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Abstract

Building on recent research in social psychology, this paper analyzes the link between the precision of initial cash offers and M&A outcomes. About one-half of the offers are made at the precision of one or five dollars per share, and an additional one-third at the precision of half dollar or one quarter. The practice of making offers at granular price per share levels is associated with the following unfavorable outcomes for the bidder: (1) higher purchase price for target shares, (2) lower probability to complete the deal, and (3) lower announcement return. A median-sized offer made at the precision of one or five dollars per share is associated with a 4−5 million dollars higher expected transaction price than one made at a precision greater than one quarter. Our results are consistent with the idea that bidders have learned to avoid making offers at the most granular level.

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1. Introduction

A large literature in the area of social psychology suggests that making the first offer tends to yield a bargaining advantage.[1] This advantage stems from negotiators anchoring on opening offers, which leads their counteroffers and the ultimate settlements to be biased in the direction of the initial proposal.[2] Experimental and field evidence from the real estate market suggest that the maker of the first offer may be able to further tilt the bargaining game to her advantage by expressing the offer price in precise terms.[3] For example, a list price of $1,020,000 is more informative and likely to lead to a smaller price adjustment than a list price of $1,000,000. A precise list price hints that the seller has a precise estimate of the value of the real estate, and is unlikely to make significant concessions on the price.[4]

Can precise initial offers tilt the bargaining game to the bidder's advantage also in M&A deals? To our knowledge, this study is the first to test this idea. The mergers and acquisitions market is in many respects an ideal venue for testing the effect of precision on bidder outcomes. The market is very large, both in terms of the value and number of transactions, so the success of bidding strategies is of great economic importance. Moreover, the behavior of each party and deal outcomes are well documented and easily available to researchers from public databases. These data make it possible not only to assess the success of precise bids,

[1] See, for example, Chertkoff and Conley (1967), Yukl (1974), Galinsky and Mussweiler (2001), and Gunia et al. (2013).

[2] See Tversky and Kahneman (1974) for evidence on the anchoring effect. Apart from negotiation outcomes, anchoring has been shown to influence valuations (Ariely, Loewenstein, and Prelec (2003), purchasing decisions (Wansink, Kent, and Hoch, 1998), and legal judgments (Englich and Mussweiler, 2001), among others. Baker, Pan, and Wurgler (2012) find that recent peaks in target share price serve as anchors in M&A deals.

[3] Janiszewski and Yu (2008) are the first to present this hypothesis and find consistent evidence using experimental and field data from the real estate market. Their results have been replicated in various experimental settings by Mason et al. (2013), Zhang (2013), and Lotchelder, Stuppi, and Trötschel (2014), among others. Thomas, Simon and Kadiyali (2010) find evidence in support of the hypothesis in the real estate market. Welsh, Navarro, and Begg (2011) and Jerez-Fernandez, Angulo, and Oppenheimer (2013) find that confident subjects make more accurate assessments than less confident ones. In the finance literature, Harris (1991) suggests that traders use discrete prices to lower the costs of negotiating. The frequency of rounded prices is an increasing function of stock price and uncertainty concerning valuation. Bradley et al. (2004) and Mola and Loughran (2004) find that initial public offerings and seasoned equity offerings priced at rounded numbers generate higher initial returns.

[4] It is worthwhile to ask *why* negotiators would choose to leak information on their reservation prices by placing a round offer, and why they would respond differently to offers made at various levels of precision. A sizeable literature suggests this is because people are hard wired to do so. People often write and speak about round numbers rather than precise numbers (e.g. Baird et al., 1970; Dehaene and Mehler, 1992; and Jansen and Pollman, 2001). Mason et al. (2013) find a similar result in a negotiation experiment: experienced executives and MBA students tend to make round initial offers if not told otherwise. Likewise, in co-operative discussions, a recipient generally assumes that the given information is as informative as required, but not more than that (Grice, 1975). Therefore, the recipient is inclined to infer from a precise offer that all digits are required to express the value of the target.

but also to look for external validation for the merits of the precise-bid strategy by observing how the stock market responds to bids of various degrees of precision.

