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ABSTRACT

The Toehold Puzzle*

The substantial control premium in corporate takeovers makes a compelling case for acquiring target shares (a toehold) prior to launching a bid. Nevertheless, with a sample exceeding ten thousand initial control bids for public targets, we show that toehold bidding has declined steadily since the early 1980s and is now surprisingly rare. At the same time, the average toehold is large (twenty percent), and toeholds are the norm in hostile bids. To explain this puzzle, we develop and test a two-stage takeover model in which optimal toeholds centre on either zero or a positive threshold. Toehold bidding gives rise to target-borne toehold costs, causing some targets to reject negotiations. In our sample, an average toehold threshold of nine percent is required to compensate the bidder for the expected cost of rejection. With liquidity costs, thresholds of this size may well induce a broad range of bidders to select zero toehold. As predicted, the probability of toehold bidding decreases and the toehold size increases with the threshold estimate. The model also predicts toehold bidding in hostile bids, as we observe.

JEL Classification: G3 and G33
Keywords: bid failure, bidding strategy, merger, tender offer, termination fee and toehold

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1 Introduction

The large premiums typically observed in corporate takeovers suggest that bidders will benefit from purchasing target shares—a toehold—in the market before launching a bid. This is particularly true for the initial bidder since the market is largely unaware of the pending takeover bid. The toehold reduces the number of shares that must be purchased at the full takeover premium, and it may be sold at an even greater premium should a rival bidder win the target. The expected toehold gain raises the bidder's valuation of the target, which may help overcome target free-rider problems and make the acquirer bid more aggressively.[1] Perhaps as a result, Walkling (1985), Jennings and Mazzeo (1993), and Betton and Eckbo (2000) all find that toehold bidding increases the probability of winning the target. Betton and Eckbo (2000) also report that toeholds are associated with lower offer premiums in winning bids.

Notwithstanding bidder toehold gains, we show in this paper that toehold bidding in U.S. mergers and tender offers has been steadily declining since the early 1980s and is now sparse. For the entire sample of approximately ten thousand initial control bids for publicly traded targets, thirteen percent bid with a toehold, and only three percent acquire toehold shares in the six-month period leading up to the initial offer. Initial bidders by and large reject the idea of acquiring toeholds. The converse is also true. In Betton, Eckbo, and Thorburn (2007) we show that for the vast majority of firms acquiring stakes in other firms, the investment leads to a long-term block holding and not a follow-on control bid. The lack of toehold bidding represents a major empirical puzzle and a challenge to standard bidding theory.

The puzzle extends beyond a surprising aversion to toehold bidding. When bidders do have toeholds, we find that they are large, on average twenty percent of the target, with toeholds purchased within six months of the bid averaging thirteen percent. Thus, a theory purporting to explain the puzzle must produce a form of threshold bidding centered on either zero or a substantial toehold size. Moreover, the theory must be capable of explaining our finding that toehold bidding is more frequent when the initial bid is a tender offer rather than a merger bid, and that toehold bidding is the norm for hostile bids. Our description of toehold bidding also reveals a toehold frequency that is greater for private than for publicly traded acquirers.

[1] See, e.g., Grossman and Hart (1980), Shleifer and Vishny (1986), Hirshleifer and Titman (1990), Bulow, Huang, and Klemperer (1999).

We develop and test a relatively simple takeover model which addresses all of these findings. The takeover game has two stages: an initial merger proposal followed by a public auction for the target that takes place prior to the target shareholders' vote on the proposed merger. Because the initial bidder's toehold impacts the auction outcome, it also directly affects the target management's incentive to accept or reject merger negotiations. Specifically, toeholds imply target-borne toehold costs which may cause target management to reject merger negotiations with toehold bidders. In equilibrium, only toehold bidders are rejected. Anticipating this, the initial bidder either approaches with a zero toehold to avoid rejection, or acquires a toehold threshold which is sufficiently large to compensate for the expected rejection costs.

In practice, the zero-toehold equilibrium proposed here does not necessarily require the bidder to move first: As reported by Boone and Mulherin (2007a,b), targets often choose a negotiating partner after a private round of talks with several potential bidders. In this case, zero-toehold bidding is a direct result of the target actively selecting bidders without toeholds. In our model, rejection forces the initial toehold bidder to make a hostile bid without the benefit of a termination agreement.[2] Thus, the model delivers an expression for the toehold threshold which contains the opportunity loss of a breakup fee. Our valuation of this loss explicitly accounts for the impact of the breakup fee on the optimal bids of both the initial and the rival bidder (where the latter effectively must pay the fee) as well as on the target's accept/reject decision. In sum, toeholds and termination agreements arise endogenously as economic substitutes in our model: You can have one but not necessarily the other given that merger negotiations must be incentive compatible for both parties.

We estimate the average toehold threshold to be nine percent across the total sample. In the presence of toehold transaction costs, a threshold of this magnitude may well cause the typical bidder to opt for a zero toehold. The three major drivers of the cross-sectional variation in the threshold estimate is the initial takeover premium (which averages forty-five percent and is our proxy for the initial bidder's private valuation of the target), the probability of the no-bidder-wins outcome (which averages thirty percent), and the breakup fee (averages three percent). As predicted, we find that toehold bidding is significantly more likely the lower the threshold estimate,

[2] Target termination agreements, which typically pay the bidder a fixed fee if the merger deal fails, have evolved since the late 1980s and are now common (Officer, 2003; Bates and Lemmon, 2003; Boone and Mulherin, 2007a).

and that the toehold size (when positive) increases with the threshold value.

The toehold threshold is relevant for the bidder only if the toehold affects the target's decision to accept merger negotiations. In particular, if target management is expected to reject all bids regardless of the toehold, toehold bidding is optimal. Our finding of a fifty percent toehold frequency in hostile bids is consistent with this argument, as is the fact that the overall decline in toehold frequency over the sample period coincides with a general decline in hostile takeovers. Moreover, toehold bidding is optimal when target management is expected to never resist. While we cannot independently confirm when a specific target is of this type, our finding of a higher toehold frequency among private bidders is suggestive of this outcome. There is evidence both in this paper and in Bargeron, Schlingemann, Stulz, and Zutter (2007) that private bidders on average generate higher security benefits from acquisitions than do public bidders. A consistent interpretation is that private bidders more frequently identify targets with less entrenched (more efficient) management.

Finally, we present new evidence on the relationship between toehold bidding and abnormal stock returns to bidders and targets. Of particular interest is the valuation effect of toehold bidding when the target rejects all bids. Thirty percent of the total sample of initial bids, and as much as forty-four percent when the bidder is private, ends up in the no-bidder-wins state. This gives credence to the argument of Goldman and Qian (2005) that bidders should be concerned with a potential toehold cost if the target rejects all bids. The toehold cost occurs if target rejection causes the target share price to fall below the toehold acquisition price. Much as reported by Bradley, Desai, and Kim (1983), we show that target abnormal stock returns through the entire contest is on average insignificantly different from zero in the subsample where no bidder wins. However, we also show that the target abnormal return is on average positive and significant in this subsample if the bidder has a toehold, and it is greater (more positive) the greater the toehold size. Thus, whatever causes targets to reject all bids, the market appears to view the existence of a bidder toehold as a positive signal when no bidder wins. Since we also show that toehold bidding significantly increases the probability that the initial bidder wins, it follows that expected toehold costs associated with the no-bidder-wins outcome cannot explain the pervasive aversion to toehold bidding.

The paper is organized as follows. Section 2 develops the structure of our sequential takeover game and solves recursively for the toehold threshold and the associated optimal toehold decision. The model yields the paper's key empirical prediction. Section 3 explains the data collection, construction of takeover contests, and describes the frequency distribution of toehold bidding. We test our toehold-threshold theory in Section 4. In Section 5 we present estimates of the impact of toeholds on expected bidder return as well as on the target's share price performance when all bids fail. Section 6 concludes the paper.

2 A theoretical toehold threshold

In this section we develop our two-stage takeover game and its main empirical implications. The structure of the takeover game is shown in Figure 1. In the first stage, target management accepts or rejects the initial bidder's invitation to merge. In the second stage, prior to the target shareholder vote on the merger, a rival bidder enters and competes for the target in a public auction. It is shown that the target management may reject the merger invitation because of target-borne costs implied by the initial bidder's toehold. In equilibrium, targets reject toehold bidders only. Anticipating this, the initial bidder either approaches with a zero toehold to avoid rejection, or acquires a toehold threshold that is sufficiently large to compensate for the costs of rejection.

2.1 Game structure and initial bidder payoff

The takeover game has three players and two stages. The players are the target, the initial bidder (B1), and a rival bidder (B2). The target management has private benefits of control $\beta \in [0,\ 1]$ which will be removed in a takeover by B1. Bidders have private valuations $v \in [0,\ 1]$ of the target, and B1 also has a toehold $\alpha \in [0,\ 0.5)$ acquired at the pre-game target share price of zero. If the target agrees to merge, B1 receives a termination agreement promising a breakup fee of $t \in [0,\ v]$ that is payable if the target withdraws. Under the termination agreement, target withdrawal takes place if B2 wins or the target rejects all bids.

In the first stage of the game, B1 offers to negotiate a merger, and the target accepts or rejects the merger proposal. The target decision is always followed by an auction where B1 competes with B2 (second stage). The inevitability of the auction after a merger agreement has been signed is the result of the fiduciary-out requirement under U.S. corporate law: while the negotiated merger agreement awaits a final shareholder vote, the target board must consider any competing bids.[3]

[3] Final approval requires a target shareholder vote, a bidder shareholder vote if the bidder issues new shares of 20% or more to pay for the target, and antitrust and regulatory approval. This process may take several months,

Moreover, we assume that if the target rejects B1's initial merger proposal, B1 launches a hostile tender offer (auction). B2's role is as follows: If the auction follows merger negotiations, B2 will remove β. However, when B1 launches a hostile bid, target management brings in B2 as a white knight and gets to keep its private benefits of control.

For tractability, we assume that bidders are risk neutral and have unaffiliated private valuations, and that the auction is sealed-bid second-price.[4] Let p^* and p_2 denote the optimal auction bids of B1 and B2, respectively. The auction has three outcomes: B1 wins, B2 wins, or no-bidder-wins, where the latter occurs with probability θ. If the auction follows merger negotiations (upper branch in Figure 1), the payoff to B1 is as follows. If B1 wins, it pays p_2 for the remaining $1-\alpha$ target shares, for a net payoff of $v-(1-\alpha)p_2$. If B2 wins, it pays p^* for the target shares, and the target pays t to B1, for a net payoff to B1 of $\alpha p^* + t$. If neither B1 nor B2 wins, the target pays t to B1, the target share price falls to $-t$, and B1's net payoff is $t(1-\alpha)$. If the auction follows target rejection of merger negotiations (lower branch in Figure 1), B1 makes a hostile tender offer without a termination agreement, and the target imposes a bidder-specific resistance cost $r \in [0,\ v]$ on B1. r captures costs ranging from a refusal to provide B1 with information required to perform due diligence of the target, to a poison pill defense. The resistance cost reduces B1's valuation from v to $v - r \geq 0$.[5]

2.2 Optimal bids and target's response

To derive the optimal bids, we start with B2. If B1 does not have a termination agreement, B2 bids its private valuation: $p_2 = v_2$. This is optimal because a bid less than v_2 risks foregoing a profitable takeover, while bidding more than v_2 risks overpaying for the target. If B1 does have a termination agrement, B1's claim of t on the target reduces B2's valuation to $v_2 - t$, which is then its optimal bid.

