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Markup Pricing Revisited

Finance Working Paper N° 199/2008
April 2008

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Keywords: Bidder returns, target runup, takeover, markup pricing, toehold bidding

JEL Classifications: G3, G34

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We examine whether pre-bid target stock price runups lower bidder takeover gains and deter short-term toehold purchases in the runup period. A dollar increase in the runup raises the initial offer price by $0.80 (markup pricing). Bidder gains, while decreasing in offer price markups, are *increasing* in runups, suggesting that runups are interpreted by the negotiating parties as reflecting increases in target stand-alone values. We also show that short-term toehold purchases increase runups. However, when purchased by the initial bidder (as opposed to by other investors), short-term toeholds lower markups, possibly because they provide evidence to the target that the runup anticipates the pending offer premium (supporting substitution between the runup and the markup). We conclude that markup pricing per se is unlikely to deter short-term toehold aquisitions

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1 Introduction

Takeover bids are typically preceded by substantial target stock price runups. The runup reflects takeover rumors generated from various public sources, such as Schedule 13(d) filings with the Securities and Exchange Commission (SEC) disclosing stake purchases of 5% or more in the target, media speculations and "street talk". The conventional view is that runups reflect takeover rumors based on information that is already known to the bidder. If this view is correct, the runup anticipates an already planned offer premium and does not require a premium revision before the offer is made. As developed by Schwert (1996), this view produces an offer premium that is independent of the runup. Alternatively, the cause of the runup may be new information about the target's fundamental or stand-alone value. If this is the consensus view among the parties negotiating the takeover, the runup forces the bidder to respond by marking up the planned offer price. Under this "markup pricing" hypothesis, a dollar increase in the runup increases the offer price by a dollar.

Schwert (1996) regresses a measure of the final takeover premium on the runup and finds strong evidence of markup pricing. His evidence raises a number of important questions about the takeover process and the negotiating parties' response to the information in the runup. With a sample of seven thousand initial takeover bids for publicly traded U.S. targets 1980-2002, we address four issues. First, does the markup pricing phenomenon manifest itself in the *initial offer price*? The initial offer price markup is of particular interest because it responds without time lag to the information in the runup. Moreover, this markup is free of information on subsequent events and bids. Consistent with Schwert (1996), we find that a dollar increase in the runup raises the initial offer by \$0.80 in the overall sample.

Second, does the cross-sectional evidence on markup pricing imply that runups are costly for bidders? To answer this question, we develop a simple framework illustrating the nature of the runup under the substitution and markup pricing hypotheses. Markup pricing follows naturally if the runup signals an increase in the target's stand-alone value. Markup pricing is value-neutral for the bidder if this increase does not affect bidder synergy gains. For this to be the case, the bidder must be as efficient as the best alternative management team (including the incumbent target management) in running the target firm at the higher stand-alone value. We examine this

issue by regressing bidder takeover gains on the runup. We find that bidder abnormal stock returns, whether measured over the entire takeover contest or around the offer announcement, are *increasing* in the runup. At the same time, bidder gains are decreasing in the initial offer markup. Since we also find that markups are non-increasing in runups, the cross-sectional evidence does not support the view that runups are costly.

Third, how do large market purchases of target shares during the runup period (henceforth "short-term toeholds") affect runups, markups and total offer premiums? Defining the runup period as the two calendar months preceding the initial takeover bid, we track short-term toehold purchases by the initial bidder as well as by other investors. Our toehold data are from Thomson's SDC Mergers & Acquisitions data base (SDC), which reports partial acquisitions originally disclosed in Schedule 13(d) to the SEC. We find that short-term toeholds increase runups regardless of the investor type. However, the degree of substitution between the runup and the markup depends on the identity of the buyer: it is significantly greater when the short-term toehold is purchased by the initial bidder as opposed to another investor. Our interpretation is that a toehold purchase helps convince the target that the runup reflects the initial bidder's own actions, supporting substitution. On the other hand, toehold purchases by other investors indicate potential competition for the target, which supports markup pricing, as the data shows.

Fourth, our evidence on short-term toehold purchases by the initial bidder allows us to address a piece of the "toehold puzzle" hitherto absent from the literature. The puzzle is that while toeholds convey substantial bidder benefits in theory, toeholds are in fact rare.[1] Over the past three decades only about ten percent of firms initiating bids for control of publicly traded U.S. targets had toeholds, and the toehold frequency has been steadily declining since the 1980s (Betton, Eckbo, and Thorburn, 2008). Our short-term toehold data helps resolve the question of whether bidders are deterred from purchasing toeholds in the runup period due to the potential for creating costly runups. Our evidence is inconsistent with this deterrence hypothesis. Specifically, short-term toeholds purchased by the initial bidder *lowers* markups and, controlling for bidder self-selection, do not increase total offer premiums. Moreover, these short-term toeholds increase the probability that the initial bidder wins the target.[2]

[1] Toeholds reduce the number of shares that must be purchased at the full takeover premium, and they are sold at a profit in the event that a rival bidder wins the target.

[2] This is consistent with the finding in the literature more generally (without distinguishing short-term toeholds

The paper is organized as follows. Section 2 discusses predictions of the substitution and markup pricing hypotheses, and the nature of costly short-term toeholds. Section 3 explains the sample selection procedure and provides data characteristics. Section 4 presents the markup pricing analysis and its impact on bidder takeover gains. Section 5 examines the short-term toehold decision and its effect on runups and offer premiums after adjusting for self-selection. Section 6 concludes the paper.

2 Runups, markups and toeholds: Hypotheses

2.1 The information in the runup

In this section, we develop predictions of the substitution and markup pricing hypotheses for the coefficients b and b_b in the following cross-sectional regressions:

$$Markup_i = a + bRunup_i + cX_i + u_i, \tag{1}$$

$$BCAR_i = a_b + b_bRunup_i + c_bX_i + u_i, \tag{2}$$

where $Markup$ is the initial offer premium minus the runup, $BCAR$ is bidder takeover gains, X is a vector of control variables, and u is an error term.

Let $v_1 = v_0 + v$ denote the target's stand-alone value on the day before the initial control bid. Here, $v_0 > 0$ is the target value prior to the runup period, assumed to contain no information about the pending bid. Moreover, $v \geq 0$ is the change in the target's stand-alone value over the runup period. Let $s_1 = s_0 + s(v)$ denote the expected total synergy gains from the takeover, where $s(0) = 0$. Total synergies are shared such that the target receives θs_0, where θ is a constant (determined by bidder competition). The initial offer premium p is

$$p(v) = v_0 + v + \theta s_0. \tag{3}$$

from those held long-term) that toehold bidding increases the probability of winning (Walkling, 1985; Jennings and Mazzeo, 1993; Betton and Eckbo, 2000; Betton, Eckbo, and Thorburn, 2008).

Moreover, the runup r and the markup m, which by definition sum to the total premium, are

$$r(v,\ \pi) = v + \pi\theta s_0 \quad \text{and} \quad m(\pi) = v_0 + (1-\pi)\theta s_0, \tag{4}$$

where π is the market's assessment of the probability that the target will be acquired. The bidder's net takeover gain is given by

$$g(s(v)) = (1-\theta)s_0 + s(v). \tag{5}$$

The markup pricing hypothesis abstracts from partial anticipation ($\pi = 0$) so that the target runup is driven solely by the change in the target's stand-alone value, $r(v) = v$:

> **H1 (Markup pricing):** *If $\pi = 0$ the markup is independent of the runup: $\partial m/\partial r = 0$ so $b = 0$. The runup is costly if $\partial g/\partial r = s'(v) < 0$ so $b_b < 0$. The runup is neutral or beneficial to the bidder if $s'(v) \geq 0$ so $b_b \geq 0$.*

Focusing on the effect of the runup v, under H1 the bidder pays the target the full value of v in return for $v + s(v)$. The markup is a function of the pre-runup target value and synergies and is therefore independent of the runup. In contrast, the bidder gains depend on both s_0 and $s(v)$, so the bidder's cost of the runup is a function of $s'(v)$.

When $s'(v) < 0$, the increase in the stand-alone value reduces bidder total synergies. There may be negative externalities between some target division and the bidder firm, for example because a target division competes with customers of the bidder and causes some customers to look for other suppliers. A case of this type is the HMO Humana, which eventually spun off its hospitals in 1993 in order to better attract patient referrals from competing HMOs. Solving these problems by divesting or spinning off the target division after the merger may be costly.

The substitution hypothesis abstracts from an increase in the target's stand-alone value, so the runup is driven entirely by the premium anticipation, $r = \pi\theta s_0$:

> **H2 (Substitution)** *If $v = 0$ there is perfect substitution between the runup and the markup: $\partial m/\partial r = -1$ so $b = -1$. Moreover, $\partial g/\partial r = 0$ so $b_b = 0$.*

In this case, the markup compensates for partial anticipation and the runup is neutral for the bidder.

2.2 Potential short-term toehold costs

As indicated in the introduction, bidder toehold benefits include a reduction in the number of target shares that must be acquired at the full takeover premium, and the profits from selling the toehold should a rival bidder win the target. The low actual toehold frequency means these expected benefits are offset by economically significant toehold costs. The literature identifies several potential sources of toehold costs, ranging from market illiquidity (Ravid and Spiegel, 1999) and information disclosure (Jarrell and Bradley, 1980; Bris, 2002) to target resistance costs (Goldman and Qian, 2005; Betton, Eckbo, and Thorburn, 2008).

Acquiring a short-term toehold may provide rivals with sufficient time and information to prepare competing bids. There are several toehold-induced information channels for the rivals. First, if the target stock is illiquid, the purchase may cause abnormal movements in the stock price and attract investor scrutiny. Second, block trades and abnormal trading volume may also trigger media speculations that a firm is in play. For example, Jarrell and Poulsen (1989) show that media speculations result in significant share price runups. Third, the information in Schedule 13(d) filings discloses the toehold purchaser's intentions with the target, causing price effects (Mikkelson and Ruback, 1985; Holderness and Sheehan, 1985; Choi, 1991). Fourth, the toehold purchase may trigger a pre-merger notification under the 1976 Hart-Scott-Rodino Antitrust Improvements Act.[3]

Thus, a decision to acquire a short-term toehold must be weighted against the odds that the toehold creates costly competition. Competition among bidders raises the target's bargaining power (θ), increasing the target's share of the total synergy. This increase manifests itself through a higher markup and total offer premium, and in reduced bidder gains. Using the above, $\partial m/\partial\theta = (1-\pi)s_0 > 0$, $\partial p/\partial\theta = s_0 > 0$, and $\partial g/\partial\theta = -s_0 < 0$.

Because the expected toehold benefits allow the acquirer to bid more aggressively, toeholds may also deter competition (Bulow, Huang, and Klemperer, 1999; Dasgupta and Tsui, 2004) and allow the bidder to win more often. This may cause certain targets to resist toehold bidders. In the empirical analysis, we exploit the toehold threshold developed by Betton, Eckbo, and Thorburn (2008). In that model, a toehold bidder's invitation to negotiate a merger is rejected by some target

[3] As of October 2005, pre-merger notification is required for transactions of $212 million or more, and for transactions exceeding $53 million if one party has assets or revenues of at least $106 million and the other party of at least $11 million. Merger-notifications are typically made public with a two-month or longer delay.

managements. A refusal to negotiate is costly because it eliminates the possibility of receiving a termination fee should the target withdraw from a negotiated merger agreement. The model gives rise to a toehold threshold defined by the condition that the expected toehold benefit equals the expected cost of target rejection. Bidders approach the target either with zero toehold (to avoid resistance) or with toeholds exceeding the threshold size.