The market for corporate control gives rise to complex strategic behavior.[5] In our setting, a bidder can hint at its confidence in the valuation of the target by expressing its bid more precisely. A bid for $10.20 per share leaves the impression that the bidder is less likely to revise the bid significantly upward than a bid for $10.00 per share. However, the target does not know the true motivations behind the precision of the bid: a bidder can place a precise bid because it genuinely has a narrow valuation range, or to bluff the target into accepting a lower price. Whether bidders express their bids in precise terms and whether precise bids lead to better outcomes such as less price adjustment, are open empirical questions. Apart from being interesting in their own right, addressing these questions informs us of the nature of the bargaining game played by the bidder and the target.

We start our analysis by documenting the precision of initial offers. Fourteen percent of initial cash bids are expressed at the precision of five dollars per share, and about one half at the precision of one dollar. Only one-sixth of the offers are expressed at a precision greater than one quarter. Given that most bidders place their bids at a relatively granular level, placing a precise bid to bluff the target cannot be common.

We next investigate the effect of precision on price change. We find that making an offer at the precision of five dollars (one dollar) is associated with a 10% (8%) higher price change than placing an offer at a precision greater than one quarter. These results are highly significant and suggest that granular offers magnify the change in the final deal price. For the median (mean) transaction, a bid made at the precision of one or five dollars is associated with a 4−5 (14−18) million dollars higher expected transaction price than one made at a precision greater than one quarter.

We also find that precise offers increase the likelihood that the initial bidder is able to close a deal with the target. For example, an initial offer placed at a precision greater than one quarter has an 8% (6%) higher likelihood of leading to a deal than an offer placed at the precision of five dollars (one dollar). These results are consistent with the idea that targets view precise offers as more credible.

[5] For a review of the literature, see e.g. Dasgupta and Hansen (2007) and Eckbo (2009).

Cash bids tend to generate positive market reactions for the acquirer and precise bids tend to be associated with a higher success rate and more favorable deal terms. Does the market consequently view an acquirer's precise bid more positively than a round one? Our results suggest that it does, although the results are noisier than in our previous tests. A bid placed at a precision greater than one quarter is associated with a 2.0% (2.0%) higher market reaction than a bid placed at the precision of five dollars (one dollar). These results are significant at the 10% level.

Are the favorable outcomes associated with precise bids outweighed by other, unfavorable outcomes? We examine three plausible alternative outcomes but find no support for this conjecture. More specifically, precise bids are not associated with a greater likelihood of price change, or competing offers, nor does it take a longer time to close a deal initiated by a precise bid; if anything, our evidence suggests the opposite. For example, bids made at a precision greater than one quarter have a significantly shorter duration than those made at the precision of five dollars.

Admittedly, no regression methodology involving bidding behavior in mergers and acquisitions can completely mimic an experiment with true randomization of treatments; one cannot randomly shock the bidders to assign differing bid strategies, nor can a researcher develop perfect instruments for bid precision that are not subject to some endogeneity biases. However, we have minimized the effect of omitted variables by including in our regressions all the usual suspects that might account for our findings. All deal and firm characteristics we use as controls are known at the time of the first bid.

While we think that our parameter estimates represent a fair characterization of the effects of precision on offer outcomes for the marginal bidder, we do not claim that they can be causally interpreted in the whole bidder population. Most initial bids have historically been, and continue to be made, at a relatively granular level. If all bidders switched to making precise bids, the information content of precision would decrease to zero. But as long as they do not, and the targets do not fully internalize the ramifications of the bidders' bluff, bidders can expect to benefit from making precise bids.

