trade any shares, and the investors' demand schedule is equal to  $P_n(y)$ , as in equation (17).

The proof that the strategy profile above is an SPE equilibrium follows exactly the same line of reasoning as the proof of proposition 2. In equilibrium, the value of shares when the bidder is allowed to make a two-tiered offer is, for all  $n \geq 0$ , equal to

$$\begin{aligned} \widehat{p}(n) &= \phi(n)p(n+1) + (1 - \phi(n))p(n) \\ &= p(n+1) - \frac{2c}{\pi}. \end{aligned}$$

The case of more interest is the one where  $n = 0$ . Note that the bidder is unable to coerce shareholders to tender if the blended price is low, because in equilibrium, this would allow arbitrageurs to enter with a high probability equal to  $\phi(0) = \left(1 - \frac{2c}{\pi[p(1)]}\right)^+$  and drive the price up to  $p(1)$ . The equilibrium stock price is then equal to  $\widehat{p}(0) = \phi(0)p(1) + (1 - \phi(0))0 = p(1) - \frac{2c}{\pi}$ , which is the same outcome as in the case where the bidder makes an any-or-all offer. ■

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