These potential costs are summarized in H3:

> **H3 (Short-term toehold costs)** *Short-term toehold acquisitions may increase markups and offer premiums, attract rival bidder entry, and trigger target resistance costs.*

We examine H3 by estimating the impact of short-term toeholds on markups, offer premiums and bidder abnormal returns, as well as on the probability that the toehold bidder wins the target. Moreover, we measure the *net* toehold threshold as the difference between the threshold and the bidder toehold at the start of the runup period. Thus, we test whether the short-term toehold acquisition is driven by expected resistance costs conditional on the bidder's long-term toehold.

3 Sample selection and data characteristics

3.1 Control contests and short-term toehold frequencies

We sample from SDC 13,730 public control bids (transaction form M and AM) for US publicly traded targets over the period 1980-2002. In a control bid, the buyer owns less than 50% of the target shares prior to the bid and seeks to own at least 50% of the target equity. The early SDC years are augmented with 687 control bids from Betton and Eckbo (2000) and 183 control bids found by searching the Wall Street Journal (WSJ) for tender offers.

The bids are grouped into takeover contests. A takeover contest may have multiple bidders, several bid revisions by a single bidder or a single control bid. The initial control bid is the first control bid for the target in six month. All control bids announced within six months of an earlier control bid belong to the same contest. The contest ends when there are no new control bids for the target over a six-month period. This definition results in 12,087 takeover contests.

We define the runup period as extending from day -42 through day -1 relative to the initial offer (day 0). We exclude targets with (1) less than 100 days of common stock return data in CRSP over

the contest event period (day -42 through the end); (2) a stock price less than $1 on day -42; (3) a total market equity capitalization below $10 million on day -42; and (4) no SIC code in CRSP. The final sample has 7,522 control contests. Of these, 7,439 initial bids are in SDC, while 79 are unique to Betton and Eckbo (2000) and another 4 are from the WSJ search.

We also use SDC and Betton and Eckbo (2000) to identify short-term toehold purchases. Over the period 1980-2002, there are 10,908 acquisitions of partial interest (transaction form AP), where the bidder seeks to own less than 50% of the target. Of these, 347 are purchases of stock in our sample target firms announced over the 42 trading days leading up to and including the day of the announcement of the initial control bid. We refer to these 347 partial acquisitions as short-term toeholds. These toeholds are in 311 different targets. That is, 4.1% of our targets have investors (initial bidder or other investors) with short-term toeholds. There are no short-term toehold purchases for 96% of the sample (7,211 targets).

Of the targets with short-term toeholds, 278 (89%) have a single toehold purchase. Of the remaining 33 targets, 30 (10%) have two toeholds, and 3 targets have up to five toehold purchases. Moreover, of the 347 short-term toeholds, 146 (in 144 targets) are acquired by the initial control bidder. The remaining 201 short-term toeholds are acquired by other investors in 182 targets. For 15 targets, a short-term toehold is acquired by both the initial control bidder and another investor.[4]

Of initial control bidders' short-term toeholds, 101 (or 70%) are announced on the day of the initial control bid. Moreover, 20 (11%) of the toehold purchases by other investors are also announced on the offer day. Since the SEC allows investors ten days to file a 13(d), these toeholds have been purchased in the 10-day period preceding the offer announcement. Thus, for these cases, the target stock-price runup does not contain information from a 13(d) schedule. The remaining short-term toeholds are disclosed in the runup period [-41,-1].

3.2 Contest characteristics

Table 1 lists the annual distribution of various characteristics of the initial control bids. The mean (median) deal value for the total sample is $688 million ($91 million). There is a marked increase in the average deal value towards the end of the sample period. Three-quarters of the control bids

[4]Extending the sampling of partial acquisitions to a six-month period prior to the initial control bid produces an additional 21 targets with short-term toeholds by the initial control bidder and another 191 targets with short-term toeholds purchased by other investors.

are merger offers and 11% are followed by a bid revision or competing offer from a rival bidder. The frequency of tender offers and multiple-bid contests is higher in the first half of the sample period. The initial bidder wins control of the target in 67% of the contests, with a higher success probability towards the end of the sample period.

The last four columns of Table 1 describe the toehold of the initial control bidder. The total toehold is the percent of the target shares (maximum 50%) held by the initial control bidder at the time of the offer. This total is the sum of toeholds acquired prior to the runup period and any short-term toehold. The total toehold is from SDC and is the same as in Betton, Eckbo, and Thorburn (2008), with the exception of 49 short-term toeholds uniquely identified here.[5]

A total of 1,046 (14%) of the 7,552 initial control bidders have a positive toehold. The toehold frequency is substantially higher in the 1980s: 25% versus 7% in the 1990s. While not shown in the table, there are substantially more toeholds in merger bids (8%) than in tender offers (29%), and in hostile bids (53% vs 11% in friendly bids). Moreover, as the table shows, 2% of the initial control bidders have a short-term toehold. The frequency of short-term toeholds is highest in the 1985-1990 period.

Conditional on the toehold being positive, the average toehold is large: 19% with a median of 14%. Although the frequency of toeholds declines over the sample period, the average toehold size is somewhat larger towards the end of the period: the average toehold is 17% (median 12%) in the 1980s versus 21% (median 18%) in the 1990-2002 period. While not shown in the table (due to the small annual sample size), the typical short-term toehold is also relatively large, with a mean of 10.1% (median 6.9%) for initial control bidders and 8.6% (median 6.2%) for other investors.

3.3 Industry characteristics

Table 2 shows characteristics of the targets' primary 4-digit SIC industry in the year of the takeover announcement, across the two subperiods 1980-1989 and 1990-2002. One-third (2,440) of the control bids are in the former period and two-thirds (5,082) are in the latter sample period. As shown in Panel A, one-third (35%) of the targets are in the manufacturing industry, while one-quarter are in each of the financial (27%) and services (24%) industries. The remaining 14% of targets are in

[5]We identify 49 short-term toeholds announced on the offer date that are not in the SDC toehold field. Missing total toehold data in SDC is otherwise classified as a toehold of zero. As discussed in Betton, Eckbo, and Thorburn (2008), SDC's overall toehold reporting accuracy increases over the sample period.

the natural resources, trade and other industries. One-fifth of the control bids are horizontal. A bid is horizontal if the target and acquirer has the same 4-digit SIC code in CRSP or, when the acquirer is private, the same 4-digit SIC code in SDC. Panel A also shows that 54% of the target firms have a book-to-market ratio exceeding the median firm in their industry.[6]

Panel B of Table 2 reports acquisition intensities for the initial bidder and the industry of the target. For initial bidders, we identify all control bids for public targets in SDC over the prior two and five years. The table reports the fraction of the sample bidders with no prior bids: 80% over the past two years, and 74% over the past five years. Thus, the majority of initial bidders are "infrequent" acquirers, with the overall acquisition intensity being somewhat higher after the 1980s. While not shown, the highest number of prior control bids is 22 (14) for the previous five-year (two-year) period. Of the frequent acquirers, 90% have 4 bids or less over the two-year window, and 5 bids or less over the five-year window.

The target industry acquisition intensity is measured in two ways. Following Song and Walkling (2000), the first measure, "dormant industry", is the proportion of our sample bids where the bid is the first control bid in the target industry over the past 12 or 24 months, respectively. We identify past takeovers in the target industry using CRSP delisting codes for mergers & acquisitions (codes 200-299). Across the sample, 39% and 30%, respectively, of the target industries are dormant (have zero delistings) over these two periods. Moreover, the proportion dormant industries is significantly higher in the 1980s than in the 1990s (41% versus 25% using a 2-year window). The second measure is the number of delistings due to M&A over the last 12 months divided by the total number of industry rivals in CRSP (including the delisted firms). In the average industry, 4% of the firms are delisted due to M&A (median 3%). Again, the delisting frequency is greater in the 1990s.

Finally, Panel C shows target industry concentration. The average number of industry rivals identified in CRSP is 106, with a median of 31 rival firms. The Herfindahl index is $HI = \Sigma_i^n (s_i/S)^2$, where s_i is the total sales of firm i (from Compustat in the year prior to the takeover) and S is the total sales in the industry, such that $S = \Sigma_i^n s_i$ and n is the total number of rivals (including the target) in the 4-digit SIC industry. The average Herfindahl index is 0.26 (median 0.19). Targets in the 1990s tend to be in less concentrated industries than targets in the 1980s.

[6]The book-to-market ratio is computed using December year-end data in Compustat in the year prior to the announcement.

3.4 Average runups, markups and offer premiums

Table 3 shows average premiums, runups, markups, and bidder returns for the total sample of 7,522 control bids. The initial offer premium is $(p_{initial} - p_{-42})/p_{-42}$, where $p_{initial}$ is the initial offer price and p_{-42} is the target stock closing price or, if missing, the bid/ask average on day -42, adjusted for splits and dividends. The final offer premium is $(p_{final} - p_{-42})/p_{-42}$, where p_{final} is the final offer price in the contest. Offer prices are from SDC and Betton and Eckbo (2000). The median offer premium is consistently a few percentage points lower than the mean, and we report only the mean in Table 3.

We also report premiums measured using target abnormal stock returns. The average daily abnormal stock return for firm j over event window k is estimated as the event parameter AR_{jk} in the conditional market model:

$$r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=1}^{K} AR_{jk} d_{kt} + \epsilon_{jt}, \quad t = day\{-291, ..., end\}, \tag{6}$$

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. For target firm estimation, the total number of event windows is $K = 2$. The two event windows are $[-41,\ -1]$ (the runup period) and $[0, end]$ (the markup period). The ending date (end) is the earlier of target delisting and 126 trading days after the last control bid in the contest. For bidder firm estimation, $K = 3$: $[-41,\ -2]$, $[-1,\ 1]$, and $[2,\ end]$. Moreover, for both targets and bidders, we re-estimate Eq. (6) with a single dummy variable for the entire contest window $[-41,\ end]$.[7]

The estimation uses OLS 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 $ACAR_k = (1/N) \sum_j CAR_{jk}$, which is reported in Table 3.[8]

Starting with the premiums in Panel A of Table 3, the average initial offer premium is 43.2%

[7] We use a slightly different announcement period window for bidders and targets. The hypotheses in Section 2 assume that the bidder waits until day -1 before ultimately deciding on the offer price markup. We therefore let the runup period go through day -1 for targets (implying an announcement period of [0, 1]). For bidders, however, we strive to capture as much as possible of the bid announcement effect, so we start the bidder announcement period on day -1 (as is customary in the literature).