2. Data and empirical results

A. Sample restrictions and key variable definitions

We collect all cash offers made on publicly listed US based targets and announced between January 1, 1985 and December 31, 2012 from Securities Data Corporation's (SDC) mergers and acquisition database.[6] We require that each initial bidder is based in the U.S. and that each target is listed on the New York Stock Exchange (NYSE), NASDAQ, or American Stock Exchange (AMEX). Offers for which either the CRSP or the Compustat data is missing are excluded from the sample. To ensure sufficient homogeneity in the precision of the bid prices, we also require the initial bid to be at least five dollars per share.[7] Furthermore, we require that the offer is not classified by SDC as a repurchase, recapitalization, restructuring, or joint venture. Finally, we drop four observations which either have apparent data errors or where the offer outcome has been agreed upon before announcing the initial bid. In these observations SDC reports that the deal was closed on the same day the initial bid was announced.

SDC reports two key price per share items, initial price per share and the (final) price per share. We define the change in bid price as the relative difference between these two price items. This price change variable is defined only if one of the bids in the takeover contest is completed.

We define takeover contests as in Betton et al. (2008). First, we define as control offers bids which SDC classifies as Acquisitions of majority interests (deal form AM) or as mergers (M) and where the bidder starts with less than 50% of the target firm shares outstanding. Second, each individual target is identified based on a CUSIP number. A takeover contest is started when the first control offer is made for a given target and continues until 126 trading days have passed without any subsequent offer. Each time an additional offer for the target is identified, the 126-trading day search window rolls forward.

We also follow Betton et al. (2008) in the computation of the duration of the takeover contest. For successful offers, duration is defined as the number of calendar days between the

[6] We restrict our analysis to the precision of pure cash bids because the SDC data does not indicate whether the exchange ratio in a stock offer applies to the initial or a later bid. Cash bids also do not require bidder shareholder approval, giving the bidder management more discretion in formulating the bids.

[7] See, for example, Bradley et al. (2004).

announcement of the initial offer and the completion date of the deal. For unsuccessful offers, duration is defined as the difference in calendar days between the initial offer date and the date of the last offer announcement, plus 126 days. Following Jaggia and Thosar (1995), we right censor duration at 365 days. This censoring applies to 31 observations, i.e. less than 2% of the sample.

We study market reactions to initial bids by calculating three-day cumulative abnormal returns around each event. Abnormal returns are computed as returns in excess of those predicted by the market model; following Bradley, Desai, and Kim (1988), we estimate the market model parameters using daily data from event days [−300,−61]. To assure that each event is important enough for the acquirer to be able to trigger a market reaction, we require that the total transaction value accounts for at least ten percent of the acquirer's equity market value.[8]

B. Descriptive statistics

Figure 1 investigates the degree to which the initial bids are clustered at round numbers. Panel A shows clear patterns in the initial bids: almost one-half of them are placed at the precision of one dollar, 19% at the precision of half dollar, and 15% at the precision of one quarter. In other words, bidders rarely place precise bids, neither in the absolute sense nor when compared with closing prices.[9] If precise bids give a bargaining advantage, most bidders must be unaware of it.

Panel B studies the bids made at the precision of one dollar in more detail. It shows that bids whose last digit is 5 and 0, i.e. bids made at the precision of five dollars, are somewhat more common than other bids. Combined these bids account for 14% of all bids.

Table 1 reports means, standard deviations, medians and extreme values for the precision, contest outcome, and control variables. The initial bidder wins the deal in about three-fourths of all bids. Ten percent of all bids are contested, and the average contest duration is 119 calendar days. The bid price changes from the initial bid in 18% of the cases; the average price change (conditional on a non-zero price change) is 14%. The price change is usually

[8] See, for example, Officer, Poulsen, and Stegemoller (2009).
[9] For example, Harris (1991) documents that 16% (14%) of closing prices take place at the precision of one dollar (half dollar). Using a post-decimalization sample, Ikenberry and Weston (2008) find that 4.6% (3.4%) of the closing prices take place at the precision of one dollar (half dollar).

positive, but findings from the due diligence process sometimes cause the price to be revised downward. The average three-day announcement return for the acquirer is 1.3%.

Table 2 reports univariate statistics on the relationship between bid precision and offer outcomes. The relationship between bid precision and offer success is almost monotonous. The initial bidder wins 69% of the bids made at the precision of five dollars, whereas in the other end, at a precision greater than one quarter, the initial bidder wins 84% of the time. The difference between these two numbers is highly significant (z-value = −4.32) and suggests that precise bids tend to be more successful.