Let $G(v)$ and $g(v)$ denote the distribution and density functions over v. If B1 has a termination

and it averages five months for the successful initial bidders in our sample.

[4]With zero bidding costs, the revenue from our second-price auction is equivalent to that of an open first-price auction. See, e.g. Dasgupta and Hansen (2007) for a review.

[5]Consistent with this assumed reduction in B1's valuation, our sample rivals win six times more often when the target is hostile.

agreement, B1's expected profit from bidding p given that B2's optimal bid is $v_2 - t$ is

$$\begin{aligned}
\Pi(p) &= \{(v)G(p+t) - (1-\alpha)\int_0^{p+t}(v_2 - t)g(v_2)dv_2 + (t+\alpha p)[1-G(p+t)]\}(1-\theta) + t(1-\alpha)\theta \\
&= [v(p+t) - \frac{1}{2}(1-\alpha)p^2 + (t+\alpha p)(1-(p+t))](1-\theta) + t(1-\alpha)\theta, \qquad (1)
\end{aligned}$$

where the second equality invokes the uniform distribution, $G(v) \sim U[0,1]$. The right-hand side of the first equation is the sum of four components. The first three (inside the curly bracket) are, respectively, B1's expected private value, the expected payment for the target, and the expected value from selling the toehold α to B2 and receiving t when B2 wins the auction. The fourth term is the expected payoff when no bidder wins.

Equation (1) implies an optimal bid of

$$p^* = \frac{v+\alpha}{1+\alpha} - t. \qquad (2)$$

which reproduces the optimal bid with a toehold first derived by Burkart (1995) and modified here by the termination fee t. Thus, while the toehold induces overbidding (relative to v), the breakup fee induces underbidding just as is does for B2. Thus, t does not affect B2's incentive to bid in the auction. Notice also that the optimal bids do not include θ because there are no price-dependent payoffs to any of the bidders in the no-bidder-wins outcome.

Next, suppose the target rejects negotiations so there is no termination agreement and the target imposes r. Since B2 now optimally bids v_2, the expected profit Π to B1 is

$$\begin{aligned}
\Pi(p) &= \{(v-r)G(p) - (1-\alpha)\int_0^{p} v_2 g(v_2)dv_2 + \alpha p[1-G(p)]\}(1-\theta) \\
&= [(v-r)p - \frac{1}{2}(1-\alpha)p^2 + \alpha p(1-p)](1-\theta), \qquad (3)
\end{aligned}$$

which leads to an optimal bid of

$$p^* = \frac{v-r+\alpha}{1+\alpha}. \qquad (4)$$

Having derived the optimal bids, we solve for the target's decision conditional on those bids. Suppose target management maximizes the expected utility $U \equiv E(\beta) + E(p)$.[6] Since the toehold

[6]For convenience, we write $E(p)$ instead of $\tau E(p)$, where τ is target management's fractional ownership of the

increases B1's optimal price p^*, it also increases B1's probability of winning the auction. As a result, the toehold impacts the target's expected utility and therefore its optimal response to B1's invitation to negotiate:

Proposition 1: *Target management accepts or rejects B1's merger offer as follows:*

$$\begin{array}{ll} accept\ for\ any\ \alpha\ when\ \beta < \underline{\beta} & (Region\ I) \\ accept\ if\ \alpha = 0\ and\ reject\ if\ \alpha > 0\ when\ \underline{\beta} < \beta < \overline{\beta} & (Region\ II) \\ reject\ for\ any\ \alpha\ when\ \beta > \overline{\beta} & (Region\ III) \end{array}$$

where the region limits are

$$\begin{aligned} \underline{\beta} &= [\frac{1}{2}r^2 + r(1-v) + (\frac{1}{2}t^2 - \frac{t}{1-\theta})(1+\alpha)^2](\frac{1}{(1-v+r)(1+\alpha)}) \\ \overline{\beta} &= [\frac{1}{2}r^2 + r(1-v) + \frac{1}{2}t^2 - \frac{t}{1-\theta}](\frac{1}{1-v+r}). \end{aligned}$$

Proof: If the target management accepts the invitation to merge, it's expected utility is

$$U_{accept} = \beta\theta + [\frac{v+\alpha}{1+\alpha} - \frac{1}{2}(\frac{v+\alpha}{1+\alpha})^2 + \frac{1}{2}t^2](1-\theta) - t. \tag{5}$$

The first term is the expected private benefits (retained only when no bidder wins), and the remainder of the expression is the expected auction revenue net of t. If the target rejects,

$$U_{reject} = \beta[1 - (1-\theta)\frac{v-r+\alpha}{1+\alpha}] + [\frac{v-r+\alpha}{1+\alpha} - \frac{1}{2}(\frac{v-r+\alpha}{1+\alpha})^2](1-\theta), \tag{6}$$

where β is retained either if $B2$ wins or if no bidder wins. The target accepts negotiations if $U_{accept} > U_{reject}$.[7] If the bidder has a zero toehold, this condition holds for $\beta < \overline{\beta}$. If the bidder approaches with $\alpha > 0$, this holds for $\beta < \underline{\beta}$. Region II exists because $\underline{\beta} < \overline{\beta}$. ■

Intuitively, in Region I and III, the target's decision is independent of the toehold. In Region I, β is so low that the security benefits dominate the loss of private benefits, and the target always accepts the offer. In Region III, the reverse happens, and the target always rejects the offer. In

target shares. This notational simplification does not change the key theoretical results.

[7]For the target management to ever accept negotiations, it is necessary that $E(p)_{accept} > E(p)_{reject}$ or, equivalently, that $r > -(1-v) + \sqrt{(1-v)^2 + (2t/(1-\theta) - t^2)(1+\alpha)^2}$.

Region II, however, there is a tradeoff between $E(\beta)$ and $E(p)$ as their values vary with α at the margin. If the bidder approaches with $\alpha > 0$ in Region II, the marginal increase in the probability of retaining control by rejecting the offer dominates the marginal increase in security benefits (the expected price) from accepting the bid. The opposite holds when $\alpha = 0$. As a result, the target rejects the offer conditional on $\alpha > 0$, and accepts the offer if $\alpha = 0$.

2.3 The threshold

We are now in a position to derive the initial bidder's optimal toehold decision, taking into account the target's response strategy in Proposition 1:

> **Proposition 2:** *Suppose toehold bidding causes the target to reject merger negotiations (Region II). Let $\hat{\alpha}$ denote a toehold threshold that makes B1 indifferent between a toehold of either zero or $\hat{\alpha}$. It follows that*
>
> $$\hat{\alpha} = -k_1 + \sqrt{k_1^2 + k_2}, \tag{7}$$
>
> *where $k_1 = v - r - \frac{1}{2}(v^2 - t^2) - \frac{t}{1-\theta}$, and $k_2 = r(2v - r) + t(\frac{2}{1-\theta} - t)$. Moreover, B1's optimal toehold strategy is as follows:*
>
> $$\begin{array}{ll} \alpha > 0 \ if \ \beta < \underline{\beta} & (Region\ I) \\ \alpha = 0 \ or \ \alpha \geq \hat{\alpha} \ if \ \underline{\beta} < \beta < \overline{\beta} & (Region\ II) \\ \alpha > 0 \ if \ \beta > \overline{\beta} & (Region\ III) \end{array}$$

Proof: First, for high values of β ($\beta > \overline{\beta}$, Region III), target management always rejects negotiations (Proposition 1). In this region, the initial bidder's expected profits is such that $\Pi_{\alpha>0}|reject > \Pi_{\alpha=0}|reject$ so it is always optimal to acquire a toehold. Second, for low values of β ($\beta < \underline{\beta}$, Region I) target management always accepts negotiation. In this case, $\Pi_{\alpha>0}|accept > \Pi_{\alpha=0}|accept$ and it is again optimal for the bidder to always acquire a toehold. Third, in Region II, target management accepts merger negotiations only if $\alpha = 0$, and it rejects negotiations if $\alpha > 0$. The condition $\Pi_{\alpha>0}|reject = \Pi_{\alpha=0}|accept$ implies the toehold threshold $\hat{\alpha}$ stated in the proposition. ∎

The intuition for the toehold strategy is as follows. First, B1 optimally acquires a toehold in all states where the target's resistance strategy is independent of α. Thus, the model predicts a greater frequency of toehold bidding when target management is expected to be hostile *ex ante* (Region III), or when private benefits of control play only a minor role for target management (Region I). Since a hostile bidder will not grant a termination agreement, observing both toeholds and termination agreements implies that target management is friendly and places sufficient weight on the security benefits from the offer.

Second, when the target's response depends on α, there are two equilibria: B1 approaches with a zero toehold and the target accepts negotiations, or B1 acquires a toehold and target management rejects the invitation to negotiate. In the latter case, B1 foregoes the termination agreement and faces resistance costs in the public auction. In this case, B1 needs to acquire a toehold $\alpha > \hat{\alpha}$ for toehold bidding to dominate the zero-toehold strategy.

In the empirical analysis below, we estimate the toehold threshold $\hat{\alpha}$ for every initial bidder in the sample, and we use this estimate to predict the likelihood of observing toehold bidding, as implied by Proposition 2.

3 Sample of takeover contests

3.1 Constructing contests

We group successive bids for the same target into a takeover contest. As the term is used here, a "contest" may have a single control bid, multiple bids by a single bidder, or multiple bidders. This follows the terminology of Betton and Eckbo (2000), and it is consistent with the observation in Boone and Mulherin (2007b) that takeovers with a single publicly announced bidder may be preceded by a private round of talks with several potentially interested bidders. These private talks produce a negotiating partner which is subsequently publicly announced as the initial bidder. A given control bid initiates the contest if there are no other public control bids for the same target over the preceding six months. All subsequent control bids within six months of a previous bid belong to the same contest. The contest ends when there are no additional control bids for the same target over the following six-month period.

To identify the initial control bidder, we first sample individual public bids from the Thomson

Financial SDC Merger & Acquisitions data base. Between 1/1980 and 12/2002, SDC contains 13,896 control bids for U.S. publicly traded firms with transaction form "M" (merger) or "AM" (acquisition of majority interest). A control bid is defined as the bidder owning less than 50% of the target shares prior to the bid and seeking to own at least 50% of the target shares after completion of the transaction.

Furthermore, we include in our sample 1,106 tender offers for control identified by Betton and Eckbo (2000) that are not in SDC, and we update another 610 SDC records with information from that paper. In addition, we search the Wall Street Journal (WSJ) for tender offers, which produces 200 control bids also not in the SDC. Reading the WSJ and the SDC history, we include any additional information on tender offer announcement dates, rival bids, and toeholds. This leaves a total of 15,197 bids for control. With our contest definition, these bids take place in a total of 12,721 takeover contests. We further require the target to be listed on the Center for Research in Security Prices (CRSP) data base, which eliminates 1,915 contests, for a total sample of 10,806 control contests.