[8] 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.

for the total sample. This premium is somewhat lower for bids where the initial bidder ultimately fails (38.8%) suggesting that one reason for the failure is a relatively low initial offer. Initial bid premiums are similar in mergers and tender offers, 42.9% versus 44.2%. The initial premium is on average lower, however, when the bidder has a toehold in the target, 36.6% versus 44.3% for bidders with zero toehold. Reflecting the preponderance of single-bid contests in our data base, the final bid premium is on average close to the initial: 43.2% versus 44.9% for the total sample.

The total target abnormal return over the contest in Panel A, $ACAR_{[-41,\ end]}$, is generally much lower than the average final offer premium $(p_{final} - p_{-42})/p_{-42}$. The difference is due to the fact that (1) $ACAR$ reflects a probability of takeover which is less than one, while the offer premium is free of this probability, (2) $ACAR$ is measured to the assumed ending date for the contest, and (3) $ACAR$ picks up estimation errors in the market model parameters. For example, while the final offer premium in bids that ultimately fail averages 40.9%, the corresponding $ACAR_{[-41,\ end]}$ is -10.5%. For the total sample, the final offer premium averages 44.9% while $ACAR_{[-41,\ end]}$ is only 14.3%. This highlights a problem with using target abnormal stock returns in the analysis of markup pricing, and motivates our use of offer prices.

Turning to the runups in Panel B, we report runups using either the raw return $(p_{-1} - p_{-42})/p_{-42}$ or the abnormal stock return from day -41 through day -1. For the total sample, the raw-return runup averages 12.0%, which is roughly one quarter of the initial offer premium. Average runups vary considerably across offer categories, with the highest runup for tender offers (19.4%) and the lowest in bids that subsequently fail (5.2%). Target runups are generally lower when computed using abnormal stock returns: 8.3% for the total sample versus 12.0% when using offer prices, as indicated above.

As shown in Panel C, the initial offer markup, $(p_{initial} - p_{-1})/p_{-1}$, is 27.3% for the average control bid. The most significant impact of using offer prices rather than abnormal stock returns is when computing markups. The markup $ACAR_{[0,\ end]}$ is 6.0% for the total sample, while the corresponding markup using the final offer price is $(p_{final} - p_{-1})/p_{-1} = 28.7\%$. Again, a large part of this difference is due to the fact that target $ACAR$ incorporates the target stock price decline following failed offers: the target markup $ACAR_{[0,\ end]}$ is -13.3% for the subsample of failed offers, while $(p_{final} - p_{-1})/p_{-1}$ is 32.4% for this offer category.

Panel D of Table 3 reports average abnormal returns to bidder firms. Announcement returns

average a statistically significant -1.5% for the total sample of 4,420 public bidders.[9] This negative announcement effect is driven by the merger sample as the average announcement return for the 874 tender offers is an insignificant 0.3%. Also, bidder returns are less negative in the category with positive toeholds. Similar to the announcement returns, total contest-induced bidder abnormal returns, $ACAR_{[-41,\ end]}$, are significantly negative for the total sample, insignificant for tender offers, and less negative for toehold bidders than for bidders with zero toeholds. We return to these differences in the cross-sectional regressions below.

Finally, Figure 1 shows the daily cumulative abnormal stock returns to targets in 1,866 tender offers (Panel A) and 5,656 merger bids (Panel B). These abnormal returns are estimated using daily dummy variables in the event period and are shown here for illustrative purposes. The period of cumulation starts on day -42 and ends on day +10 relative to the initial control bid. For mergers, the runup is lowest when there is no short-term toehold and highest when an investor other than then initial control bidder purchases a toehold. Confirming the information on runups in Table 3, the runup for the sample with no short-term toehold is higher in tender offers than in mergers.

4 Markup pricing and bidder takeover gains

4.1 Does markup pricing exist?

We begin by showing, in Table 4, estimates of the runup parameter b in Eq. (1) without the vector X of controls. Each row in the table is a separate regression, performed on the total sample and a set of subsamples. The definition of the various subsamples in the table corresponds to the variable definitions in Table 5 that are used in the multivariate regressions below. In Panel A, the variables are computed using offer prices, so $Runup = ln(p_{-1}/p_{-42})$ and $Markup = ln(p_{initial}/p_{-1})$. In Panel B, the variables are estimated as $Runup = CAR_{[-41,\ -1]}$ and $Markup = CAR_{[0,\ end]}$. Panel B uses the total sample of 7,522 targets, while we have offer prices for 5,910 cases in Panel A. The Table lists t-values against both -1 (the predicted value for b under the substitution hypothesis H2) and zero (the value predicted by the markup pricing hypothesis H1).

The first row in Panel A of Table 4 shows an estimated value of b of -0.200, with a t-value of 60.37 against -1 and -15.44 against zero. Thus, this coefficient simultaneously rejects full substitution

[9] Negative average abnormal bidder returns are also reported by Moeller, Schlingemann, and Stulz (2005).

($b = -1$) and full markup pricing ($b = 0$). However, the coefficient estimate indicates near-full markup in that a dollar increase in the runup increases the total premium by \$0.80 for the total sample. As concluded by Schwert (1996) as well, near-markup pricing is pervasive.[10]

Across the various subgroups, the estimated value of b is lowest (shows the greatest degree of substitution) for offers involving toeholds by the initial bidder. The coefficient estimate is -0.340 in the "Positive toehold" category. Moreover, $b = -0.392$ in hostile bids, where half of the bidders have toeholds. This contrasts with toehold purchases by investors other than the initial bidder, which generate a coefficient estimate of $b = -0.130$. Also, $b = -0.199$ for bids with no short-term toeholds. In sum, there is substantially greater substitution between runups and markups in the presence of toeholds. We return to the effect of short-term toeholds below.

The estimates of b in Panel B of Table 4 are much higher than those in Panel A, and they have switched from negative to positive. For the total sample, $b = 0.595$, indicating strong markup pricing. The difference in the coefficient estimates in Panel A and B is driven by the fact that the markup variable in Panel B is the total contest-induced markup, and not only the markup in the initial bid as in Panel A. Since we are primarily interested in how the initial bidder reacts to the runup, we focus in the following on results where markups are measured using the initial offer price.[11]

4.2 Short-term toeholds and markups

Table 4 reveals an interesting effect on the substitution between runups and markups of short-term toehold purchases by the initial bidder. Short-term toeholds that are acquired but not announced until the offer day ("Short term toehold initial, day 0") have a slope coefficient of 0.083, i.e., near-full markup pricing. In contrast, short-term toeholds by the initial bidder that are announced prior to day 0 have a slope coefficient of -0.442, indicating substantial substitution between the runup and the markup. Moreover, short-term toeholds purchased by other investors ("Short-term toehold other") have a slope coefficient of -0.130.

[10] Accounting for all of his subsample results, Schwert (1996) concludes that "at least two-thirds of the runup is added to the total premium paid by successful bidders" (p.188).

[11] An interesting avenue not pursued here is to investigate actual offer price revisions during the *runup* period. A potential source of information on such bid revisions is fairness reports issued by the negotiating parties' respective advisors. For evidence on fairness reports, see Kisgen, Qian, and Song (2006), Makhija and Narayanan (2007), and Chen and Sami (2006).

To further investigate the difference between the latter two slope coefficients, we find that

$$\begin{aligned} Markup &= 0.189 + 0.012(ST\ toe\ initial\ ex\ d0) \\ &\quad -0.509(Runup)(ST\ toe\ initial\ ex\ d0) - 0.127(Runup)(ST\ toe\ other). \end{aligned} \tag{7}$$

The hypothesis that the two coefficients on *Runup* in equation (7) are equal is rejected with a t-value of -2.12.[12] That is, short-term toeholds purchased by the initial bidder and announced prior to the offer day lead to a degree of substitution between the runup and the markup that is significantly greater than when the short-term toehold is purchased by other investors. This suggests that toehold purchases by the initial bidder up to the offer day help convince the parties negotiating the takeover that the runup anticipates the offer price, allowing substitution to take place.

Table 6 shows the results of our estimation of Eq. (1) with the full set of control variables X. First, these control variables allow us to check for robustness of the markup pricing coefficient estimate of -0.200 for the full sample in Table 4. Second, inclusion of X indicates whether the average markup varies systematically with offer-specific variables, including toeholds. Table 6 also shows multivariate markup regressions with the markup in the final offer premium as dependent variable.

The control variables in X are defined in Table 5. There are three controls for target characteristics. The first two are *Target size*, defined as the natural logarithm of the target market capitalization on day -42, and $NYSE/Amex$, indicating whether or not the target is listed on the NYSE or Amex. The third variable, *Amihud liquidity*, is a measure for the liquidity of the target stock, computed as $|R_i|/(p_i S_i)$ where R_i is the percent holding period return, p_i is the target stock closing price, and S_i is the number of shares traded on day i, and where $i \in [-250, -42]$ (Amihud, 2002).

There are five toehold variables. The first, *Positive toehold*, is a binary variable which takes a value of one if the initial bidder has a positive toehold at the time of the initial control bid. This variable captures the average effect of the initial bidder's toehold on the markup, with no specific

[12] The slope coefficients differ slightly from those reported in Table 4 because regression (7) eliminates six targets where both the initial bidder and other investors purchase toeholds.

reference to when the toehold was acquired. To capture the effect of short-term toehold purchases by the initial bidder, we include three dummy variables. The first, *ST toe initial*, takes a value of one if the initial bidder purchases a short-term toehold. The next two variables, *ST toe initial ex d*0 and *ST toe initial d*0, indicate whether the initial bidder's short-term toehold is announced prior to and on day 0, respectively. Since these toehold variables are correlated, they are not all entered at the same time. Moreover, we add the binary variable *ST toe other* indicating that an investor other than the initial bidder purchases a short-term toehold in the runup period.

Furthermore, the regressions include indicators for whether the acquirer is a public versus a private firm (*Acquirer public*) and whether the initial control bid is horizontal or not ($Horizontal$). Also, there are controls for deal characteristics which the extant literature has shown affect target abnormal stock returns. $Tender\ offer$ indicates tender offer versus merger. There are two dummies for the payment method being all cash ($Cash$) or all stock ($Stock$). The dummy $Hostile$ indicates a hostile bid. To control for the effect of anticipation, we include the variable *Dormant industry*, which indicates that the bid is the first control transaction in the target industry for a period of two years. Finally, the regressions control for multiple bids resulting from subsequent bid revisions or the entry of a rival bidder ($Multiple\ bids$), for the unsuccessful outcome when no bidder wins the target ($No\ bidder\ wins$), as well as for deals in the 1980s ($1980 - 1989$).

The markup regressions in Table 6 use either the markup in the initial offer or the final offer markup, while the runup is $Runup = ln(p_{-1}/p_{-42})$. The coefficient b on *Runup* in the three first regressions is a highly significant -0.18, close to the estimate of -0.20 previously reported Table 4. The estimate of b in the three last regressions further show that the runup also creates a slightly higher markup of the final offer premium. That is, a dollar increase in the runup increases the final offer premium by \$0.84.