Table 2 also suggests that greater bid precision is associated with a smaller price change from the initial bid price to final price. The relationship between bid precision and average price change is almost monotonous. Conditional on a price change, bids made at the precision of five dollars generate on average a price change of 17.6%, whereas the corresponding price change for bids made at a precision greater than one quarter is 6.0%. The difference between these numbers is highly significant (t-value = 3.43). These results are consistent with the idea that targets anchor more on precise initial offers than on round offers.

Finally, Table 2 reports the association between bid precision and the three-day announcement return for the acquirer. Bids made at the most granular levels, i.e. at the precision of five dollars or one dollar, are associated with announcement returns of 0.1% and 0.2%, respectively. Bids made at a greater precision generate 2−3% higher announcement returns, a difference that is significant at the 10% level. These results are consistent with the idea that the marginal trader in the stock market thinks that precise bids are better for acquirers than round bids.

C. Multivariate results

C.1. Likelihood to make a successful bid

Table 3 reports the results from logit regressions which relate the likelihood to make a successful bid to initial bid precision and controls. Specification 1 reports the association between the bid precision variables and offer success. Consistent with Table 2, all precision variables are significantly negative at the 5% level, suggesting that placing a bid at a precision greater than one quarter (the omitted variable) is associated with a greater chance for the initial bidder to be successful than a bid placed at a lower precision.

Specification 2 drops the bid precision variables and instead adds control variables to the regression equation. We add controls for tender offers (e.g. Betton et al, 2009), hostile offers (Schwert, 2000), the inverse of offer price (Baker et. al., 2012), horizontal offers (Betton et al, 2009), premium (Betton and Eckbo, 2000), toehold (Betton and Eckbo, 2000), and public acquirers (Betton et al, 2009). In addition, in the spirit of Moeller et al. (2004) and Baker et al. (2012), we control for the size of the transaction. Our results suggest that public acquirers, tender offers, horizontal offers, offers made at higher prices, and large offers tend to be associated with a significantly greater chance of success, whereas hostile offers tend to be associated with a significantly smaller chance of success.

Specification 3 includes both the precision variables and controls in the regression equation. All the precision variables survive the addition of controls and remain significantly negative at least at the 5% level. For example, placing a bid at the precision of five dollars has a marginal effect of 0.079 (*t*-value = −2.60), i.e. it is associated with a 8% lower likelihood for the initial bidder to win a deal than a bid made at the precision greater than one quarter. The corresponding marginal effect for an initial bid made at the precision of one dollar is 0.057 (*t*-value = −2.01). These results are consistent with the idea that targets view precise offers as more credible.[10,11]

C.2. Relative price change

Table 4 runs a series of OLS regressions that associate relative price change from the initial bid to final price for all successful bids. While the structure of the table is the same as in Table 3, the sample is much smaller because we limit our analysis to events where the final price differs from the initial bid price. Specification 1 regresses the price change against the

[10] As an alternative hypothesis, we consider the possibility that precise bids are associated with a smaller likelihood of competing offers, depriving the target of a meaningful alternative to accepting the initial bidder's offer. While the first specification in Table IA1 in Internet Appendix finds that bids placed at the precision of five dollars or half dollar are significantly more likely to generate competing bids than bids presented at a precision greater than one quarter (*t*-values: 1.82 and 2.47, respectively), the bid precision variables lose their significance once other bid attributes are controlled for.

[11] Precise offers also turn out to be at least as good as round ones in terms of their duration. The first specification in Table IA2 finds that bids made at a precision greater than one quarter have a significantly shorter duration than those made at the precision of five dollars or one dollar. The five-dollar coefficient remains significant at the 10% level (*t*-value = −1.87) even when other bid attributes are controlled for.

bid precision variables. Consistent with Table 2, the three coarsest bid precision variables are all associated with significantly greater price change than bids made at a precision greater than one quarter.