3.2 Sample characteristics

As shown in the second column of Table 1, two-thirds of the total number of initial bids (7,076 cases) are from the period 1990-2002, and 7,750 or 72% of the total are merger bids.[8] A total of 6,726 or 62% of the bidders are publicly traded.[9] The target receives publicly announced control bids from two or more bidders in 862 or 8% of the contests. The target management is hostile in 511 (5%) of the contest.[10] While not shown in the table, targets are hostile in 10% of the cases prior to 1990 and in 2% after 1989. Moreover, tender offers trigger hostility four times as often as merger bids (10% vs. 2%), and multiple-bidder contests are associated with target hostility in 14% of the cases versus 4% in single-bidder contests. The initial bidder offers all-cash as payment to the target in 4,185 cases (39%).

[8]A bid is classified as a merger if it is listed as transaction form M in SDC and is not flagged as a tender offer. A bid is classified as a tender offer if (1) the SDC flags it as a tender offer or it has transaction form AM, (2) it is labeled a tender offer by the WSJ, or (3) it is sampled from Betton and Eckbo (2000). Of the 3,056 tender offers, 289 are from Betton and Eckbo (2000) in the period 1972–1979.

[9]The 4,080 private bidders include 754 subsidiaries, 4 government owned companies, 19 investor groups, 45 joint ventures, and 8 mutual companies. Private bidders select a merger bid somewhat less often than public bidders (64% versus 76%).

[10]The target's response is classified as friendly if the SDC or the WSJ characterize the response as positive or neutral, or a response is not recorded, and hostile otherwise.

Columns three and four of Table 1 show the mean and median deal values. Deal value is available for 8,271 targets, with missing information primarily for the no-bidder-wins outcome. The median is substantially smaller than the mean, indicating a skewed distribution. For the total sample the average deal size is \$715 million with a median of \$89 million. The deal size is greater in the second part of the sample period, in merger deals (on average twice the size of tender offers), when the bidder is public, when the contest develops multiple bidders, and when the payment is not all-cash. The largest average deal size in the sample occurs when the target is hostile: \$1,204 million versus \$688 in friendly deals.

We are able to classify the contest outcome for 10,619 contests. The initial bidder wins in 67% of the cases. The initial bidder fails either because a rival bidder wins (4% of all contests) or because the target rejects all bids (30%).[11] Interestingly, the initial bidder wins more often when presenting a tender offer rather than a merger bid (64% versus 75%). Initiating a merger bid is more risky than a tender offer primarily because targets are more likely to reject *all* bids in mergers: 33% versus 20% in tender offers. Not surprising, target hostility increases the percent of the sample where no bidder wins from 29% to almost half (49%). Notice also that, in the overall sample, the probability of the no-bidder-wins outcome is substantially greater for private than for public bidders: 44% versus 21%.

Conditional on a rival bidder entering, the rival wins the contest twice as often as the initial bidder (48% versus 21%). The entry of a rival does not materially change the sample proportion of the no-bidder-wins outcome. Moreover, when the initial bid is hostile, rivals win in 16% of the contests compared to only 3% when the initial bidder is friendly. Thus, hostility increases both the chance of a rival bidder winning and the no-bidder-wins outcome. Overall, in hostile cases, the initial bidder succeeds with only 34% of their bids compared to 68% in friendly deals.

The last two columns of Table 1 show average initial and final offer premiums. We use the former in our estimation of the toehold threshold below. The initial offer premium is defined as $(p_{ini}/p_{-41}) - 1$, where p_{ini} is the initial offer price, and p_{-41} is the target share price as listed on CRSP on day -41 relative to the initial offer date (adjusted for splits and dividends). The final offer premium is $(p_{fin}/p_{-41}) - 1$, where p_{fin} is the final price offered. Thus the final premium is the total premium relative to the pre-contest target share price. With SDC as our primary source, we

[11]SDC describes the bid as "withdrawn" in a majority of the cases where all bids fail.

have offer premium data on a total of 6,886 contests.[12] The median offer premium is consistently a few percentage points lower than the mean, and we report only the mean in Table 1.

The average initial offer premium is 44.5% across the total sample with premium data. The final premium is almost identical (46.1%) due to the large portion of contests where the initial price is also the the final price (single-bidder contests). There is no discernible difference in initial and final offer premiums in the first and the second part of the sample period. Initial (final) offer premiums are 43.6% (44.5%) in mergers and 46.5% (50.2%) in tender offers. Separating ex post single- and multiple-bidder contests, the average initial and final premiums in multiple-bidder contests is 41.1% and 53.2%, respectively. For single-bidder contests, the initial premium averages 44.8% (final 45.4%). Thus, as found by Betton and Eckbo (2000) as well, the initial bid in contests that develop bidder competition is slightly lower than the final (single) price in contests where no rival bidders enters to compete. While not a test of preemptive bidding, this finding is consistent with the argument that single-bid contests became single bid because the initial bidder strategically raised the initial bid somewhat (Fishman, 1989).

Table 1 also shows that initial (and final) offer premiums are somewhat lower when the bidder is private, 40.1% versus 46.1% for public acquirers, respectively. Premiums are almost identical in all-cash and all-stock/mixed offers. Finally, contests with hostile targets have both the highest initial bid premium (49.0% versus 44.1% for friendly targets) and final offer premium (60.9% versus 45.1%).

3.3 Toeholds

A toehold is an ownership stake in the target held at the announcement of the initial bid. With our definition of a control bid, toeholds are less than fifty percent of the target shares. Figure 2 shows the annual toehold frequency for the initial merger bids and tender offers in our sample. The toehold frequency in tender offers increases during the 1970s and starts declining in the mid 1980s. For merger bids, the toehold frequency peaks in 1980 and again in 1986-1988, and then declines steadily towards the end of the sample period. Notice that this decline coincides with a general

[12] In single-bid contests, the SDC often reports the offer price as the "final" price, leaving open the field for the "initial" price. Of course, in single-bid contests the final price is also the initial, as labeled here.

increase in stock market liquidity.[13]

Table 2 lists additional information on the average toehold frequency and size across several bid categories. Of the 10,806 initial bidders, thirteen percent have toeholds. The toehold frequency is substantially lower in the second half of our sample period (7% versus 22%), and it is lower in merger bids (7%) than in tender offers (26%). In single-bidder contests, there are 12% toeholds versus 18% in multiple-bidder contests. Toeholds are four times more frequent in hostile bids (50%) than in friendly bids (11%). There are also more toeholds among private bidders than public bidders (16% vs. 11%), and when a rival wins the contest.

We classify toeholds as long-term and short-term using the reporting practise of SDC. A long-term toehold is defined as target shares held six months prior to the initial bid date. A short-term toehold is the incremental toehold purchased during the six-month period leading up to the bid. It should be noted that the merger negotiation process in itself limits short-term toehold acquisitions as defined here. It is common practice for bidders to sign a standstill agreement at the start of the negotiations. The length of these negotiations, which take place prior to the public announcement of the merger, typically ranges from two to six months (Bruner, 2004; Boone and Mulherin, 2007b). Thus, for some bidders, negotiations may have prevented a short-term toehold acquisition in the six-month look-back period prior to the announcement date.[14]

Of the 1,363 toehold bidders, we are able to classify 970 toeholds into long- and short term. As shown in Table 2, 91% of these toehold bidders have a long-term toehold, and 22% acquire a short-term toehold. This means that in the overall sample of 10,000+ initial control bidders, only 3% have short-term toeholds. Moreover, 13% of the toehold bidders have both short- and long-term toeholds, and 14% of the bidders with a long-term toehold also acquire a short-term stake. Of the bidders with short-term toeholds, 41% have no long-term toehold. Table 2 also shows that the percentage long-term toeholds is somewhat higher, and short-term toeholds lower, in the second half of the sample period, in tender offers, and when the target is friendly.

Conditional on being positive, the average toehold size is large: 20% of the target shares. The

[13] Notice also that the increase in the toehold frequency throughout the 1970s continues well after the passage of the 1968 Williams Act (mandating information disclosure in tender offers) and the 1976 Hart-Scott-Rodino Act (mandating pre-notification of mergers for antitrust review).

[14] In the context of our threshold theory, signing a standstill agreement is itself a decision that involves the tradeoff between negotiations and an unsolicited bid. Thus, observing a zero short-term toehold carries information regardless of the constraint imposed by the negotiation process.

average size of a long-term toehold is also 20% of the target equity, while the average short-term toehold size is 13%. Since large toeholds may trigger significant costs associated with liquidity and information disclosure (Ravid and Spiegel, 1999; Bris, 2002), this short-term toehold size is surprising. The average toehold size increases somewhat from the 1980s to the 1990s. Toeholds are larger in friendly than in hostile bids (22% versus 11%), and larger in single-bidder contests (21% versus 13%). Moreover, toeholds are on average greater in contests where the initial bidder wins. The average size of long-term and short-term toeholds displays a similar pattern as the total toehold.

Panel A of Figure 3 plots the frequency distribution of the toehold size. About half of the toeholds exceeds 15% of the target shares, and are relatively evenly distributed between 15% and 50%. One-sixth of the toeholds are less than 5% with a peak in the distribution of toeholds between 5% and 10%. Panel B of Figure 3 shows the relative distribution of short-term and long-term toeholds across different toehold sizes. Long-term toeholds have a fatter right tail than short-term toeholds, with two-thirds exceeding 10% of the target shares and one-third exceeding 25%. For short-term toeholds, forty percent has a size greater than 10% and only ten percent exceeds 25%.

4 Does toehold threshold bidding exist?

In this section, we estimate the toehold threshold $\hat{\alpha}$ for every initial bidder in the sample, and we use this estimate to predict the likelihood of observing toehold bidding. The main hypothesis is as follows:

H1 (Toehold threshold hypothesis): *Let $\hat{\alpha}$ denote the toehold threshold as defined in Proposition 2. Moreover, let $c(\alpha)$ denote a transaction cost of acquiring a toehold of size α, such that $\partial c/\partial \alpha > 0$. Observed toeholds α are then as follows:*

(i) Toehold probability: The probability of observing $\alpha > 0$ is higher the lower the value of $\hat{\alpha}$ and the lower the value of $c(\alpha)$.

(ii) Toehold size: $\alpha = 0$ or $\alpha \geq \hat{\alpha}$. That is, conditional on $\alpha > 0$, α is increasing in $\hat{\alpha}$.

(iii) Target hostility: Toehold bidding is more likely for targets that are expected to be hostile to the bidder.

Parts (i) and (ii) of H1 refer to Region II in Proposition 2, where bidders are indifferent between approaching the target with a zero toehold or a toehold equal to the threshold $\hat{\alpha}$. The transaction cost $c(\alpha)$ in H1 breaks this indifference in favor of selecting a zero toehold, and the more so the greater is $\hat{\alpha}$. Part (iii) refers to Region III, where target management is expected to optimally resist the bid regardless of the toehold. Proposition 2 also predicts toehold bidding in Region I, where target management is not expected to resist the initial bidder. H1 does not include this as a separate prediction because we have no way of classifying a toehold bidder as being in Region I as opposed to Region II. However, we present some indirect evidence on this distinction using private bidders in the empirical analysis below.