Interestingly, toeholds (both short-term and total) have a negative and significant effect on markups. The coefficient on *Positive toehold* is -0.02 (t-vale of -2.45) for the initial offer markup, and -0.02 (t-value -2.06) for the final markup. *ST toe initial* receives a coefficient of -0.06 (t-value -1.98) and -0.07 (t-value -2.28), respectively, for the initial and final markups. This suggests that toeholds allow the initial bidder to reduce the markup, perhaps because the toehold improves the bidder's bargaining position. This is in contrast to our hypothesis H3 under which the net effect of toeholds is to increase markups. As discussed earlier, toeholds may reduce markups because they

have a deterrent effect on competition. Also, short-term toeholds may help convince the target that the runup reflects partial anticipation of the offer (substitution). Interestingly, the result in Table 6 that toehold purchases by investors *other* than the initial bidder do *not* lower markups is also consistent with this interpretation. The coefficient on *ST toe other* is insignificantly different from zero in all six regression specifications in Table 6.

As to the remaining controls in X, markups decrease in $Target\ size$, and are unaffected by measures of liquidity such as $NYSE/Amex$ and *Amihud liquidity*. Markups are on average significantly greater for public than for private bidders. Among deal characteristics, tender offers and stock offers have significantly lower markups, while cash offers increase markups (relative to mixed cash-stock deals). Hostile bids and contests attracting multiple bids have greater markups in final bids. Final premium markups are also higher in the later part of the sample period 1990-2002. There is little evidence that markups are affected by *Dormant industry* and $Horizontal$.

Schwert (1996) presents cross-sectional regressions of takeover-induced target abnormal stock returns ($Premium$) and find, like us, that $Premium$ is higher for all-cash offers and for multiple bids. However, in his sample, $Premium$ is also greater for tender offers, while in our markup regression $Tender\ offer$ has a negative impact. Recall from Panel A in our Table 3 that initial offer premiums are similar in tender offers and mergers (44% versus 43%), while $ACAR_{[-41,\ end]}$ for tender offers is almost twice that for mergers (21% versus 12%). Again, it makes a difference whether one measures total premiums using offer prices or target abnormal stock returns.

We now turn to an analysis of the effect of runups and markups on bidder gains. This allows us to address whether markup pricing is associated with lower bidder takeover gains in the cross-section.

4.3 Target runups and bidder takeover gains

Table 7 shows the coefficient estimates from regression equation (2). The dependent variable is either the bidder total contest return $BCAR_{[-41,\ end]}$ or the bidder announcement return $BCAR_{[-1,\ 1]}$. The target runup is measured two ways, either as the raw return $ln(p_{-1}/p_{-42})$ or as the abnormal return $CAR_{[-41,\ -1]}$. The regressors are the same as in Table 6 with the addition of *Initial bidder wins* and the initial offer markup ($Markup$). The main objective is to gauge the effect of *Runup* on bidder takeover gains (coefficient b_b in equation (2)).

Runup receives a positive and statistically significant coefficient in all eight specifications in Table 7. When the runup is measured as $ln(p_{-1}/p_{-42})$, and with total bidder contest return as dependent variable, the coefficient b_b on *Runup* is 0.12 with t-values greater than 3.27. When the dependent variable is bidder announcement-induced abnormal return, $b_b = 0.01$ with t-values exceeding 2.18. Measuring the runup using $CAR_{[-41,\ -1]}$ produces similar coefficient estimates, with $b_b = 0.18$ for bidder total contest returns and $b_b = 0.01$ for bidder announcement returns, both statistically significant. In sum, bidder takeover gains are increasing in the target runup.

Table 7 shows that bidder announcement returns are decreasing in $Markup$ while total contest returns are independent of the initial offer markup. Moreover, all toehold variables for the initial bidder are insignificant. However, toeholds are indirectly beneficial since they reduce markups (Table 4 and Table 6). Notice that bidder total returns are lower when another investor purchases a short-term toehold in the runup period, possibly indicating increased competition for the target.

Of the remaining control variables, three have a significant impact on bidder abnormal returns in all regression specifications. These are *Cash* (increasing $BCAR$), *Stock* (decreasing $BCAR$), and the early sample period dummy 1980-1989 (increasing $BCAR$). There is also some evidence that target market liquidity affects bidder returns, with $NYSE/Amex$ increasing $BCAR$ over the entire contest period, and *Amihud liquidity* increasing the bidder announcement-period return.

Notice also the significantly positive coefficient for *Initial bidder wins* in the regression for total contest return $BCAR_{[-41,\ end]}$. That is, winning the contest increases bidder gains, suggesting that completing the takeover is a positive net present value project. This inference is also supported by the significantly positive coefficient on *Dormant industry* for the announcement-period return $BCAR_{[-1,\ 1]}$. That is, the bidder announcement effect is greater when the initial bid is the first takeover in the target's 4-digit SIC industry over a period of two years. As also shown by Song and Walkling (2000, 2005), takeover gains measured using announcement-induced abnormal stock returns are largest (for both targets and bidders) when the announcement is largely unanticipated. Surprisingly, bidder total returns are also larger for hostile offers.

The positive coefficient on *Runup* in Table 7 suggests that the target runup is a proxy for total (bidder plus target) synergies. That is, in the cross-section, takeovers with larger total synergies are associated with greater runups. There is also a tendency for runups to lower markups, in particular when the initial bidder has a toehold. Consistent with this, we show in the next section

that toeholds reduce total offer premiums.

5 The short-term toehold decision

As discussed in Section 2 (H3), there is a risk that the short-term toehold acquisition provides potential rivals with time and information to mount competing bids. On the other hand, a toehold increases the bidder's total valuation of the target, making the bidder a more aggressive competitor. The net effect of these competing arguments is the subject of the empirical analysis of this section.

5.1 The toehold threshold

Let $\gamma' Z$ denote the initial bidder's short-term toehold choice model, where Z is a vector of explanatory variables and γ is the corresponding vector of coefficients. We estimate the parameters γ using probit and a vector Z which includes the variables listed for the first four regressions in Table 8. The variables include most of the bidder, target and deal characteristics discussed earlier in Table 7.

Table 8 introduces the variable *Net Threshold*. This is the difference between the theoretical toehold threshold developed in Betton, Eckbo, and Thorburn (2008) and the initial control bidder's toehold two months prior to the initial control bid (the long-term toehold). As mentioned in Section 2, the toehold threshold arises in a takeover model where toeholds cause some target managements to refuse merger negotiations. By acquiring a toehold at least equal to the threshold, the bidder offsets expected rejection costs with expected toehold benefits. The toehold threshold is estimated for each bidder in the data base, and it averages 9.5% in the sample of six thousand initial bidders used. Moreover, the *Net threshold* averages 6.9%.

In the first four regressions in Table 8, the dependent variable is one if the initial bidder acquires a short-term toehold and zero otherwise. In the first two regressions, the sample includes all control bidders (i.e. also bidders with zero toehold). In regressions three and four, the sample is restricted to initial bidders with a positive toehold. The prediction for *Net threshold* differs across the two samples. In the first (all bidders), bidders hypothetically choose between zero short-term toehold (to avoid target rejection costs) or a total toehold size at least equal to the threshold (to offset expected rejection costs). With toehold transaction costs, the greater the net threshold the less likely the

bidder is to purchase a short-term toehold. This prediction is confirmed by the significantly negative coefficient on *Net threshold* in the second column of Table 8. This is consistent with the findings in Betton, Eckbo, and Thorburn (2008) that the likelihood of toehold bidding decreases in the toehold threshold.

The predicted effect of *Net threshold* is different when we restrict the sample to initial bidders with positive toeholds. This sample ensures that the initial bidder has decided to approach the target with a positive toehold. Under the threshold theory, these bidders all expect to bear target rejection costs, and the remaining decision is whether to acquire additional target shares up to the threshold. Larger values of *Net threshold* indicate larger net rejection costs (net of the long-term toehold) and thus a greater incentive to purchase additional target shares (short-term toehold). This prediction is supported by the significantly positive coefficient on *Net threshold*, and negative coefficient on *Toehold size*, in the fourth regression in Table 8. In sum, the short-term toeholds in our sample are consistent with initial bidders requiring a certain minimum toehold size to offset toehold-induced target rejection costs.

Below, we use a Heckman procedure (Heckman, 1979) to correct for bidder self-selection of short-term toeholds, where we use the first column of Table 8 as our choice model $\gamma' Z$. According to this model, the likelihood of the initial bidder purchasing a short-term toehold is decreasing in *Target size*, in *Horizontal*, and when the payment method is *Cash* or *Stock* (relative to mixed cash-stock offers). Moreover, the likelihood of a short-term toehold is increasing in *Tender offer*, in *Hostile*, and for offers in the early period 1980-1989. Interestingly, short-term toeholds are also more likely if an investor other than the initial bidder purchases a short-term toehold (*ST toe other*). This is consistent with the argument of Bulow, Huang, and Klemperer (1999) that a bidder is at a disadvantage if its toehold is lower than that of its rival. Observing other toehold purchases, the initial bidder may want to level the playing field by acquiring (additional) target shares.

5.2 Effects of toeholds on rival bidder entry and bidder success

The last two columns of Table 8 show the coefficient estimates for the probability of a rival bidder entering and for the initial bidder winning the target. Notice first that the size of the initial bidder's total (long-term plus short-term) toehold at the time of the initial offer (*Toehold size*) significantly lowers the probability that the control bid attracts competition from a rival bidder.

The purchase of a short-term toehold does not add explanatory power beyond the total toehold size. In other words, it is the initial bidder's total toehold, and not the timing of its acquisition, that matters for the rival bidder's entry decision. This finding fails to support the proposition that short-term toeholds, while possibly disclosing the initial bidder's intentions, attract competition. Rather, the effect appears to be the opposite as a large toehold lowers the probability of facing direct competition from rivals.

The rival entry probability is also decreasing in the target's stock liquidity (*Amihud liquidity*), and is lower if the initial bidder is public (*Acquirer public*) and the payment method is all stock. The rival bidder entry probability is greater when the target's book-to-market ratio exceeds the industry median ($Tgt\ book\text{-}to\text{-}mkt > Ind$), when the initial bid is hostile, and when it takes place in the period 1980-1989. Notice also that neither the target runup nor the offer price markup affects the rival bidder's decision to enter the contest.

Turning to the probability that the initial bidder wins the target, most of the coefficients in the last column of Table 8 are significant. Importantly, the probability of initial bidder success increases in the size of the initial bidder's toehold, and increases further if the initial bidder acquires a short-term toehold. The former result is consistent with the findings of others (Walkling, 1985; Jennings and Mazzeo, 1993; Betton and Eckbo, 2000; Betton, Eckbo, and Thorburn, 2008), while the latter is original to this paper. Toehold bidding, with both short-term and long-term toeholds, conveys a significant advantage in terms of driving the initial bidder towards success.

Of the remaining variables, the success probability increases with $Target\ size$ and target listing ($NYSE/Amex$), and it decreases if the acquisition is the first in the industry over the past two years (*Dormant industry*). Among the bidder characteristics, the win-probability increases with the initial bidder being a frequent acquirer (*Prior bids*), if the bidder is a public firm, and if the acquisition is horizontal. Moreover, the deal characteristics $Tender\ offer$, *Runup*, and *Stock* all increase the probability of the initial bidder winning, while the probability is lower for hostile bids and contests taking place in 1980-1989.