Specification 2 reports the results for the same battery of control variables as in Table 3, except that it also adds the target's return volatility to account for the degree of uncertainty in the valuation of the target. Among the control variables, only one variable, the hostile offer dummy, is significantly related to the price change.

Specification 3 includes both the bid precision variables and control variables in the regression. Among the bid precision variables, all but the one quarter dummy are associated with statistically significantly higher bid price changes than bids made at a precision greater than one quarter. The results are also economically highly significant. For example, making a bid at the precision of five (one) dollars is associated with a 10.1% (7.6%) greater price change than those made at a precision greater than one quarter. Assessed at the median (mean) transaction value of 254 (986) million, and taking into account the unconditional probability for a price change of 18.2%, these two coefficient estimates translate into coarse bidders paying 4.7 (18.1) and 3.5 (13.6) million dollars more for their targets, respectively.[12]

C.3. Acquirer announcement effect

Table 5 studies the announcement effect of an initial bid for the acquirer. This analysis is motivated by three separate findings. First, Table 3 indicates that precise initial bids are associated with a higher likelihood of offer success than round ones. Second, Table 1 suggests that initial bids tend to generate a positive announcement effect, so a strategy increasing the chances of a successful offer is expected to benefit the acquirers' shareholders. Third and finally, Table 4 finds precise offers to be associated with a smaller price change from the

[12] We also consider the possibility that the likelihood of a price change could be a function of bid precision. To test this conjecture, Table IA3 regresses the likelihood of a price change on the bid precision variables and controls. The first specification shows that bids made at the precision of five dollars and one dollar are significantly or almost significantly more likely to be associated with price change than bids made at the precision greater than one quarter (*t*-values: 1.55 and 1.89, respectively). However, the bid precision variables lose their significance in the third specification where other bid attributes are controlled for. When assessing the economic significance of the results, we err on the side of caution by ignoring any association between the bid precision variables and the probability of price change.

initial bid price. Combined, these three results lead us to hypothesize that an acquirer's precise initial bid is greeted with a more positive market response than a round one.[13]

Table 5 is structured in the same way as in Table 3 and Table 4. The sample is considerably smaller than in Table 3 because only about one-half of all bidders are listed and because we require the transaction to account for at least 10% of the size of the bidder. Specification 1 regresses the three-day cumulative market-adjusted return against the bid precision variables. Consistent with Table 2, the two coarsest bid precision variables are associated with a greater announcement return than bids made at a precision greater than one quarter.

Specification 2 reports the results for the battery of control variables used in Table 3, along with the relative size of the transaction (e.g. Chang, 1998, and Fuller, Netter, and Stegemoller, 2002). The results suggest that offers where the transaction is large relative to the acquirer are associated with significantly larger market reactions, whereas hostile offers and large offers are associated with significantly smaller market reactions.

Specification 3 includes both the bid precision and control variables in the regression. Making a bid at the precision of five dollars (one dollar) is associated with a 2.0% (2.0%) lower market reaction than making one at a precision greater than one quarter. Despite the inevitable noise driven by the small sample, these results are statistically significant at the 10% level. Overall, our results are consistent with the idea that the market interprets precise bids more positively than round ones.

D. Have bidders learned to place precise bids?

It is no more costly for a bidder to make a precise rather than a round offer. Given the advent of academic literature on the benefits of making precise offers, it is worthwhile to ask whether precise offers have become more common over time and whether their association with acquirer deal outcomes has become less favorable. We study these matters by splitting the sample into two parts, one representing the era before decimalization (1985–2001) and

[13] Note that a similar hypothesis cannot be drawn from the target's market reaction. While the target is expected to benefit from an increase in the likelihood to complete an offer, it is expected to lose from a decrease in the price paid for its shares. Consistent with these two conflicting forces offsetting one another, Table IA4 finds no significant relation between initial bid precision and target event reaction in the specification controlling for other bid attributes.

another after decimalization (2001–2012).[14] Decimalization made it more common to trade at prices other than round numbers (Ikenberry and Weston, 2008), so splitting the sample from the time of decimalization has the additional benefit of accounting for the effect of trading practices on bid prices and offer outcomes.