4.1 Estimating the threshold

According to Proposition 2, the toehold threshold is a function of four parameters: $\hat{\alpha} = f(\theta,\ t,\ v,\ r)$. Below, we reduce the estimation to θ, t and v only. Beginning with the probability of the no-bidder-wins outcome (θ), recall from Table 1 that 30% of all contests end up with no bidder winning the target. We estimate θ using binomial logit, where the dependent variable equals one if the target rejects all bids. The explanatory variables are defined in Table 3, while Table 4 shows the corresponding coefficient estimates. The variables include target-, bidder-, and contest characteristics that are observable at the outset of the auction. Target characteristics include (log of) market value of equity ($Target\ size$), measures of target stock liquidity such as an indicator for a share price below \$1 on day -41 ($Penny\ stock$), average stock turnover over days -166 through -42 ($Turnover$), and whether the target is listed on a major stock exchange ($NYSE/Amex$). Moreover, the logit regression contains a poison pill indicator.

We include as bidder characteristics the public status of the bidder ($Acquirer\ public$), and an indicator for the product market relationship with the target. The acquisition is classified as horizontal if the two firms have the same primary 4-digit SIC code ($Horizontal$). With this definition, 27% of the contests start with a horizontal bid. The regression further includes contest characteristics such as indicators for tender offer ($Tender\ offer$), the payment method being cash only ($Cash$), target hostility ($Hostile$), and the entry of a rival bidder ($Multiple\ bidders$). Finally, while not shown we include industry fixed effects for financial, manufacturing, trade, and services industries.

The process of takeover negotiations changes over time as the investment banking industry becomes more actively involved in promoting takeovers and develops new deal protection devices such as termination agreements. Since these changes are likely to affect θ, we estimate the model separately for the 1972-1989 and 1990-2002 time periods. Moreover, we single out target hostility and multiple bidders (model specification II in Table 4) as these characteristics are uncertain at the beginning of the contest.

The regressions are all significant at the 1% level. For both time periods, the estimated probability of the no-bidder-wins outcome θ increases with target hostility (both $Hostile$ and $Poison\ pill$). In other words, target hostility to the *initial* bid lowers the success-probability of *all* bids. This is consistent with target resistance reflecting target management entrenchment. It is also interesting that having a poison pill by itself increases θ. Since we show below that poison pills have no discernable impact on offer premiums, this means that pills reduce expected premiums. This extends the finding of Comment and Schwert (1995) on the impact of pills.

Moreover, θ decreases when the initial bidder is publicly traded and if the target is listed on NYSE/Amex. After 1989, θ is also greater for penny stocks and lower for horizontal bids. These results indicate that targets are more likely to accept an offer the more liquid the bidder (public status) and target shares.[15] Moreover, targets are more likely to be acquired in tender offers and when the payment method is cash. In the following, since Model I in Table 4 only contains variables that are observable at the beginning of the contest, we use this model to form a predicted value for θ for each initial bidder.

Second, the model requires an estimate of the target termination fee t. Target termination agreements come in two forms: a fixed dollar payment or a lock-up option to purchase target assets below market value. We restrict our attention to fixed breakup fees which is also the most prevalent in the data.[16] Using SDC information, termination agreements are rare prior to 1990, increasing to 50% of our control bidders in the late 1990s.[17] The average termination fee is \$34 million or 4% of the deal value. In our sample, target termination agreements are observed almost three times as

[15] Only four percent of the failed private bidders offered all-stock as payment method. Thus, the higher failure rate of private bidders is not driven by the difficulty of a "going private" decision by the target.

[16] We also observe bidder termination agreements, compensating the target for a failed bid. Bidder termination agreements do not affect the key intuition of our model and are therefore not part of the analysis below.

[17] Coates and Subramanian (2000) suggest that the boost in termination fees is the result of two judicial decisions by the Delaware Supreme Court: Paramount in 1994 and Brazen in 1997. These court rulings established that the typical breakup fee represents a reasonable compensation for the initial bidder's opportunity cost of losing the target.

often for public bidders (33% of the bids) as for private bidders (13%).

The threshold estimation requires an estimate of the ex ante value t of a termination agreement for each initial bidder, regardless of whether or not an agreement is observed ex post. For the purpose of this estimation, we use the actual fee when available, and otherwise the average fee for the target's four-digit industry and year. The SDC does not report any termination agreement before 1985, and we set $t = 0$ for takeover bids prior to this year. The average industry-estimate of t after 1984 used in our analysis is 3%. Note that this estimation benefits from the substantial standardization of termination contracts as of the early 1990s.[18]

Third, we approximate the initial bidder's private valuation v with the initial bid premium $(p_{ini}/p_{-41}) - 1$. Thus, bidders are assumed to differ in their synergy gains with the target (giving rise to different offer premiums), while the the stand-alone, no-information target share value (p_{-41}) is common across bidders. As in the model, we fit the premium observations to the uniform cumulative distribution function.[19]

Fourth, the toehold threshold depends on the unknown target resistance cost parameter r. Recall from the proof of Proposition 1 that, for the target to ever accept a toehold bidder (Region I and II), r must exceed a minimum value (expressed in footnote 7 above) which depends on θ, t, v and α. We compute r assuming $\alpha = 0$, which represents the lower bound on r for Region II to exist. This value of r ensures that the estimated toehold threshold is always consistent with equilibrium threshold bidding. The average value of this r is three percent (median two percent), which is almost certainly a conservative estimate of target resistant costs. Since $\hat{\alpha}$ increases in r, our use of its lower bound produces a conservative test for threshold bidding.

The threshold estimate averages 9% (median 8%) for the total sample. The threshold distribution shifts to the right over the sample period, averaging 7% (median 4%) over 1972-1989 and 11% (median 9%) over 1990-2002. The primary reason for this shift is that termination contracts were not used until after the mid 1980s. As shown above, offer premiums (used to estimate v) did not change materially between the two periods, while the probability of the no-bidder-wins outcome

[18]Boone and Mulherin (2007a) find from SEC filings that SDC underreports the incidence of termination contracts. This underreporting does not adversely affect this paper since the counterfactual for our model is a combination of zero toehold and no termination agreement. The finding of Boone and Mulherin (2007a) of an almost universal use of termination agreements reduces the likelihood of this counterfactual.

[19]As robustness checks, we replace the initial offer premium with the initial bidder's *final* offer premium (whether or not this is the last premium in the contest), and use the normal distribution for v instead of the uniform. These alterations do not change our conclusions below.

actually decreased after the first subperiod.

4.2 Testing the toehold threshold hypothesis

Table 5 shows the results of estimating the probability of observing a toehold (logit estimation) and a second model for the toehold size (OLS). The explanatory variables are as in the earlier regression for the probability θ (Table 4) plus *Threshold* which is our estimate of $\hat{\alpha}$ explained above. The regressions are significant and yield several interesting results. First, recall that the main prediction of H1 is that the probability of observing toehold bidding is greater for lower values of *Threshold*. The two logit regressions provide strong support for this prediction. In the first regression, the coefficient on *Threshold* is negative and significant at the 1% level, while the p-value is 0.03 in the second specification. Second, also as predicted by H1, toehold bidding is more likely when liquidity costs are lower, here indicated by the target trading on NYSE or Amex.[20]

Third, as suggested earlier by the univariate toehold information in Table 2, toehold bidding is significantly more likely for potentially hostile targets. This is also a prediction of H1 (Region III in Proposition 2). Toehold biding is significantly more likely when the target has a poison pill (*Poison*), and when the target actually turns out to be hostile (*Hostile*). Since *Hostile* is not directly observed until after the initial bid, we have included *Hostile* in a separate regression specification. The inclusion of *Hostile* does not materially alter the significance of *Threshold*. Thus, it appears that *Threshold* and *Hostile* provide two independent and significant sources of toehold bidding behavior, again as implied by our takeover game.

Fourth, toehold bidding is significantly more likely when the bidder is *not* a publicly traded firm (*Acquirer public*) and when the payment method is all cash (*Cash*). Since a private bidder is less likely to offer stock as payment, this all-cash effect likely also emanates from the private status of the bidder. Recall that the targets are all publicly traded so accepting stock as payment means converting a liquid stock (the target's) into an illiquid stock (the bidder's). This conversion is unattractive to sellers and helps explain why the proportion using all-cash as payment method is 50% for private bidders and only 32% for publicly traded bidders.[21]

[20] Liquidity does not seem to play a role beyond stock exchange listing as the variable *Turnover* enters with a small but negative coefficient and *Pennystock* is statistically insignificant.

[21] Private bidders use all-stock in 3% of the deals, and mixed cash-securities in the remaining 47% of the offers (where securities may be stock and/or bonds). Public bidders use all stock in 36% of the cases.

Our finding of a significantly greater toehold bidding probability for private bidders is intriguing. Recall that toehold bidding is optimal when the target's accept/reject criterion is independent of the toehold (Region I and III in Proposition 2). Target hostility (Region III) is unlikely to explain the greater toehold propensity of private bidders, however, as there is no discernable difference in the sample proportions of public and private bidders that are hostile (5% in both categories).

Alternatively, private bidders may be more prone than public bidders to seek out targets where the management's accept/reject decision is driven primarily by the security benefit of the offer (Region I). Recall that several private bidders are private equity investors. These investors are often focused on restructuring the target to achieve efficiency gains in terms of increased leverage and incentive-based compensation schemes. Moreover, to achieve these gains, private equity investors often have a clearly expressed policy of seeking out targets where the management is sufficiently effective to be a partner in the restructuring.

Turning to the bidder's decision on the toehold size, recall from Table 2 that the average toehold conditional on being positive is twenty percent. The average conditional threshold estimate is lower (eleven percent) as expected under threshold bidding. The last two columns of Table 5 examines whether the toehold size is also increasing in the threshold. For this test we condition on the toehold being positive. The coefficient on $Threshold * Positive\ toehold$ is positive and highly significant, as predicted by H1. That is, when bidders elect to bid with a positive toehold, the toehold size is increasing in the theoretical threshold estimate.

The impact of the remaining explanatory variables for the toehold size is somewhat weaker than their effect on the probability of observing a positive toehold. For example, neither target hostility nor cash payment impact the average toehold size. Toehold size does increase, however, when the target is traded on NYSE/Amex, and when the initial bid is a tender offer. The average toehold size is smaller when the target has a poison pill, possibly reflecting the constraint on the toehold of the pill itself,[22] and when the auction attracts multiple bidders. The latter finding is consistent with the proposition that relatively large initial bidder toeholds help deter competition from rival bidders (Bulow, Huang, and Klemperer, 1999).

[22]The typical pill is triggered for toeholds greater than fifteen percent.

5 Toeholds and takeover gains

The analysis so far has focused on the likelihood and size of toehold bidding. Our tests indicate that actual toehold bidding is consistent with the existence of a toehold threshold. In this section we examine two additional issues of interest to the overall toehold puzzle. First, we examine whether toehold bidding impacts takeover gains, either directly through prices or indirectly through the probability that the bidder wins the contest. Second, we study valuation effects of toeholds specifically in the no-bidder-wins outcome. This allows us to test the for the existence of toehold costs implied by the takeover model of Goldman and Qian (2005).