5.3 Toeholds effects controlling for self-selection

Table 9 shows determinants of target runups and initial offer premiums as a function of toeholds, accounting for the endogenous short-term toehold decision. The main interest is the effect of

toeholds and toehold acquisitions. As above, since several of the toehold variables are highly correlated, these are introduced in separate regressions. The regressions include a correction for initial bidder self-selection of a short-term toehold. That is, the bidder acquires a short-term toehold if $\gamma' Z \geq \eta$, where $\gamma' Z$ is the regression model in the first column of Table 8, and η is a mean zero error term with $Var(\eta) = 1$. Consider the runup regression, and let $Runup_{\ toe>0}$ denote the target runup if the bidder acquires a toehold, and $Runup_{\ toe=0}$ if a zero toehold is selected. The bidder essentially switches between two target pricing (runup) regressions:

$$\begin{aligned} Runup_{\ toe>0} &= \beta' X + \epsilon \text{ iff } \gamma' Z \geq \eta \\ Runup_{\ toe=0} &= \beta' X + \epsilon' \text{ iff } \gamma' Z < \eta \end{aligned} \tag{8}$$

where X is the vector of regressors in Table 9 and η is correlated with ϵ and ϵ'. Due to this correlation, $E(\epsilon | \eta \leq \gamma' Z) \neq 0$ and $E(\epsilon' | \eta > \gamma' Z) \neq 0$.

The standard procedure to eliminate the bias is to include the inverse Mills ratio based on the choice model $\gamma' Z$ as an additional explanatory variable in the pricing model regression (Heckman, 1979; Maddala, 1983; Li and Prabhala, 2007). Define the inverse Mills ratio λ such that $\lambda = \phi/\Phi$ if the initial control bidder acquires a a short-term toehold and $\lambda = -\phi/(1-\Phi)$ if not, where $\phi(\gamma' Z)$ and $\Phi(\gamma' Z)$ are the standard normal density- and cumulative distribution functions, respectively, evaluated at the predicted value $\hat{\gamma}' Z$. The coefficient on λ is statistically insignificant in all specifications, indicating that self-selection does not induce a coefficient bias in β. The WLS estimation in Table 9 corrects for heteroscedasticity.

Notice first that short-term toehold purchases by investors other than the initial bidder have a significantly positive impact on *Runup* in all three regressions. Furthermore, short-term toehold purchases by the initial bidder also increase *Runup* provided the purchase is disclosed prior to the offer day. Moreover, there is no impact of *Positive Toehold* on the runup as most toeholds are acquired prior to the two-month runup period. In sum, the evidence shows that only short-term toehold purchases have a significant impact on target runups.

Several of the other explanatory variables for *Runup* receive significant coefficients. *Runup* increases in *Target size* and market liquidity (*NYSE/Amex*). Moreover, the runup is higher for firms with relatively few growth options (*Tgt book-to-mkt > ind*), when the acquirer is publicly

traded, in tender offers, when the payment method is either all-cash or all-stock (as opposed to mixed), and for takeovers in the period 1980-1989.

Turning to the initial offer premium, the inverse Mills Ratio is again statistically insignificant. The offer premium is decreasing in both *Positive toehold* and *Toehold size*, a result also reported by Betton and Eckbo (2000) for their tender offer sample. While short-term toehold purchases by the initial bidder have no separate impact on offer premiums, *ST toe other* has a marginally significant positive impact on premiums. Offer premiums are further increasing in *Tgt book-to-mkt > ind*, *Acquiror public*, and *Cash*. The greater offer premiums paid by public over private bidders is also reported by Bargeron, Schlingemann, Stulz, and Zutter (2007). Finally, offer premiums are decreasing in *Target size*.

This evidence is consistent with total toeholds conveying benefits in terms of reducing rival bidder competition and increasing the initial bidder's success rate, and by lowering total offer premiums. Short-term toeholds have a direct impact on the probability of initial bidder success, and otherwise contribute to toehold benefits through the total (long- plus short-term) toehold.

6 Conclusions

Schwert (1996) finds that pre-offer target stock price runups increase total target takeover-induced abnormal stock returns by approximately a dollar. Defining the markup as the difference between the total abnormal return and the runup, he warns that this markup pricing may be costly for the bidder.[13] In this paper, we examine Schwert's costly-markup-pricing hypothesis using a large sample of *offer prices* in control bids for U.S. public targets. Offer prices sharpen the markup pricing tests. Moreover, the *initial* offer price reveals how the bidder reacts to the runup without time lag and is therefore not impacted by subsequent events such as competing bids and target rejection. We find that a dollar increase in the runup increases the initial offer price by \$0.80. Thus, there is substantial markup pricing in the initial offer price as well.

Does markup pricing reduce bidder takeover gains? As discussed above, the answer does not immediately follow from markup pricing per se. The reason is that increases in the target's stand-alone value over the runup period may allow the bidder to raise the offer price accordingly without

[13] "With little substitution between the runup and the markup, the runup is an added cost to the bidder." (Schwert, 1996, p.153).

reducing bidder synergy gains. Consistent with this, we find that bidder gains are *increasing* in the target runup. While markups are indeed costly (we show that markups reduce bidder announcement returns), the evidence is that markups decrease in runups (on average by 20%). Overall, our results do not support the conjecture that runups are costly.

Does large purchases of target stock in the runup period (short-term target toeholds) affect markup pricing and bidder takeovers gains? We find that short-term toehold purchases tend to increase runups. However, the impact on the markup depends on the identity of the buyer. When purchased by the initial bidder, short-term toeholds lower markups, possibly because they provide evidence to the target that the runup anticipates the pending offer premium (supporting substitution between the runup and the markup). When purchased by other investors, however, there is full markup as if the parties to the takeover assume that the entire runup reflects an increase in the target's stand-alone value.

If short-term toehold purchases reveal valuable information to potential rival bidders, one would expect a positive effect on the rival entry probability. We find instead that total toeholds (the sum of short-term and long-term toeholds) reduce the likelihood of attracting rival bidders. Moreover, both short-term and total toeholds increase the initial bidder's probability of winning. Toehold bidding also reduces offer prices, possibly because it deters competition.

Finally, we show that the probability of a short-term toehold purchase by the initial bidder is independent of target stock liquidity, is greater when other investors purchase toeholds, and responds as predicted to a threshold estimate capturing toehold-induced target resistance costs. Overall, our evidence does not support the proposition that the risk of generating a pre-bid target runup deters short-term toehold acquisitions. By implication, we also reject the deterrence hypothesis as a potential explanation for the zero-toehold puzzle (Betton, Eckbo, and Thorburn, 2008).

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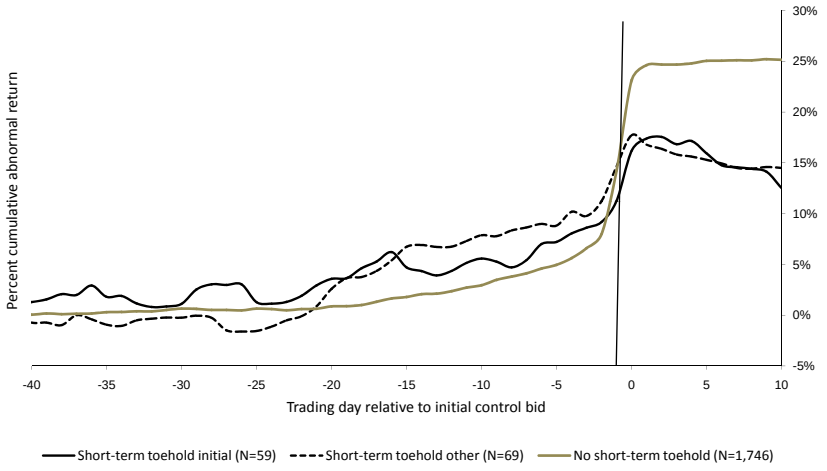
Figure 1
Target stock price runup in 7,552 initial control bids, 1980-2002

Target stock price daily average abnormal return from day -41 through +10 relative to the initial bid for control. A short-term toehold is an acquisition of target stock over the two months leading up to and including the day of the announcement of the initial control bid. Short-term toeholds can be acquired by the initial control bidder (initial) and by other investors (other).

A: Sample of 1,866 tender offers



B: Sample of 5,656 merger offers

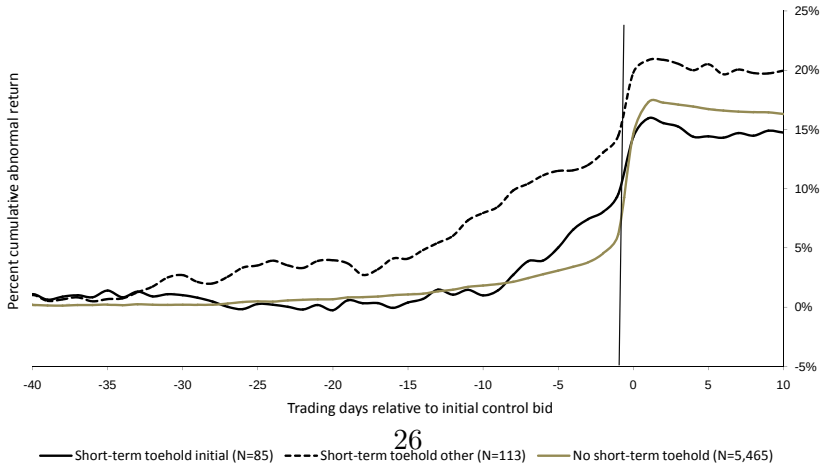


Table 1
Sample of initial control bids for U.S. public targets, 1980-2002

We sample 13,730 control bids (transaction form M or AM) from SDC, 687 control bids from Betton and Eckbo (2000), and 183 control bids (all tender offers) from the WSJ. In a control bid, the buyer owns less than 50% and seeks to own 50% or more of the target shares. Bids are grouped into a total of 12,087 takeover contests. The initial control bid is the first control bid for the target in six month. All control bids announced within six months of an earlier bid belong to the contest. The contest ends when there are no new control bids for the target over a six-month period. We require targets to have (1) at least 100 days of common stock returns in the estimation period, (2) a 4-digit SIC code on CRSP, and (3) a stock price$\geq$ \$1 and a equity market capitalization $\geq$ \$10 million on day -42. A toehold is target shares held by the acquirer when announcing the initial control bid. A short-term toehold is a toehold purchase disclosed in the 2-month period leading up to the initial control bid. The toehold size reported in the table is the percent of target shares owned by the initial bidder, conditional on a positive toehold.