Panel A of Table 6 shows the precision distribution of initial bids in the two subperiods. Bids made at the precision of five dollars are more common in the first compared to the second subperiod; the difference in their frequency, 6%, has a *z*-value of 3.46. Likewise, bids made at a precision greater than one quarter are 5% more common in the second subperiod (*z*-value for difference: −2.32). Bids made at the precision of one dollar, half dollar, and one quarter are about equally common in both subperiods.

What explains the decrease in the fraction of bids made at the precision of five dollars? Decimalization is an unlikely explanation for this result, because the incidence of bids made at the precision of one dollar, half dollar, and one quarter is very similar in both subperiods. To check that the result is not driven by a change in external factors such as a difference in the frequency of hostile offers, Panel B reports the results from a logit regression where the dummy for bids made at the precision of five dollars is regressed against the post-decimalization dummy and a host of controls. We complement this analysis with a specification where the left-hand-side variable is a dummy for bids made at a precision greater than one quarter.

Specification 1 of Table 6 Panel B shows that the post-decimalization period dummy is highly significantly associated with the decision to place a bid at the precision of five dollars (*t*-value: −4.04). The marginal effect associated with the post-decimalization dummy coefficient suggests that five-dollar bids are 10% more common in the first subperiod than the second, when offer and bid characteristics are controlled for. The coefficients for the control variables indicate that hostile offers and offer size are positively associated with the likelihood to bid at a coarse level. Specification 2 finds that the post-decimalization period dummy is not significantly related to bids made at a precision greater than one quarter when all bid attributes are controlled for.

[14] The cut-off date between the pre-decimalization and post-decimalization periods, defined as the date when the transition to decimal trading was completed, is different for different exchanges. The date for NASDAQ is April 9, 2001 and for NYSE and AMEX it is January 29, 2001.

Given that the bid precision variables are determined at the same time as some of the control variables, it is difficult to make causal statements about the results reported in Table 6 Panel B. It is nevertheless reassuring to see that the unconditional difference in the relative frequency of bids made at the precision of five dollars in the two subperiods, reported in Panel A, is economically and statistically highly significant just as is the corresponding estimate in Panel B which controls for the correlation between bid precision and the other regressors. Collectively, the results reported in Panel A and B are consistent with the idea that bidders have learned to avoid making offers at the most granular level.

Has the change in bidders' tendency to make round offers changed the link between bid precision and offer outcomes? Table IA5 addresses this question by adding a post-decimalization dummy and an interaction between this dummy and the precision variables to the specification reported in the rightmost column of Table 3 through Table 5. While the first column suggests that the association between precision and the likelihood for the initial bidder to complete the deal is weaker in the second subperiod, a joint test of whether the precision parameters have changed is not significant at conventional levels. Likewise, the link between the precision parameters and bid price change (second column) or announcement reaction (third column) does not change statistically significantly from the first subperiod to the second.[15] To sum up, we find no significant evidence that precise bids have been associated with less favorable outcomes in recent years.

3. Conclusion

Building on recent research in the area of social psychology, this paper analyzes the link between the precision of initial offers and M&A outcomes. We start our analysis by documenting that the initial offer price per share is usually expressed at coarse terms. We then show that this widely spread practice is associated with three kinds of unfavorable outcomes for the bidder. First, a round initial offer price is associated with a higher price paid for the target shares. Second, it is associated with a lower probability for the initial bidder completing the deal. Third, the stock market response for an offer expressed at coarse terms is less positive than for one expressed at precise terms. Our results are consistent with the idea that

[15] The lone exception to this is the coefficient for bids made at the precision of one dollar in the bid price change specification in column 2 of Table IA5. Here, the association between bid price precision and price change is stronger—not weaker—in the second subperiod. This significant number is probably a chance result, driven by a comparison of a large number of combinations of precision parameters and specifications.

bidders have learned to avoid making offers at the most granular level. However, we find no significant evidence that precise bids have been associated with less favorable outcomes in recent years.