5.1 Toeholds and average abnormal stock returns

We estimate abnormal stock returns from trading day -41 relative to the first bid through the contest end. The ending date is the earlier of the target delisting date and the day of the last bid in the contest plus 126 trading days. Let AR_k denote the average daily abnormal stock return over the k'th event window, $k = 1, 2, 3$. The first event window covers trading days [-41, -2] (the runup period), the second is [-1, 1] (the announcement period), and the third is days [2, end] (the post-announcement period). The three event parameters AR_k are estimated using the following market model:

$$r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=1}^{3} AR_{jk} d_{kt} + \epsilon_{jt}, \qquad t = day(-291), ..., day(contest\ ends), \tag{8}$$

where r_{jt} is the return to firm j over day t, r_{mt} is the value-weighted market return, and d_{kt} is a dummy variable that takes a value of one if day t is in the k'th event window and zero otherwise. We estimate the event parameter for the total contest window [-41, end] separately using the market model with a single event parameter for the entire event period.[23] The cumulative abnormal return for event period k is $CAR_{jk} = \omega_k AR_{jk}$, where ω_k is the number of trading days in the event window. In a sample of N firms, the average cumulative abnormal return is $ACAR_k = (1/N) \sum_j CAR_{jk}$, which is reported in Table 6.[24]

[23]The estimation uses ordinary least squares with White's heteroscedastic-consistent covariance matrix.

[24]The table also reports the z-value for ACAR, where $z = (1/\sqrt{N}) \sum_j AR_{jk}/\sigma_{AR_{jk}}$ and $\sigma_{AR_{jk}}$ is the estimated standard error of AR_{jk}. Under the null of ACAR=0, $z \sim N(0, 1)$ for large N.

Starting with bidder abnormal returns, the ACAR for the total sample of 5,297 publicly traded bidders in Panel A is negative and strongly significant over the announcement period (-1.24%, z-value -18.40) and over the total contest period (-10.19%, z-value -12.71). Our announcement-return estimate is similar to the bidder abnormal return of a significant -1% reported by Fuller, Netter, and Stegemoller (2002) in acquisitions of public targets. In our subsample of 566 toehold bidders, however, the bidder ACAR is close zero over the announcement period and a marginally significant -4.05% (z-value -1.97) for the total contest period. The difference between the bidder ACAR in the zero-toehold sample and in the toehold sample is statistically significant at the 1% level. Furthermore, sorting on toehold bidding generates the largest relative benefit of toeholds for the subsample of 1,107 contests where no bidder wins. In Panel C, bidder ACAR in the zero-toehold sample is -20.11% for the total contest (z-value -8.28) compared to -7.83% (z-value -2.27) for 133 toehold bidders. The difference of 12.28% in these two ACARs is again statistically significant at the 1% level. In sum, the univariate sorts in Table 6 indicate that toehold bidders on average outperform bidders without toeholds, and particularly so when the target rejects all bids.

Turning to the total sample of 9,418 target firms, the target ACAR is a significant 6.84% for the runup period, 13.43% over the announcement-period , and 17.17% over the entire contest. The total contest gain for the 6,520 successful targets is a significant 26.90%, while the corresponding ACAR for 2,898 contests where no bidder wins is a statistically insignificant -4.71% (z-value 0.80). This finding updates the evidence first presented by Bradley, Desai, and Kim (1983): the target share price falls back to its pre-contest level when all bids fail. While Bradley, Desai, and Kim (1983) find this result over the two years following the initial bid, we demonstrate here that the target price decline occurs within 125 days of the final bid in failed contests.

Table 6 also shows that there is no discernible impact of toehold bidding on target ACAR for either the total sample or the sample of successful targets. However, the contest-period ACAR for ultimately unsuccessful targets is a significantly positive 13.90% (z-value 5.56) when the bidder has a toehold. In other words, when no bidder wins, the target stock price falls back to the pre-contest level only if the initial bidder does not have a toehold. This finding is of particular interest as the target price decline represents an ex post toehold cost (it reduces the market value of the toehold). Panel C of Table 6 suggests that toehold bidding itself is correlated with factors that lower this cost. We return to this issue below.

5.2 Cross-sectional determinants of bidder gains

Table 7 presents WLS parameter estimates in cross-sectional regressions with bidder abnormal returns CAR[-41,1] and CAR[-41,end], and the initial and final offer premiums, as dependent variables. Moreover, the last column shows logit-estimates of the determinants of the probability π that the initial bidder wins the contest.[25]

There are several interesting results. We follow Schwert (1996) and Betton, Eckbo, and Thorburn (2007) and include the target stock price rununp prior to the initial bid as a determinant for the bidder CARs and premiums. The significantly positive effect of the variable $Target\ runup$ suggests that takeovers associated with relatively large target runups are also relatively profitable for both bidders and targets. Moreover, the greater the target runup, the greater the probability π that the initial bidder succeeds. Also, bidder CARs measured over the total contest is significantly lower when no bidder wins. This result, which is consistent with the average CARs reported earlier in Table 6, indicates that winning is marginally better than losing for the bidder. While this does not explain why the overall market reaction to takeover bidding is negative for acquiring firms, it does indicate that withdrawing from the takeover attempt may be suboptimal once the bid has been launched.

In addition to $Target\ runup$ and $No\ bidder\ wins$, significant determinants of total contest-induced bidder CARs include the liquidity variables ($Penny\ stock$, $Turnover$, $NYSE/Amex$), all-cash as payment method, and the bid occurring prior to 1990. With the exception of $Penny\ stock$, these variables tend to affect offer premiums in the same direction as bidder CARs. Notice also that $Hostile$ increases the final offer premium but does not impact total bidder CARs. Moreover, the size of the target is insignificant across the board. $Toehold\ size$ also receives a statistically insignificant coefficient in the bidder CAR regressions. This suggests that the other variables included in the cross-sectional regression pick up the tendency for toehold bidding to be associated with greater (less negative) bidder CARs in Panel A and C of Table 6.

Finally, Table 6 shows that greater toeholds lower offer premiums (both initial and final premiums) and increase the probability π that the initial bidder wins. The significantly positive impact of $Toehold\ size$ on π indicates that toeholds are somewhat of a hedge against the no-bidder-wins

[25] Note that π differs from the probability θ estimated earlier in Table 4, as $1 - \theta$ is the probability that either the initial or a rival bidder wins.

outcome. Thus, toeholds have two opposing implications for the no-bidder-wins outcome. On the one hand, this outcome reduces the toehold value (Panel C of Table 6). On the other hand, bidding with a toehold reduces the probability π of that outcome. It appears that the net effect on bidder profitability is zero at the margin as the coefficients on *Toehold size* in the two bidder CAR regressions are statistically insignificant. [26]

5.3 When all bids fail

As shown earlier in Table 6, over the contest period, the target stock price rises in response to the initial bid and falls back to the pre-contest level when all bids fail. While the toehold threshold developed in Section 2 above fully accounts for the target share price returning to its pre-offer level when all bids are rejected, Goldman and Qian (2005) present a model in which the target price drops *below* the pre-offer price. Since toeholds are assumed to be acquired at the pre-offer target price (in both models), such a price drop adds a potentially important toehold cost that is unique to the Goldman and Qian (2005) model. In this section we provide a first empirical test of their key model prediction.

In Goldman and Qian (2005), a single bidder makes a conditional tender offer for a widely held target with entrenched management. As in our takeover game, target management will be replaced if the bid succeeds, so entrenched managers may resist the offer. The degree of managerial entrenchment is unknown ex ante, however, and it is assumed that successfully defeating a bidder requires greater entrenchment the greater the toehold. Thus, conditional on the toehold and successful target resistance, the market lowers the target share price to a level below the pre-bid price by an amount that is increasing in the toehold. Bidders trade off this potential price drop ex ante,

[26] To further check for a toehold impact on bidder CARs, notice that, since the market is forward-looking,

$$CAR[-41,1] = CAR_u(1-\pi(x)) + CAR_s\pi(x),$$

where CAR_u and CAR_s are the expected bidder returns conditional on the bid failing or succeeding, respectively, and x is a vector of offer characteristics. We identify CAR_u and CAR_s as parameters in the cross-sectional regression with $CAR[-41,1]$ as dependent variable and our estimate $\hat{\pi}$ as regressor:

$$CAR[-41,1] = CAR_u + (CAR_s - CAR_u)\hat{\pi}(x) + \epsilon,$$

where ϵ is a mean zero error term. Using the estimated regression parameters and $\hat{\pi}(x)$ to predict CAR[-41,1] (i.e., the bidder's expected return), we find that the partial derivative of this prediction with respect to *Toeholod size* is positive and significant. This effect is again a manifestation of the positive impact of *Toehold size* on π, and it simultaneously controls for the effect on bidder CAR of the other explanatory variables for π. The results of this analysis were reported in an earlier draft and are available upon request.

and a zero toehold is optimal at the margin for some bidders.[27]

Table 8 presents an empirical test of their proposition that the target price-drop in the no-bidder-wins outcome is increasing in the toehold. In the first two regressions, the dependent variable is the target CAR[-41,end]. For robustness, we also use as dependent variable the target raw return $ln(p_{end}/p_{-41})$, where p_{end} is the target stock price six months following the date of the last bid in the contest, and p_{-41} is the pre-contest target stock price (adjusted for splits and dividends).[28] The variable *Toehold size* receives a positive and statistically significant coefficient in the CAR regression, as does the variable *Positive toehold.* There is also no evidence of a negative price impact of toeholds when using the target's raw return. Jointly with Panel C of Table 6 (target CAR[-41,end] averages 13.90% when no bidder wins and the bidder has a toehold), this evidence fails to support the existence of the Goldman-Qian type of toehold cost.

Several of the other regressors in Table 8 are also significant. The target CAR in ultimately defeated contests increases with target characteristics such as runup and NYSE/Amex listing. The CAR—but not the premium measure—is also greater if the bid is horizontal and a cash offer. Notice that while several extant empirical studies show positive effects on target gains from an all-cash payment, the evidence in Table 8 further shows that such valuation effects are present in total target returns also when all bids are defeated.

6 Conclusions

Given the very high premia in control-oriented takeovers, one would expect bidders to purchase target shares in the open market up to the limits of market liquidity prior to launching the bid. Also, standard auction theory suggests that toeholds provide a competitive advantage over rival bidders. Against this background, we identify a multifaceted toehold puzzle. The first aspect of this puzzle is that short-term toeholds, which are the main focus of bidding theory, are almost non-existent. In a sample exceeding ten thousand initial bidders for control of publicly traded targets, only three percent acquire target shares over the six-month period leading up to the initial control bid. When

[27] Since the ex post target price drop is continuous, so is the optimal toehold size. Thus, there is no discrete toehold threshold as in our model.

[28] The difference between CAR[-41,end] and $ln(p_{end}/p_{-41})$ is essentially that the former contains estimation error from the market model, which may be non-negligible given the long contest duration of some defeated contests (on average 130 trading days, median 127). We also examined a p_{end} defined as the last bid date plus either three months or twelve months. Our conclusions are unaffected by these alternative definitions.

adding toeholds held long term, the overall toehold frequency is thirteen percent. Second, despite an increase in market liquidity, toehold bidding has declined steadily since the early 1980s and is now almost non-existent in merger bids. Third, when toeholds are positive, they are surprisingly large: on average twenty percent and thirteen percent for short-term toeholds. Fourth, toehold bidding is greater in tender offers than in initial merger bids, and it is the norm (fifty percent) in hostile bids. Finally, toehold bidding is more likely when the bidder is private rather than publicly traded.