	Sample size	Target market value		% control contests with:			% initial bidders with:		Size of initial bidder toehold	
		($million)			Multiple	Initial	Positive	Short-term	(% of target)	
Year	*N*	Mean	Median	Merger	bids	bidder wins	toehold	toehold	Mean	Median
1980	43	192.6	74.3	37.2	20.9	62.8	55.8	0.0	18.7	20.9
1981	147	310.7	105.9	68.0	19.7	61.2	21.1	0.7	18.6	14.4
1982	148	205.3	65.7	69.6	12.2	62.2	22.3	0.0	14.3	9.1
1983	148	274.2	67.0	70.3	16.9	66.9	23.0	0.7	15.2	13.6
1984	253	280.9	70.0	65.6	20.6	56.1	27.7	0.8	20.7	18.9
1985	277	405.5	86.9	63.5	21.7	57.4	30.3	2.2	17.0	10.6
1986	325	333.0	80.7	56.3	22.5	64.3	35.1	4.6	17.3	13.9
1987	326	282.9	83.3	71.8	16.9	55.5	32.8	7.4	16.8	10.0
1988	394	352.6	57.7	72.3	22.3	45.2	29.7	5.6	17.5	11.0
1989	379	410.1	52.4	82.8	18.2	38.8	10.8	6.1	17.1	12.2
1990	246	443.7	57.8	80.9	8.1	41.9	15.4	2.4	18.2	9.8
1991	172	247.8	54.3	82.6	12.2	54.1	14.5	4.1	17.8	9.6
1992	172	170.8	49.3	85.5	7.0	61.6	16.3	1.7	17.8	15.4
1993	232	392.0	68.4	81.0	6.0	68.1	9.9	1.3	18.4	10.8
1994	357	433.9	71.1	77.9	11.5	69.2	3.1	1.4	15.2	10.6
1995	432	476.5	87.8	78.0	10.4	72.0	8.1	0.9	23.4	22.7
1996	484	769.9	107.0	79.3	9.5	73.8	8.7	1.2	22.9	18.4
1997	580	574.7	130.7	74.7	7.8	82.1	6.6	0.5	24.0	20.1
1998	637	185.9	135.6	86.3	4.9	77.4	1.6	0.8	18.7	10.0
1999	649	943.8	151.9	73.5	6.0	80.7	5.7	0.6	21.0	18.7
2000	544	1298.6	149.6	72.2	7.5	75.2	8.6	0.4	20.7	16.0
2001	360	910.8	98.9	76.9	4.2	80.3	10.3	0.3	25.6	25.3
2002	217	941.4	93.4	78.3	3.7	71.0	9.2	0.5	18.3	14.0
Total	7,522	688.3	91.0	75.2	11.4	67.1	13.9	1.9	18.8	14.5

Table 2
Industry characteristics for 7,522 initial control bids for US public targets, 1980-2002

The industry is defined as all firms with the same 4-digit sic code in CRSP as the target firm in the year of the takeover announcement. Book-to-market is computed using the December closing price (Compustat). The Herfindahl index is $\sum_i (s_i/S)^2$, where s_i is the total sales of firm i, S is the total sales in the industry ($\sum_i s_i$), and i is an index of all firms in the industry. The Compustat data is from the year prior to the takeover. * indicates that the sample proportion is significantly different from 0.50 at the 1% level using a 2-tailed binomial test.

		1980-1989	1990-2002	Total
Sample size, N		2,440	5,082	7,552
% of sample		32.4	67.6	100
A: Target industry				
Percent sample firms in the industry of:	Financial	23.2	28.8	27.0
	Manufacturing	39.9	33.2	35.4
	Natural resources	5.9	4.2	4.8
	Services	19.5	25.7	23.7
	Trade	10.5	7.7	8.6
	Other	1.0	0.3	0.6
% horizontal bids		16.1	20.9	19.3
% targets with book-to-market > the median industry rival:		55.2*	53.9*	54.3*
B: Acquisition intensity				
% acquirers where the initial control bid is the acquirer's first bid for a public target over the last 2 or 5 years:	2 years	89.1	75.3	79.8
	5 years	85.3	68.0	73.6
% targets where the initial control bid is the first takeover in a "dormant" industry in 1 or 2 years:	1 year	49.8	33.5	38.8
	2 years	40.7	25.0	30.1
% of target industry firms acquired over the past year:	mean	2.9	4.5	4.0
	median	0.6	3.9	2.9
C: Target industry concentration				
Number of target industry rivals:	mean	75	121	106
	median	20	37	31
Herfindahl index of target industry:	mean	0.321	0.236	0.263
	median	0.265	0.164	0.192

Table 3
Average offer premiums, runups, markups, and bidder abnormal returns (ACAR) in control bids

The sample is 7,522 initial control bids for US public targets, 1980-2002. The average daily abnormal stock return for firm j over event window k is estimated as the event parameter AR_{jk} in the value-weighted market model $r_{jt} = \alpha_j + \beta_j r_{mt} + \sum_{k=1}^{K} AR_{jk} d_{kt} + \epsilon_{jt}$, where t=day{-291,...,end}, 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. For target firm estimation, the total number of event windows is $K = 2$. The two event windows are $[-41, -1]$ (the runup period) and $[0, end]$ (the markup period). For bidder firm estimation, $K = 3$: $[-41, -2]$, $[-1, 1]$, and $[2, end]$. Moreover, for both targets and bidders, we re-estimate Eq. (6) with a single dummy variable for the entire contest window $[-41, end]$ The estimation uses OLS 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. The offer premiums are $(p_{initial} - p_i)/p_i$ and $(p_{final} - p_i)/p_i$, respectively, where $p_{initial}$ is the initial offer price and p_{final} is the final offer price in the contest (from SDC or Betton and Eckbo (2000)). p_i is the target stock closing price or, if missing, the bid/ask average on day i, $i = \{-1, -42\}$ and p_{-42} is adjusted for splits and dividends. * indicates that the mean $\neq 0$ at the 1% level using a standard t-test.

		Initial bid type		Contest outcome		Initial bidder	
	All	Merger	Tender offer	Success	Failure	Zero toehold	Positive toehold
Sample size targets	7,522	5,656	1,866	5,340	2,078	6,525	997
A: Target total premium							
$(p_{initial} - p_{-42})/p_{-42}$	0.432*	0.429*	0.442*	0.442*	0.388*	0.443*	0.366*
$(p_{final} - p_{-42})/p_{-42}$	0.449*	0.438*	0.478*	0.455*	0.409*	0.453*	0.419*
$ACAR_{[-41,end]}$	0.143	0.121	0.211	0.240	-0.105	0.139	0.172
	(32.85)	(24.12)	(23.96)	(40.24)	(-2.96)	(29.70)	(14.25)
B: Target runup							
$(p_{-1} - p_{-42})/p_{-42}$	0.120*	0.095*	0.194*	0.145*	0.052*	0.117*	0.136*
$ACAR_{[-41,-1]}$	0.083	0.064	0.141	0.104	0.028	0.080	0.102
	(29.47)	(21.15)	(22.34)	(29.24)	(7.97)	(25.87)	(14.77)
C: Target markup							
$(p_{initial} - p_{-1})/p_{-1}$	0.273*	0.298*	0.201*	0.267*	0.305*	0.284*	0.207*
$(p_{final} - p_{-1})/p_{-1}$	0.287*	0.307*	0.230*	0.278*	0.324*	0.294*	0.248*
$ACAR_{[0,end]}$	0.060	0.056	0.070	0.136	-0.133	0.058	0.069
	(21.23)	(17.32)	(12.46)	(29.78)	(-7.63)	(20.05)	(7.02)
D: Bidder returns							
Sample size bidders	4,420	3,546	874	3,574	802	3,994	426
$ACAR_{[-1,+1]}$	-0.015	-0.019	0.003	-0.016	-0.012	-0.017	-0.001
	(-20.84)	(-23.63)	(0.72)	(-19.86)	(-6.61)	(-20.96)	(-2.96)
$ACAR_{[-41,end]}$	-0.113	-0.131	-0.039	-0.090	-0.212	-0.117	-0.069
	(-13.00)	(-13.71)	(-1.61)	(-10.09)	(-8.83)	(-12.72)	(-2.92)

Table 4
Markup pricing regressions for U.S. public targets, 1980-2002

The table reports estimates of the coefficients a and b in the following regression equation:

$$Markup_i = a + bRunup_i + e_i,$$

where $Markup$ and $Runup$ are measured either using initial offer prices $p_{initial}$ (Panel A) or target abnormal stock returns CAR (Panel B). When using offer premiums, we report OLS estimates and p_i is the target closing price or, if missing, the bid/ask average on day i, $i = \{-1, -42\}$, with p_{-42} adjusted for splits and dividends. When using abnormal stock returns, we report WLS estimates with weights σ_{AR} from the market model (6), and the contest ending date is the earlier of delisting and 126 days after the last bid. All targets have stock price $\geq$ \$1 and market value $\geq$ \$10 million on day -41. ^{c} (^{d}) indicates that the runup coefficient b is different across the paired subsamples at the 1% (5%) level and * denotes that $F \neq 0$ at the 1%-level.

Sample	*Runup* coeff., b	T-stat. $t(b=-1)$	T-stat. $t(b=0)$	Interc. a	T-stat. $t(a=0)$	Sample size, N	Adj. R^2	F
A: Initial offer premiums: $Markup = ln(p_{initial}/p_{-1})$, $Runup = ln(p_{-1}/p_{-42})$								
All (5,910 targets)	-0.200	60.37	-15.44	0.232	67.85	5,910	0.039	238.4*
Successful	-0.196	54.47	-13.61	0.230	60.22	4,757	0.037	185.2*
No bidder wins	-0.199	25.11	-6.35	0.244	30.02	1,092	0.035	40.3*
Positive toehold	-0.340^c	23.58	-12.82	0.205	29.09	865	0.159	164.3*
Zero toehold	-0.175^c	56.23	-12.15	0.237	62.44	5,045	0.028	147.6*
Short-term toehold initial day 0[1]	0.083	7.52	0.58	0.168	5.08	38	-0.018	0.33
Short-term toehold initial ex day 0[2]	-0.442^c	5.91	-4.86	0.193	6.98	36	0.374	21.95*
Short-term toehold other	-0.130	13.75	-2.05	0.187	8.98	121	0.026	4.22
No short-term toehold	-0.199	58.92	-15.00	0.233	66.89	5,722	0.038	225.1*
Cash	-0.266	39.37	-14.54	0.242	48.33	2,486	0.078	211.3*
Stock	-0.086^c	38.66	-3.68	0.222	36.20	1,833	0.007	13.6*
Mixed	-0.235	26.04	-8.29	0.230	32.90	1,591	0.041	68.7*
Multiple bids	-0.301^c	20.58	-9.05	0.223	25.31	668	0.108	81.8*
Single bid	-0.187^c	56.94	-13.41	0.223	63.41	5,242	0.033	180.0*
Tender offer	-0.190	34.10	-8.11	0.182	24.41	1,534	0.041	65.8*
Merger	-0.177	50.91	-11.25	0.247	64.93	0 4,376	0.028	126.5*
Hostile	-0.392^c	14.41	-10.22	0.234	24.49	352	0.228	104.6*
Friendly	-0.191^c	58.75	-14.11	0.233	65.08	5,558	0.034	199.0*
Dormant industry	-0.234	30.36	-9.48	0.220	34.76	1,700	0.050	89.8*
Active industry	-0.187	52.21	-12.24	0.237	58.34	4,210	0.034	149.9*
Horizontal	-0.193	35.26	-8.56	0.226	37.03	1,746	0.040	73.3*
Non-horizontal	-0.203	49.20	-12.83	0.234	56.86	4,164	0.038	164.7*
B: Abnormal stock returns: $Markup = CAR_{[0,end]}$, $Runup = CAR_{[-41,-1]}$								
All (7,522 targets)	0.595	71.33	26.64	-0.066	-6.99	7,522	0.086	709.9*
Successful	0.493	62.47	20.65	0.084	9.02	5,340	0.074	426.6*
No bidder wins	0.522	32.92	11.29	-0.353	-15.94	2,078	0.057	127.6*

[1] Toeholds purchased by the initial bidder and announced on the offer day (day 0).
[2] Toeholds purchased by the initial bidder and announced prior to the offer day (day 0).