Our results have applications for M&A practice. First, some bidders may use round offer prices on purpose to make the target feel like the bidder left some “meat on the bone” for them, hoping this will improve their chances of winning the deal. Our results speak against this idea: round offer prices are not only associated with a higher price adjustment, but also with a lower chance for the initial bidder winning the deal. Second, it is virtually costless to change the offer price from a round number to a precise one, allowing the bidder to signal (or hide) its private information (or lack of it) on the accuracy of its valuation of the target. If the link between bid precision and M&A outcomes remains as strong in the future as it has been until now, this simple intervention can increase the chances of a successful offer and yet generate significant cost savings.

We expect our results to inspire researchers to study the effect of precision on other outcomes in financial markets. For example, one can test whether analyst estimates expressed at precise terms are more influential and associated with more herding than ones expressed at coarse terms. Testing this hypothesis is left for future work.

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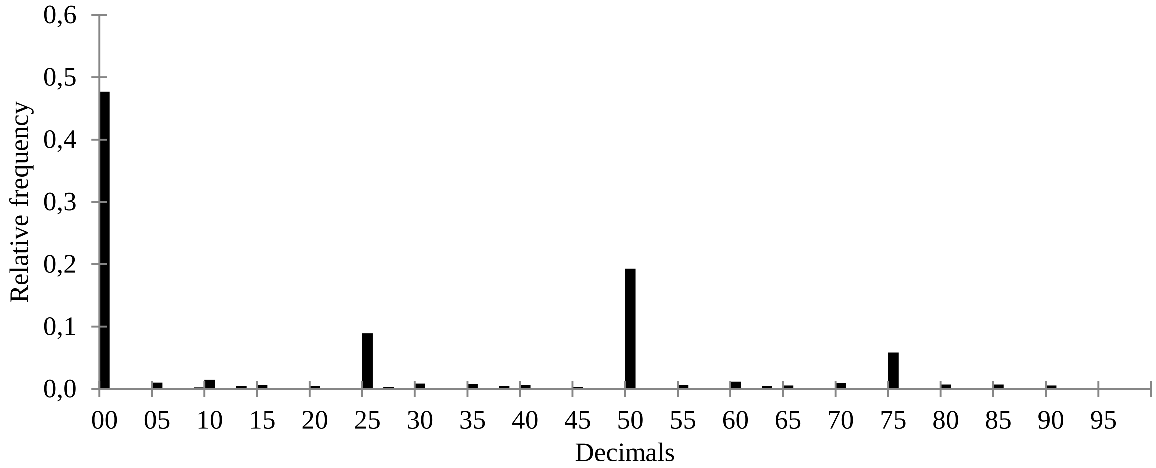
Figure 1
Initial bid price frequency at various decimal and digit levels

Panel A reports the distribution of decimals in the initial bid price per share. Panel B reports the distribution of the last digit when the bid price is divisible by one dollar. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Panel A: Distribution of decimals, full sample



Panel B: Distribution of the last digit, conditional on the price per share being divisible by one dollar