Explaining the toehold puzzle requires identifying significant toehold costs. As highlighted by Goldman and Qian (2005), there is a potential for a bidder toehold cost if target rejection of all bids causes the target share price to fall below the toehold acquisition price. Since thirty percent of our total sample of initial bids ends up in the no-bidder-wins state—as much as forty-four percent when the bidder is private—this is a potentially important concern for bidders. As Bradley, Desai, and Kim (1983), we show that target abnormal stock returns through the entire contest is on average insignificantly different from zero in the subsample where no bidder wins. However, the target abnormal return is on average positive and significant in this subsample if the bidder has a toehold, and more positive the greater the toehold size. Since we also show that toehold bidding significantly increases the probability that the initial bidder wins, it follows that expected toehold costs associated with the no-bidder-wins outcome cannot explain the pervasive aversion to toehold bidding.

We argue in this paper that a theory purporting to resolve the toehold puzzle must generate optimal toeholds that are bimodal—centering on either zero or a relatively large threshold. We develop and test a two-stage takeover model that has this feature. The takeover game starts with a private merger bid and is followed by a public auction (the second stage). Toehold bidding in the second-stage auction gives rise to target-borne toehold costs because it increases the chance that the target management will be replaced. The key insight of the model is that the target-borne toehold costs give targets an incentive to resist negotiating with toehold bidders in the fist stage of the game. Moreover, the initial bidder in our model may avoid resistance by approaching the target with a zero toehold. With non-negligible bidder-specific costs of target resistance, zero toehold bidding may well be optimal for a wide range of bidder firms, as observed. This holds *a fortiori* when the target itself initiates merger negotiations, which is more common towards the end of our sample period (Boone and Mulherin, 2007b).

If toehold bidding is going to trigger costly target resistance, it follows that optimal toeholds must produce sufficient benefits for the bidder to offset those costs. Since bidder toehold benefits are increasing in the toehold size, this naturally leads to a toehold threshold. The threshold in our model is driven by the bidder private valuation of the target, the value of a termination agreement foregone as a result of hostility, and the probability that all bids for the target will fail. The sample-wide estimate of the threshold averages nine percent. We argue that, in the presence of liquidity costs, a threshold of this size may prevent a substantial number of bidders from acquiring toeholds. We show that the probability of observing zero-toehold bidding and the size of the toehold when positive both increase with the estimated toehold threshold, as predicted.

Moreover, the model predicts toehold bidding when the target's optimal merger decision in the first stage is independent of the toehold. In this case, the toehold does not trigger an opportunity cost for the bidder. This happens when target management is so entrenched that it is expected to resist all bids. Our finding that fifty percent of bidders launching hostile bids have toeholds is consistent with this prediction as well. Hostile bids are more likely to be in the form of a tender offer, and the overall toehold frequency in tender offers is twenty-six percent. Moreover, as the number of hostile takeovers declines during the second half of our sample period, the toehold bidding frequency also declines (Figure 2).

Finally, we conjecture (but do not test) that private bidders have greater toehold propensity because they may be more successful in identifying target management who place great emphasis on the security benefits of the offer. In our model, such targets will never resist, and as a result, toehold bidding is again optimal.

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Figure 1
The takeover game: private merger bid followed by public auction

The pre-game target share price is normalized to $p = 0$. The payoff to target management is $\beta + p$, where β is a private benefit of control and p is the bid price. The initial bidder B1's private valuation of the target is v and it has a toehold α. B1 initiates the game with a merger offer which stipulates removal of β and a termination fee t payable if B1 does not win. The target merger decision is always followed by a sealed-bid second-price public auction with a rival bidder B2 and bids p^* (by B1) and p_2. If the target accepts the merger proposal, B2 also removes β if it wins. If the target rejects B1's initial merger proposal, B1 initiates a hostile tender offer and B2 is a white knight allowing the target management to retain β. Moreover, in the hostile auction, the target imposes a bidder-specific resistance cost r on B1. If all bids fail, which happens with probability θ, the target stock price falls back to zero.

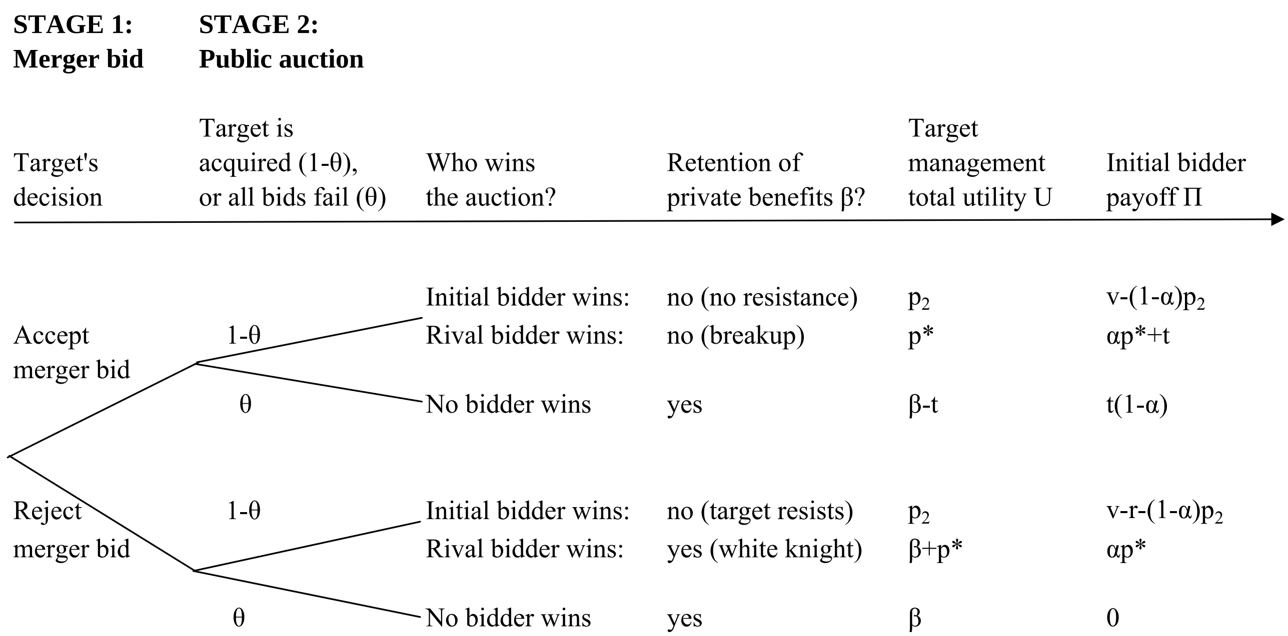


Figure 2
Annual percentage of toehold bidders

Percentage initial control bidders with positive toehold in the total sample of 3,056 tender offers over the period 1973-2002, and in 7,750 merger bids over the period 1980-2002. Targets are U.S. domiciled and publicly traded.

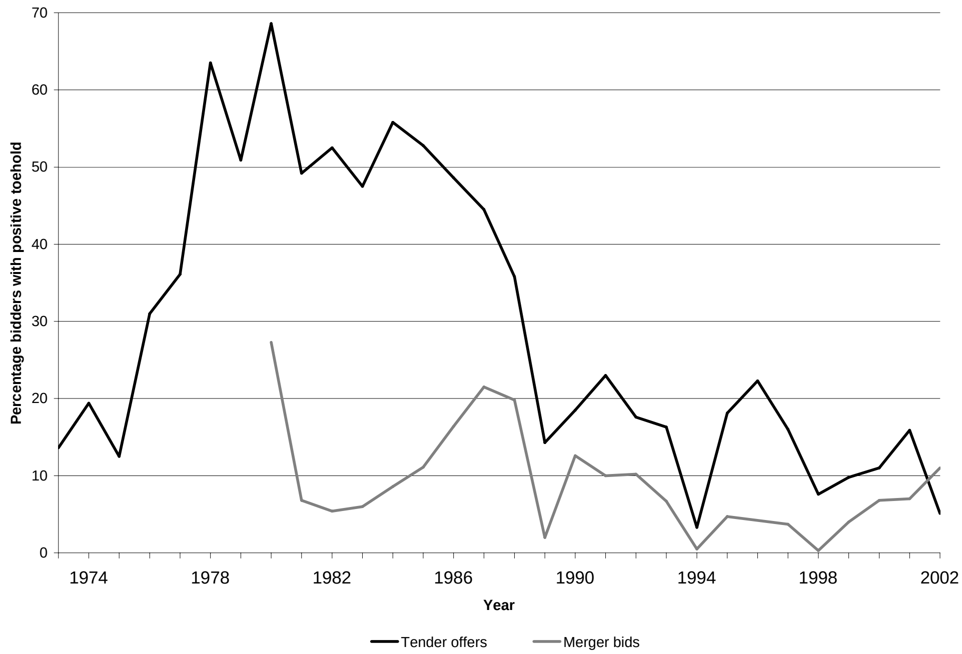
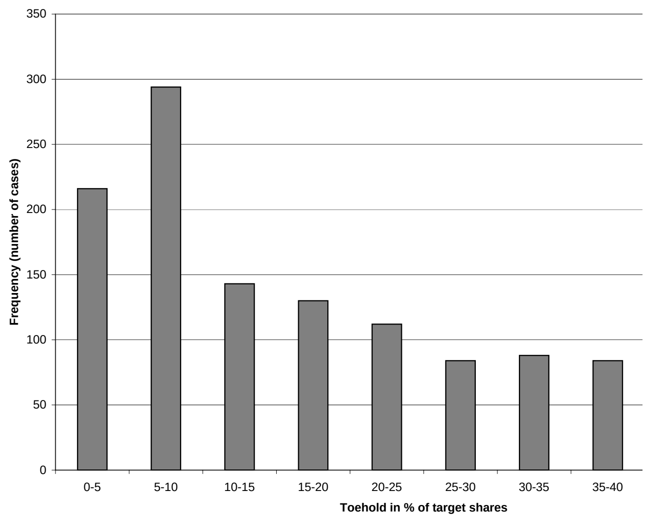


Figure 3
Frequency distribution of the initial control bidder's toehold size when positive

Panel A uses the total sample of 1,363 initial control bidders with positive toeholds for U.S. public targets, 1972-2002 (with merger bids sampled from 1980-2002). A toehold with a size equal to the boundary between two intervals is included in the lower interval. Panel B is for the subsample of 970 initial control bidders whose toeholds could be classified as long-term and short-term. A long-term toehold is purchased more than six months prior to the announcement of the initial control bid. A short-term toehold is purchased within six months of the initial bid.