Table 5
Variable definitions

Variable definitions. The initial control bid is announced on day 0 in year 0. The industry is all firms in CRSP with the same 4-digit industry as the target (acquirer) in the announcement year.

Variable	Definition
A. Target characteristics	
Target size	Natural logarithm of the target market capitalization in $ million on day -42.
Relative size	Ratio of target market capitalization to bidder market capitalization on day -42.
NYSE/Amex	Target is listed on NYSE or Amex.
Amihud liquidity	Average value of $\|R_i\|/(p_i S_i)$ over days $i \in \{-250, -42\}$, where R_i is the % holding period return, p_i is the closing price and S_i is the number of shares traded.
Book-to-mkt>ind	Target (acquirer) book to market exceeds the industry median.
Herfindahl	Industry concentration index $\sum_i (s_i/S)^2$, where s_i is total sales of firm i in year -1, S is the total sales in the industry $S = \sum_i s_i$ in year -1, and i is all firms in the industry.
Dormant industry	First takeover bid in the target 4-digit SIC industry for a period of 2 years.
B. Bidder characteristics	
Positive toehold	The acquirer owns shares in the target when announcing the initial control bid.
ST toe initial	Toehold acquired by the initial control bidder over the 42 days leading up to and including the day of the initial control bid.
ST toe initial ex d0	Toehold acquired by the initial control bidder over the 42 days leading up to but but not including the day of the initial control bid.
ST toe initial d0	Toehold acquired by initial control bidder announced on the day of the initial control bid.
ST toe other	Toehold acquired by another investor over the 42 days leading up to and including the day of the initial control bid.
Prior bids	Number of control bids for public targets launched by the acquirer over the last 5 years.
Acquiror public	Bidder is publicly traded.
Horizontal	Bidder and target has the same 4-digit SIC code in CRSP.
Net threshold	The difference between the toehold threshold (from Betton, Eckbo, and Thorburn (2008)) and the initial control bidder's toehold 2 months prior to the initial control bid.
Toehold size	The percent target shares owned by the initial control bidder when announcing the bid.
Inverse Mills ratio, λ	$\lambda = \phi/\Phi$ if *ST toe initial* $= 1$ and $\lambda = -\phi/(1-\Phi)$ if *ST toe initial* $= 0$. ϕ and Φ are the standard normal density and cumulative distribution functions, respectively, evaluated at $\hat{\gamma}'Z$. $\hat{\gamma}'Z$ is the predicted value from a probit estimation of the probability of *ST toe initial* $=$ 1, using the explanatory variables in column 1 of Table 8.
C. Contest characteristics	
Tender offer	Bids identified by SDC or WSJ as a tender offer, or with SDC transaction form AM.
Runup	The target runup expressed as $CAR_{[-41,-1]}$, the cumulative abnormal return of the target stock over days -41 to -1, or as $ln(p_{-1}/p_{-41})$, where p_i is the target closing price or, if missing, the bid/ask mean on day i, with p_{-42} adjusted for splits and dividends.
Markup	$ln(p_{ini}/p_{-1})$, where p_{ini} is the initial offer price and p_{-1} is the target stock price (or bid/ask average) on day -1.
Cash	Payment method is cash only.
Stock	Payment method is stock only.
Hostile	Target management's response is hostile.
Multiple bids	A competing bid from a rival or a revised bid from the initial bidder.
Initial bidder wins	The initial bidder wins the contest.
No bidder wins	No bidder wins the contest and the target remains independent.
1980-1989	The contest is announced in the period 1980-1989 (vs. 1990-2002).

Table 6
Determinants of markups for 5,921 targets, 1980-2002

The table shows OLS estimates for the equation

$$Markup_i = a + bRunup_i + cX_i + e_i,$$

where X is a vector of explanatory variables. $Markup = ln(p_{offer}/p_{-1})$ and $Runup = ln(p_{-1}/p_{-42})$, where p_{offer} is either the initial or the final offer price, respectively, and p_i is the target closing price or, if missing, the bid/ask average on day i, and p_{-42} is adjusted for splits and dividends. The remaining variables are defined in Table 5. T-statistics are in parenthesis and * denotes that the F-value is different from zero at the 1% level.

	Initial offer markup			Final offer markup		
Intercept	0.329	0.327	0.327	0.313	0.312	0.312
	(22.95)	(22.89)	(22.86)	(20.08)	(20.08)	(20.08)
$Runup: ln(p_{-1}/p_{-42})$	-0.181	-0.180	-0.180	-0.159	-0.158	-0.158
	(-13.87)	(-13.79)	(-13.78)	(-11.12)	(-11.04)	(-11.05)
Target characteristics						
Target size	-0.035	-0.035	-0.035	-0.031	-0.031	-0.031
	(-8.68)	(-8.69)	(-8.68)	(-7.15)	(-7.17)	(-7.18)
NYSE/Amex	-0.003	-0.003	-0.003	0.000	-0.001	-0.001
	(-0.38)	(-0.44)	(-0.44)	(-0.04)	(-0.11)	(-0.11)
Amihud liquidity	8.200	8.674	8.671	6.775	7.138	7.161
	(1.13)	(1.19)	(1.19)	(0.85)	(0.89)	(0.89)
Dormant industry	-0.013	-0.013	-0.013	-0.010	-0.011	-0.010
	(-1.80)	(-1.83)	(-1.83)	(-1.33)	(-1.35)	(-1.34)
Bidder characteristics						
Positive toehold	-0.024			-0.022		
	(-2.45)			(-2.06)		
ST toe initial		-0.055			-0.067	
		(-1.98)			(-2.28)	
ST toe initial ex d0			-0.056			-0.050
			(-1.39)			(-1.15)
ST toe initial d0			-0.054			-0.082
			(-1.42)			(-2.07)
ST toe other	-0.002	-0.002	-0.002	-0.016	-0.015	-0.016
	(-0.09)	(-0.10)	(-0.10)	(-0.68)	(-0.64)	(-0.66)
Acquiror public	0.027	0.028	0.028	0.023	0.024	0.024
	(3.05)	(3.20)	(3.20)	(2.37)	(2.48)	(2.48)
Horizontal	-0.005	-0.005	-0.005	-0.003	-0.003	-0.003
	(-0.66)	(-0.63)	(-0.63)	(-0.34)	(-0.33)	(-0.32)
Deal characteristics						
Tender offer	-0.075	-0.078	-0.078	-0.080	-0.083	-0.083
	(-9.13)	(-9.74)	(-9.73)	(-8.96)	(-9.46)	(-9.48)
Cash	0.015	0.015	0.015	0.030	0.030	0.030
	(1.84)	(1.79)	(1.78)	(3.38)	(3.29)	(3.32)
Stock	-0.024	-0.024	-0.024	-0.024	-0.024	-0.024
	(-2.76)	(-2.72)	(-2.72)	(-2.50)	(-2.50)	(-2.49)
Hostile	0.021	0.016	0.016	0.061	0.057	0.057
	(1.46)	(1.12)	(1.12)	(3.89)	(3.71)	(3.71)
$1980 - 1989$	-0.008	-0.011	-0.011	-0.014	-0.017	-0.017
	(-1.05)	(-1.51)	(-1.51)	(-1.69)	(-2.02)	(-2.04)
Multiple bids				0.059	0.058	0.058
				(5 49)	(5.39)	(5.39)
Sample size, N	5,826	5,826	5,826	5,921	5,921	5,921
Adjusted R^2	0.074	0.073	0.073	0.056	0.056	0.056
F-value	34.0*	33.8*	31.6*	24.5*	24.6*	23.1*

Table 7
Bidder returns in 4,362 initial control bids for US public targets, 1980-2002

The table shows WLS estimates of bidder total returns $BCAR_{[-41,end]}$ and announcement returns $BCAR_{[-1,1]}$ All variables are defined in table 5. T-statistics are in parenthesis and * denotes that the F-value $\neq 0$ at the 1% level.

	Bidder total contest $BCAR_{[-41,end]}$				Bidder announcement $BCAR_{[-1,1]}$			
Intercept	-0.332	-0.332	-0.331	-0.300	-0.019	-0.019	-0.019	-0.023
	(-9.91)	(-9.90)	(-9.88)	(-11.30)	(-5.10)	(-5.13)	(-5.12)	(-7.52)
$Runup:\ ln(p_{-1}/p_{-42})$	0.120	0.122	0.122		0.011	0.011	0.011	
	(3.27)	(3.32)	(3.30)		(2.18)	(2.18)	(2.20)	
$Markup:\ ln(p_1/p_{-1})$	0.025	0.027	0.027		-0.035	-0.035	-0.035	
	(0.64)	(0.70)	(0.70)		(-6.23)	(-6.23)	(-6.23)	
$Runup:\ CAR_{[-41,-1]}$				0.180				0.013
				(5.47)				(2.68)
Target characteristics								
Relative size	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.55)	(0.48)	(0.49)	(0.73)	(0.47)	(0.47)	(0.48)	(0.76)
NYSE/Amex	0.080	0.080	0.080	0.095	0.002	0.002	0.002	0.003
	(4.30)	(4.27)	(4.27)	(5.39)	(0.58)	(0.61)	(0.60)	(1.00)
Amihud liquidity	31.88	32.23	32.06	6.676	14.74	14.67	14.63	10.60
	(1.33)	(1.35)	(1.34)	(0.33)	(4.32)	(4.30)	(4.29)	(3.67)
Dormant industry	0.015	0.013	0.013	0.014	0.010	0.010	0.010	0.010
	(0.69)	(0.63)	(0.63)	(0.69)	(3.41)	(3.41)	(3.41)	(3.59)
Bidder characteristics								
Positive toehold	-0.041			-0.036	0.001			0.004
	(-1.24)			(-1.16)	(0.16)			(0.91)
ST toe initial		-0.044				0.014		
		(-0.48)				(1.04)		
ST toe initial ex d0			-0.069				0.008	
			(-0.53)				(0.42)	
ST toe initial d0			-0.019				0.019	
			(-0.15)				(1.06)	
ST toe other	-0.157	-0.158	-0.157	-0.139	-0.009	-0.010	-0.010	-0.008
	(-2.11)	(-2.11)	(-2.09)	(-2.01)	(-0.87)	(-0.95)	(-0.92)	(-0.79)
Prior bids	0.005	0.005	0.005	0.005	0.001	0.001	0.001	0.001
	(1.41)	(1.39)	(1.39)	(1.42)	(2.51)	(2.51)	(2.52)	(2.59)
Horizontal	-0.007	-0.007	-0.007	-0.003	-0.003	-0.003	-0.003	0.000
	(-0.31)	(-0.31)	(-0.32)	(-0.14)	(-0.90)	(-0.88)	(-0.89)	(-0.16)
Deal characteristics								
Tender offer	-0.009	-0.016	-0.016	-0.031	0.002	0.002	0.003	0.002
	(-0.33)	(-0.61)	(-0.60)	(-1.22)	(0.61)	(0.66)	(0.67)	(0.60)
Cash	0.070	0.071	0.070	0.068	0.019	0.016	0.019	0.016
	(2.82)	(2.84)	(2.81)	(2.95)	(5.37)	(5.37)	(5.33)	(4.69)
Stock	-0.073	-0.073	-0.073	-0.084	-0.013	-0.013	-0.013	-0.016
	(-3.23)	(-3.30)	(-3.30)	(-4.07)	(-4.02)	(-4.01)	(-4.01)	(-5.30)
Hostile	0.099	0.089	0.089	0.084	0.004	0.003	0.003	0.004
	(2.16)	(1.98)	(1.97)	(1.91)	(0.59)	(0.56)	(0.55)	(0.70)
$1980-1989$	0.058	0.052	0.052	0.061	0.008	0.008	0.008	0.006
	(2.51)	(2.31)	(2.31)	(2.91)	(2.59)	(2.64)	(2.66)	(2.06)
Multiple bids	0.055	0.052	0.052	0.031				
	(1.60)	(1.53)	(1.53)	(1.00)				
Initial bidder wins	0.176	0.175	0.175	0.143				
	(6.91)	(6.86)	(6.85)	(6.59)				
Sample size, N	3,874	3,874	3,874	4,362	3,874	3,874	3,874	4,362
Adjusted R^2	0.037	0.037	0.036	0.041	0.059	0.059	0.059	0.042
F-value	9.8^*	9.7^*	9.1^*	12.5^*	17.2^*	17.3^*	16.2^*	14.7^*

Table 8
Probability of short-term toehold, rival bidder entry, and initial bidder wins

Logit coefficient estimates for the probability that the initial control bidder acquires a short-term toehold, a rival bidder enters, and the initial bidder wins, respectively. Sample of 6,184 U.S. public targets, 1980-2002. The explanatory variables are defined in Table 5. p-values are in parenthesis and * denotes that $\chi^2 \neq 0$ at the 1% level.

Sample:	All contests		Toehold> 0		All contests	
Dependent variable:	Initial bidder short-term toehold				Rival enters	Initial wins
Intercept	-3.247	-3.332	0.615	-1.124	-2.450	0.167
	(0.000)	(0.000)	(0.255)	(0.209)	(0.000)	(0.374)
Net threshold		-0.036		0.034		
		(0.001)		(0.006)		
Toehold size			-0.061		-0.013	0.011
			(0.000)		(0.042)	(0.011)
ST toe initial					-0.761	1.473
					(0.160)	(0.001)
Target characteristics						
Target size	-0.289	-0.357	-0.316	-0.196	0.026	0.204
	(0.012)	(0.129)	(0.041)	(0.426)	(0.721)	(0.000)
Tgt book-to-mkt > ind	-0.060	0.168	-0.420	-0.059	0.424	-0.083
	(0.758)	(0.656)	(0.089)	(0.881)	(0.000)	(0.295)
NYSE/Amex	-0.246	-0.296	-0.024	-0.039	-0.155	0.201
	(0.342)	(0.547)	(0.943)	(0.471)	(0.258)	(0.035)
Amihud liquidity	-59.04	-291.1	136.2	17.96	-457.4	75.32
	(0.789)	(0.665)	(0.583)	(0.982)	(0.049)	(0.394)
Target Herfindahl	-0.113	-0.537	-0.247	-0.689	0.261	0.160
	(0.800)	(0.541)	(0.684)	(0.468)	(0.316)	(0.393)
Dormant industry	0.253	0.626	0.120	0.634	0.147	-0.217
	(0.248)	(0.123)	(0.669)	(0.155)	(0.258)	(0.020)
Bidder characteristics						
ST toe other	0.958	-0.363	0.072	-1.199	-0.024	0.007
	(0.005)	(0.728)	(0.868)	(0.264)	(0.942)	(0.978)
Prior bids	-0.043	0.023	-0.026	0.141	-0.082	0.083
	(0.673)	(0.869)	(0.868)	(0.430)	(0.089)	(0.006)
Acquirer public	-0.153	-0.816	-0.085	-0.348	-0.355	0.652
	(0.517)	(0.073)	(0.780)	(0.463)	(0.011)	(0.000)
Horizontal	-1.226	-0.678	-0.712	-0.135	-0.206	0.394
	(0.004)	(0.277)	(0.128)	(0.841)	(0.171)	(0.000)
Deal characteristics						
Tender offer	0.412	-0.809	-0.613	-1.013	-0.241	0.785
	(0.051)	(0.068)	(0.024)	(0.024)	(0.073)	(0.000)
Runup : $ln(p_{-1}/p_{-42})$					-0.358	1.010
					(0.135)	(0.000)
Markup : $ln(p_1/p_{-1})$					0.104	0.045
					(0.665)	(0.767)
Cash	-0.635	0.067	-0.824	-0.458	-0.103	-0.048
	(0.002)	(0.870)	(0.001)	(0.292)	(0.423)	(0.617)
Stock	-1.049	-0.712	-0.726	-0.312	-0.609	0.359
	(0.010)	(0.321)	(0.191)	(0.687)	(0.001)	(0.001)
Hostile	0.880	1.804	-0.480	0.232	1.153	-2.228
	(0.002)	(0.000)	(0.147)	(0.629)	(0.000)	(0.000)
1980-1989	0.958	0.228	0.255	-0.150	0.630	-0.866
	(0.000)	(0.591)	(0.372)	(0.725)	(0.000)	(0.000)
Sample size: y=1	117	35	89	35	398	3,768
y=0	6,067	4,480	749	608	4,481	1,111
Cox & Snell R^2	0.019	0.011	0.080	0.046	0.044	0.151
χ^2	118.8*	51.4*	69.9*	30.5	221.1*	801.3*

Table 9
Target runup and initial offer premium in 6,184 control contests, 1980-2002

The table shows WLS estimates of the target runup $Runup = ln(p_{-1}/p_{-42})$ and the initial offer premium $Premium = ln(p_{initial}/p_{-42})$, where p_i is the target closing price or, if missing, the mean bid/ask on day i and p_{-42} is adjusted for splits and dividends. λ corrects for self-selection of a short-term toehold by the initial control bidder. Variables are defined in Table 5. T-statistics are in parenthesis and * denotes that the F-value $\neq 0$ at the 1% level.

	$Runup = ln(p_{-1}/p_{-42})$			$Premium = ln(p_{initial}/p_{-42})$			
Intercept	-0.057	-0.097	-0.105	0.304	0.282	0.281	0.278
	(-2.56)	(-2.11)	(-2.29)	(9.05)	(4.72)	(4.71)	(4.63)
Inverse Mills Ratio, λ	-0.000	-0.005	-0.006	-0.002	-0.004	-0.004	-0.005
	(-0.00)	(-0.92)	(-1.12)	(-0.68)	(-0.66)	(-0.67)	(-0.79)
Target characteristics							
Target size	0.010	0.011	0.011	-0.034	-0.034	-0.034	-0.034
	(2.56)	(2.73)	(2.74)	(-6.02)	(-5.68)	(-5.70)	(-5.69)
Tgt book-to-mkt > ind	0.019	0.019	0.020	0.041	0.040	0.041	0.042
	(2.71)	(2.78)	(2.81)	(4.48)	(4.32)	(4.35)	(4.49)
NYSE/Amex	0.032	0.036	0.037	0.012	0.013	0.013	0.015
	(3.81)	(3.83)	(3.90)	(1.13)	(1.11)	(1.10)	(1.24)
Amihud liquidity	3.49	3.62	3.68	12.46	13.74	14.00	12.66
	(0.70)	(0.72)	(0.73)	(1.12)	(1.24)	(1.26)	(1.14)
Target Herfindahl	-0.001	0.027	0.033	0.010	0.025	0.025	0.029
	(-0.05)	(0.78)	(0.95)	(0.35)	(0.55)	(0.55)	(0.64)
Dormant industry	0.004	-0.005	-0.006	0.000	-0.005	-0.005	-0.004
	(0.43)	(-0.37)	(-0.49)	(-0.02)	(-0.33)	(-0.29)	(-0.27)
Bidder characteristics							
Positive toehold	-0.015			-0.047			
	(-1.31)			(-3.24)			
Toehold size							-0.002
							(-4.63)
ST toe initial		0.052			0.002		0.038
		(0.81)			(0.03)		(0.42)
ST toe initial ex d0			0.080			0.080	
			(2.09)			(0.83)	
ST toe initial d0			-0.069			-0.069	
			(0.37)			(-0.73)	
ST toe other	0.106	0.094	0.090	0.073	0.064	0.063	0.064
	(4.87)	(3.90)	(3.75)	(2.30)	(1.86)	(1.84)	(1.86)
Prior bids	0.002	0.000	-0.001	0.003	0.002	0.002	0.001
	(0.98)	(-0.06)	(-0.23)	(1.05)	(0.44)	(0.43)	(0.33)
Acquiror public	0.055	0.056	0.056	0.055	0.058	0.058	0.054
	(6.09)	(6.20)	(6.19)	(4.39)	(4.60)	(4.62)	(4.32)
Horizontal	-0.005	0.026	0.033	-0.005	0.011	0.012	0.016
	(-0.33)	(0.74)	(0.95)	(-0.20)	(0.26)	(0.27)	(0.35)
Deal characteristics							
Tender offer	0.059	0.054	0.053	0.008	0.000	-0.001	0.007
	(6.76)	(5.97)	(5.87)	(0.66)	(-0.04)	(-0.10)	(0.59)
Cash	0.052	0.052	0.053	0.029	0.029	0.030	0.031
	(6.38)	(6.41)	(6.47)	(2.43)	(2.39)	(2.49)	(2.58)
Stock	0.030	0.031	0.031	-0.009	-0.008	-0.007	-0.008
	(3.19)	(3.27)	(3.27)	(-0.67)	(-0.60)	(-0.57)	(-0.60)
Hostile	0.026	-0.016	-0.027	0.006	-0.025	-0.025	-0.033
	(1.11)	(-0.37)	(-0.61)	(0.192)	(-0.45)	(-0.45)	(-0.59)
$1980 - 1989$	0.018	0.017	0.017	0.005	-0.003	-0.004	0.005
	(2.26)	(2.11)	(2.10)	(0.41)	(-0.28)	(-0.35)	(0.42)
Sample size, N	6,184	6,184	6,184	4,889	4,889	4,889	4,879
Adjusted R^2	0.041	0.041	0.042	0.024	0.022	0.023	0.026
F-value	16.5*	16.5*	15.9*	8.2*	7.5*	7.3*	8.3*

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