A: Frequency distribution of the total toehold size



B: Frequency distribution of long-term and short-term toehold size

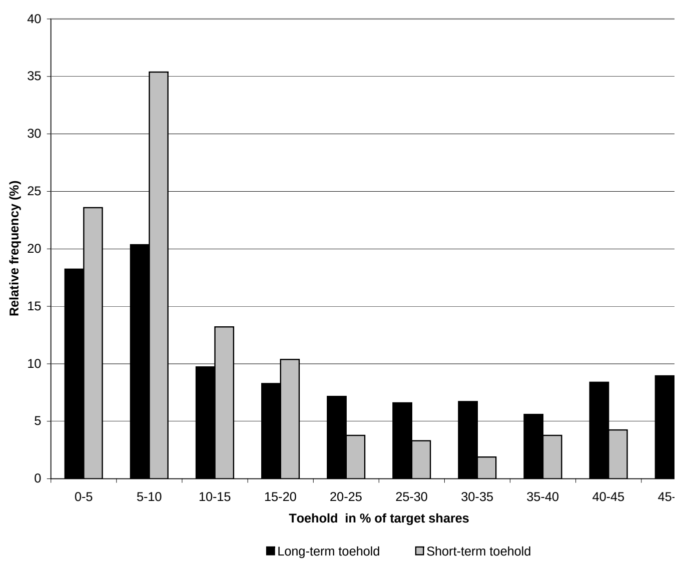


Table 1
The total sample of 10,806 control contests for public U.S. targets, 1972-2002.

The contest sample is constructed as follows: Between 1/1980 and 12/2002, the SDC Merger & Acquisitions data base contains 13,896 control bids for U.S. publicly traded firms with transaction form "M" (merger) or "AM" (acquisition of majority interest). A control bid is defined as the bidder owning less than 50% of the target shares prior to the bid and seeking to own at least 50% of the target shares. Successive control bids for the same target are then grouped into a control contest. A "contest" may have only a single control bid, multiple bids by a single bidder, or multiple bidders. A given control bid *initiates* the contest if there are no other public control bids for the same target over the preceding six months. All subsequent control bids within six months of a previous bid belong to the same contest, and the contest ends when there are no additional control bids for the same target over the following six-month period. We also include 1,106 tender offers for control identified by Betton and Eckbo (2000) that are not found in SDC, and we update another 610 SDC records with information from that paper. In addition, we search the WSJ for tender offers, which produces 200 control bids also not in the SDC. Reading the WSJ and the SDC history, we include any additional information on tender offer announcement dates, rival bids, and toeholds. This leaves a total of 15,197 bids for control. With our contest definition, these bids take place in a total of 12,721 takeover contests. When we also require the target to be listed on CRSP, the total sample becomes 10,806 control contests. The deal value is available for 8,271 contests and the final contest outcome is classified for 10,619 contests. The initial offer premium is $p_{ini}/p_{-41} - 1$, where p_{ini} is the first offer price, p_{-41} is the target stock price on day -41 adjusted for splits and dividends, and 0 is the day of the initial control bid. The final offer premium is $p_{fin}/p_{-41} - 1$, where p_{fin} is the last offer price in the contest. We have data on offer premiums for a total of 6,886 contests (source: SDC, WSJ and Betton and Eckbo (2000)).

		Deal value ($ million)		% of contests where the winner is:			Average offer premium (%)	
Sample	Number of cases	Mean	Median	Initial bidder	Rival	No bidder wins	Initial bid	Final bid
All contests	10,806	715	89	66.6	3.7	29.7	44.5	46.1
1972-1989	3,730	312	60	58.7	5.2	36.1	45.0	48.5
1990-2002	7,076	903	108	70.7	3.0	26.4	44.2	45.0
Merger bid	7,750	827	92	63.5	3.3	33.2	43.6	44.5
Tender offer	3,056	433	78	74.8	4.8	20.4	46.5	50.2
Acquirer public	6,726	902	112	75.6	3.2	21.3	46.1	47.5
Acquirer private	4,080	285	52	51.7	4.6	43.7	40.1	42.6
Single bidder	9,944	693	88	70.5	0.0	29.5	44.8	45.4
Multiple bidders	862	989	101	20.6	47.8	31.7	41.1	53.2
Target friendly	10,295	688	85	68.0	3.2	28.8	44.1	45.1
Target hostile	511	1,204	183	34.4	16.3	49.2	49.0	60.9
All cash	4,185	320	66	69.1	4.0	27.0	44.1	46.6
Stock/mixed	6,621	1,048	119	65.0	3.6	31.4	44.7	45.8

Table 2
Initial control bidder's toehold

The table shows the toehold of the initial control bidder in 10,806 contests for U.S. targets listed on CRSP, 1972-2002. A toehold is target shares held by the acquirer prior to the announcement of the initial control bid. The toehold information is from SDC, the WSJ and Betton and Eckbo (2000). A long-term toehold is purchased more than 6 months prior to the bid. A short-term toehold is purchased within the last 6 months of the bid. The toeholds could not be classified as long- and short-term for 393 tender offers. The toehold size reported in the table is conditional on a positive toehold.

	Initial bidders with toehold		% of toehold bidders with[b]		Average toehold size in % of target shares		
Sample	Number of cases	% of all bidders[a]	Long-term toehold	Short-term toehold	Total toehold	Long-term toehold	Short-term toehold
A: All control contests							
All contests	1,363	12.6	91.1	21.6	20.0	20.2	12.6
1972-1989	832	22.3	88.2	25.4	18.7	18.2	11.2
1990-2002	531	7.5	93.7	18.4	22.0	21.9	14.2
Merger bid	558	7.2	89.1	26.0	19.0	18.9	11.1
Tender offer	805	26.3	93.9	15.8	20.6	21.8	15.8
Acquirer public	714	10.6	91.8	17.7	19.5	20.4	14.2
Acquirer private	649	15.9	90.6	24.9	20.4	20.1	11.6
B: Contest outcome							
Single bidder	1,211	12.2	90.9	21.6	20.9	21.2	12.8
Multiple bidders	152	17.6	92.9	22.3	12.8	13.0	11.1
Target friendly	1,106	10.7	92.0	20.4	21.9	21.6	13.1
Target hostile	257	50.3	85.1	30.6	11.5	10.0	10.1
Initial bidder wins	866	12.2	88.3	24.3	22.7	23.0	14.8
Rival wins	79	20.0	94.0	16.0	10.9	12.1	5.8
No bidder wins	354	11.2	97.6	15.0	16.4	16.6	6.7

[a]The percent of the total number of initial bidders (with or without toehold) in the category specified by the row.
[b]The percent of the total number of initial toehold bidders in the category specified by the row.

Table 3
Summary of variables used in the cross-sectional analysis

Variable	Definition and estimation
A. Toehold bidding	
Toehold size	Fraction target shares owned by the initial control bidder prior to announcing the bid.
Positive toehold	The acquirer has a positive toehold.
Threshold	The minimum % toehold threshold $\hat{\alpha}$ required for the bidder to optimally acquire a toehold: $\hat{\alpha} = -k_1 + \sqrt{k_1^2 + k_2}$, where $k_1 = v - r - \frac{1}{2}(v^2 - t^2) - \frac{t}{1-\theta}$ and $k_2 = r(2v - r) + t(\frac{2}{1-\theta} - t)$ (Proposition 2). We use the initial offer premium (adjusted for splits and dividends) as a proxy for bidder private valuations v and assume the uniform distribution for v. The termination fee t is the actual fee in % of deal value. If missing, t is set to the average fee for control bids in the same industry and year. The probability θ that the target remains independent is the predicted value from model I in Table 4. The resistance cost $r = -(1-v) + \sqrt{(1-v)^2 + 2t/(1-\theta) - t^2}$, the minimum cost for Region II (Proposition 2) to exist.
B. Target characteristics	
Target size	Natural logarithm of the target market capitalization in $ million on day -41 relative to the announcement day of the initial bid (day 0).
Target runup	Target average cumulative abnormal return over the period [-41,-2] using a value-weighted market model estimated over [-291, end] with a dummy for the runup window. The contest ends on the earlier of target delisting and 126 trading days after the last control bid in the contest.
Penny stock	$p_{-41} < 1$, where p_{-41} is the target share price on day -41.
Turnover	Average daily trading volume as a fraction of target shares over [-166, -42].
NYSE/Amex	The target is listed on NYSE or Amex.
Poison pill	The target has a shareholder rights plan.
Industry	Vector of industry dummies for financial-, manufacturing-, trade-, and service industries.
C. Bidder characteristics	
Horizontal	Bidder and target has the same 4-digit primary SIC code.
Acquirer public	The bidder is publicly traded.
D. Contest characteristics	
Tender offer	Bid for at least 50% of the target shares (i) with SDC transaction form AM, (ii) with SDC transaction form M and flagged as a tender offer, or (iii) identified by the WSJ or Betton and Eckbo (2000) as a tender offer.
Cash	Payment method is cash only.
1972-1989	The contest is announced in the period 1972-1989 (versus 1990-2002).
Hostile	Target management's response is recorded as hostile, as opposed to friendly/neutral or response not recorded.
Multiple bidders	A rival bidder enters the contest.
No bidder wins	Indicates the no-bidder-win contest outcome.

Table 4
Determinants of the probability θ of the no-bidder-wins outcome

The table shows logit estimates of the coefficients for variables determining the probability θ that no bidder wins the contest. The estimations use initial control bids for targets listed in CRSP, 1972-2002. Variables are defined in Table 3. All regressions control for industry fixed effects (using the vector *Industry*). p-values are in parentheses.

	Sample period 1972-1989		Sample period 1990-2002	
Variable	Model I	Model II	Model I	Model II
Constant	0.847	0.911	0.495	0.445
	(0.009)	(0.006)	(0.062)	(0.097)
Target characteristics				
Target size	-0.015	-0.016	0.020	0.022
	(0.550)	(0.504)	(0.274)	(0.242)
Penny stock	-0.728	-0.615	0.473	0.483
	(0.074)	(0.135)	(0.001)	(0.001)
Turnover	0.024	0.025	0.003	0.003
	(0.163)	(0.138)	(0.506)	(0.423)
NYSE/Amex	-0.247	-0.367	-0.223	-0.253
	(0.029)	(0.002)	(0.015)	(0.006)
Poison pill	1.058	0.645	1.951	1.117
	(0.000)	(0.036)	(0.000)	(0.010)
Bidder characteristics				
Acquirer public	-0.567	-0.545	-1.693	-1.708
	(0.000)	(0.000)	(0.000)	(0.000)
Horizontal	0.024	-0.036	-0.279	-0.287
	(0.827)	(0.752)	(0.001)	(0.001)
Contest characteristics				
Tender offer	-0.574	-0.766	-0.942	-0.927
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	-0.337	-0.364	-0.821	-0.887
	(0.000)	(0.000)	(0.000)	(0.000)
Hostile		1.070		1.831
		(0.000)		(0.000)
Multiple bidders		-0.299		-0.032
		(0.019)		(0.814)
Number of cases	2,344	2,344	5,285	5,285
Nagelkerke R^2	0.087	0.117	0.208	0.226
χ^2	156.7	212.7	803.1	876.7
	(0.000)	(0.000)	(0.000)	(0.000)

Table 5
Determinants of the probability of toehold bidding and the toehold size.

The table shows logit estimates of coefficients for variables determining the probability that the initial control bidder has a toehold, and OLS regressions for the percent toehold size. Sample of initial control bids for targets listed in CRSP, 1972-2002. Variables are defined in Table 3. All regressions control for industry fixed effects (*Industry*). p-values are in parentheses.

Variable	Probability of toehold (logit)		% toehold size (OLS)	
Constant	-1.033	-1.223	3.302	3.417
	(0.001)	(0.000)	(0.000)	(0.000)
Toehold bidding				
Threshold	-0.017	-0.013		
	(0.004)	(0.034)		
*Threshold * Positive toehold*			0.953	0.958
			(0.000)	(0.000)
Target characteristics				
Target size	-0.030	-0.032	-0.019	-0.016
	(0.160)	(0.139)	(0.708)	(0.761)
Penny stock	-0.489	-0.444	-1.856	-1.892
	(0.132)	(0.178)	(0.004)	(0.003)
Turnover	-0.033	-0.026	-0.048	-0.051
	(0.001)	(0.008)	(0.002)	(0.001)
Nyse/Amex	0.674	0.521	0.649	0.671
	(0.000)	(0.000)	(0.003)	(0.002)
Poison pill	1.606	0.858	-4.428	-4.182
	(0.000)	(0.003)	(0.000)	(0.000)
Bidder characteristics				
Acquirer public	-1.095	-0.979	-0.997	-1.082
	(0.000)	(0.000)	(0.000)	(0.000)
Horizontal	-0.068	-0.162	-0.168	-0.158
	(0.479)	(0.102)	(0.431)	(0.460)
Contest characteristics				
Tender offer	1.175	1.084	2.902	2.926
	(0.000)	(0.000)	(0.000)	(0.000)
Cash	0.306	0.381	-0.429	-0.441
	(0.001)	(0.000)	(0.052)	(0.046)
Hostile		1.538		-0.344
		(0.000)		(0.400)
Multiple bidders		0.189		-1.168
		(0.150)		(0.001)
Number of cases	5,822	5,822	5,822	5,822
Nagelkerke/Adjusted R^2	0.192	0.234	0.284	0.285
χ^2/F-value	662.4	817.2	165.6	146.0
	(0.000)	(0.000)	(0.000)	(0.000)

Table 6
Average abnormal returns to bidders and targets sorted on toehold bidding

The sample is 9,418 control contests for U.S. targets with sufficient return data on CRSP, 1972-2002. The average daily abnormal stock return for firm j over event window k is estimated directly as the event parameter AR_{jk} in the value-weighted market model

$$r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=1}^{3} AR_{jk} d_{kt} + \epsilon_{jt}, \qquad t = day(-291), ..., day(contest\ ends),$$

where r_{jt} is the return to firm j over day t, r_{mt} is the value-weighted market return, and d_{kt} is a dummy variable that takes a value of one if day t is in the k'th event window and zero otherwise. Day 0 is the day of the initial control bid and the ending date is the earlier of the target delisting date and the day of the last bid in the contest plus 126 trading days. The three event windows are [-41, -2] (the runup period), [-1, 1] (the announcement period), and [2, end] (the post-announcement period). The estimation uses ordinary least squares with White's heteroscedastic-consistent covariance matrix. The cumulative abnormal return to firm j over event period k is $CAR_{jk} = \omega_k AR_{jk}$, where ω_k is the number of trading days in the event window. In a sample of N firms, the average cumulative abnormal return is $ACAR_k = (1/N)\sum_j CAR_{jk}$. The z-values are in parentheses, where $z = (1/\sqrt{N})\sum_j AR_{jk}/\sigma_{AR_{jk}}$ and $\sigma_{AR_{jk}}$ is the estimated standard error of AR_{jk}. Under the null of ACAR=0, $z \sim N(0,1)$ for large N.

	Bidder ACAR (%)				Target ACAR (%)			
Sample	No of cases	Runup [-41, -2]	Announcement [-1, 1]	Total [-41, end]	No of cases	Runup [-41, -2]	Announcement [-1, 1]	Total [-41, end]
Panel A: All contests								
All	5,297	0.36	-1.24	-10.19	9,418	6.84	13.43	17.17
		(0.20)	(-18.40)	(-12.71)		(25.61)	(105.20)	(37.45)
Zero toehold	4,731	0.48	-1.38	-10.92	8,146	6.83	13.39	16.98
		(0.55)	(-18.22)	(-12.76)		(22.80)	(95.88)	(34.00)
Positive toehold	566	-0.68	0.00	-4.05	1,272	6.90	13.69	18.39
		(-1.00)	(-3.61)	(-1.97)		(11.99)	(43.62)	(15.85)
Panel B: Contests where the target is ultimately acquired								
All	4,190	0.63	-1.24	-7.96	6,520	8.47	14.93	26.90
		(0.82)	(-17.06)	(-9.90)		(25.15)	(90.65)	(44.47)
Zero toehold	3,757	0.78	-1.39	-8.54	5,639	8.61	15.07	27.91
		(1.11)	(-17.10)	(-10.11)		(23.01)	(83.52)	(41.76)
Positive toehold	433	-0.75	0.00	-2.88	881	7.57	14.05	20.39
		(-0.71)	(-2.70)	(-1.00)		(10.21)	(35.33)	(15.34)
Panel C: Contests where no bidder wins								
All	1,107	-0.66	-1.21	-18.64	2,898	3.18	10.06	-4.71
		(-1.17)	(-7.05)	(-8.55)		(8.45)	(53.67)	(0.80)
Zero toehold	974	-0.69	-1.36	-20.11	2,507	2.83	9.62	-7.60
		(-0.96)	(-6.56)	(-8.28)		(6.59)	(47.57)	(-1.34)
Positive toehold	133	-0.46	-0.15	-7.83	391	5.40	12.88	13.90
		(-0.78)	(-2.58)	(-2.27)		(6.30)	(25.64)	(5.56)

Table 7
Determinants of bidder abnormal returns, initial and final offer premiums, and the probability π that the initial bidder wins the contest.

Sample of initial control bids for U.S. public targets with sufficient stock return data on CRSP, 1972-2002. The table reports WLS estimates of bidder cumulative abnormal returns (CAR) over the runup and announcement period [-42, 1] and over the entire contest [-41, end], respectively, using σ_{AR} as weights. Columns 3 and 4 report OLS estimates of log of the initial and final offer premium, $ln(p_{ini}/p{-}41)$ and $ln(p_{fin}/p{-}41)$, respectively, where p_{ini} is the initial offer price, p_{fin} is the final offer price in the contest, and p_{-41} is the target stock price on day -41 adjusted for splits and dividends. The last column shows a logit estimation of the probability π that the initial control bidder wins the contest. Variables are defined in Table 3. All regressions control for industry fixed effects. p-values are in parentheses.

Variable	Bidder CAR [-41, 1]	Bidder CAR [-41, end]	Initial offer premium	Final offer premium	Probability that initial bidder wins
Constant	-0.032	-0.173	0.168	0.156	-0.217
	(0.169)	(0.009)	(0.000)	(0.000)	(0.290)
Toehold bidding					
Toehold size	-0.001	0.014	-0.105	-0.106	1.863
	(0.978)	(0.914)	(0.024)	(0.033)	(0.000)
Target characteristics					
Target size	0.000	-0.001	0.000	0.001	-0.018
	(0.893)	(0.859)	(0.809)	(0.575)	(0.213)
Target runup	0.150	0.144	0.740	0.754	0.806
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Penny stock	0.091	0.214	-0.111	-0.136	-0.506
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Turnover	-0.002	-0.008	-0.001	-0.001	0.002
	(0.000)	(0.000)	(0.082)	(0.101)	(0.704)
NYSE/Amex	0.010	0.098	0.021	0.026	0.211
	(0.104)	(0.000)	(0.020)	(0.005)	(0.002)
Poison pill	0.018	0.038	-0.001	0.018	-1.694
	(0.562)	(0.676)	(0.986)	(0.649)	(0.000)
Bidder characteristics					
Acquirer public			0.026	0.021	1.197
			(0.015)	(0.059)	(0.000)
Horizontal	0.017	0.013	-0.005	0.003	0.121
	(0.008)	(0.457)	(0.539)	(0.779)	(0.060)
Contest characteristics					
Tender offer	0.000	0.004	-0.036	-0.032	0.704
	(0.988)	(0.868)	(0.000)	(0.002)	(0.000)
Cash	0.009	0.075	0.039	0.049	0.450
	(0.252)	(0.000)	(0.000)	(0.000)	(0.000)
1972-1989	-0.003	0.052	0.014	0.016	-0.783
	(0.739)	(0.018)	(0.115)	(0.108)	(0.000)
Hostile		0.048		0.062	
		(0.260)		(0.000)	
Multiple bidders		-0.045		0.059	
		(0.198)		(0.000)	
No bidder wins		-0.113			
		(0.000)			
Number of cases	4,417	4,417	5,825	5,926	7,470
Nagelkerke/Adjusted R^2	0.050	0.048	0.286	0.271	0.197
χ^2/F-value	16.5	13.4	147.0	123.6	1,139.6
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Table 8
Determinants of target abnormal returns when no bidder wins.

The table shows WLS estimates of the target total cumulative abnormal return $CAR[-41, end]$, using σ_{AR} as weights, and OLS estimates of the target total raw return $ln(p_{end}/p_{-41})$, where p_{end} is the target stock price 126 days after the last control bid in the contest and p_{-41} is the closing price 41 days prior to the initial control bid, adjusted for splits and dividends. The sample is control contests for targets listed in CRSP 1972-2002 where no bidder wins. The explanatory variables are defined in Table 3. All regressions control for industry fixed effects. p-values in parentheses.

Variable	Target total CAR [-41, end]		Target raw return $ln(p_{end}/p_{-41})$	
Constant	-0.349	-0.353	5.342	5.309
	(0.005)	(0.005)	(0.000)	(0.000)
Toehold bidding				
Toehold size	0.917		0.450	
	(0.001)		(0.505)	
Positive toehold		0.233		0.255
		(0.000)		(0.084)
Target characteristics				
Target size	-0.011	-0.011	-0.486	-0.485
	(0.244)	(0.246)	(0.000)	(0.000)
Target runup	1.305	1.302	0.275	-0.271
	(0.000)	(0.000)	(0.126)	(0.132)
Penny stock	0.066	0.067	-3.007	-3.003
	(0.192)	(0.181)	(0.000)	(0.000)
Turnover	-0.010	-0.010	-0.011	-0.011
	(0.000)	(0.000)	(0.072)	(0.075)
Nyse/Amex	0.195	0.188	0.600	0.594
	(0.000)	(0.000)	(0.000)	(0.000)
Poison pill	0.172	0.165	0.552	0.538
	(0.237)	(0.256)	(0.078)	(0.086)
Bidder characteristics				
Acquirer public	-0.062	-0.058	-0.189	-0.181
	(0.147)	(0.177)	(0.117)	(0.135)
Horizontal	0.146	0.150	0.118	0.123
	(0.002)	(0.002)	(0.348)	(0.325)
Contest characteristics				
Tender offer	-0.007	-0.015	-0.596	-0.612
	(0.873)	(0.740)	(0.000)	(0.000)
Cash	0.216	0.213	-0.244	-0.262
	(0.000)	(0.000)	(0.017)	(0.011)
1972-1989	0.020	0.013	0.188	0.181
	(0.627)	(0.750)	(0.055)	(0.065)
Hostile	0.138	0.097	0.663	0.616
	(0.071)	(0.209)	(0.000)	(0.001)
Multiple bidders	-0.119	-0.123	-0.013	-0.019
	(0.048)	(0.041)	(0.932)	(0.906)
Number of cases	2,292	2,292	2,026	2,026
Adjusted R^2	0.391	0.392	0.233	0.234
F-value	82.59	82.93	35.12	35.31
	(0.000)	(0.000)	(0.000)	(0.000)