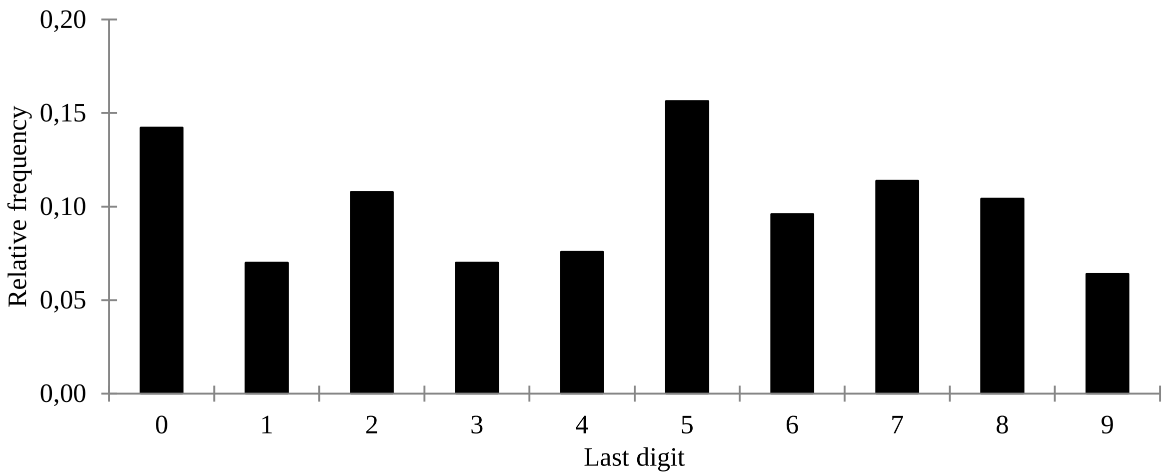


Table 1
Summary statistics

Panel A reports means, standard deviations, and extreme values for the initial bid precision dummy variables. *Five dollars* takes the value of one if the bid price is divisible with five dollars. *Dollar* equals one if the bid price is divisible with one dollar but not with five dollars. *Half dollar* equals one if the bid price is divisible with fifty cents but not with a dollar. *Quarter* equals one if the bid price is divisible with 25 cents but not with 50 cents. Panel B reports takeover contest outcomes. *Initial bidder wins* equals one if one of the initial bidder's offers is completed. *Competed* equals one if the initial bid is challenged by some other control bidder. *Contest duration* is the number of calendar days from the initial offer announcement to completion of a deal or censored at 365 days. *Relative price change* is the relative change from the initial bid price per share to the final price per share of a completed offer. *Price change dummy* equals one if the price change differs from zero. *Acquirer announcement return* and *Target announcement return* are cumulative abnormal returns computed over trading days [−1,+1] surrounding the initial bid. Panel C reports control variables. *Tender offer* equals one if the offer is classified as a tender offer by SDC. *Hostile offer* refers to an unsolicited offer or hostile target management reaction in the SDC data. *Offer price* is the offer price per share in the initial offer. *Horizontal offer* equals one if the target and the bidder are in the same 3-digit SIC code industry. *Premium* is the relative difference in the price per share offered and the target share price 30 days prior to the offer announcement. *Transaction value* is the value offered for the target shares based on the offer price per share in the initial offer in millions. *Public acquirer* equals one if the acquirer is listed on an exchange. *Toehold* is the bidder's ownership in the target at the time of the announcement. *Volatility* is the target's daily stock return standard deviation, calculated over event days [−239,−20]. *Relative size* is the ratio of the transaction value and acquirer equity market value. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

	N	Avg	Std dev	Min	25 %	Median	75 %	Max
Panel A								
Five dollars	1769	0.14	0.35	0	0	0	0	1
Dollar	1769	0.33	0.47	0	0	0	1	1
Half dollar	1769	0.19	0.39	0	0	0	0	1
Quarter	1769	0.15	0.35	0	0	0	0	1
Panel B								
Initial bidder wins	1769	0.76	0.43	0	1	1	1	1
Competed	1769	0.10	0.30	0	0	0	0	1
Contest duration	1769	119	71	23	67	113	138	365
Relative price change	260	0.14	0.18	−0.61	0.04	0.12	0.22	0.92
Price change dummy	1408	0.18	0.39	0	0	0	0	1
Acquirer announcement return	308	0.013	0.07	−0.24	−0.02	0.01	0.05	0.38
Target announcement return	1641	0.27	0.27	−0.28	0.10	0.22	0.36	2.83
Panel C								
Tender offer	1769	0.30	0.46	0	0	0	1	1
Hostile offer	1769	0.18	0.38	0	0	0	0	1
Offer price	1769	23.66	19.97	5.00	10.50	18.25	29.50	240.00
Horizontal offer	1769	0.32	0.47	0	0	0	1	1
Premium	1769	0.42	0.86	−0.57	0.18	0.32	0.51	28.55
Transaction value	1769	986	2500	2	96	254	797	41000
Public acquirer	1769	0.44	0.50	0	0	0	1	1
Toehold	1769	2.27	7.37	0.00	0.00	0.00	0.00	49.90
Volatility	260	0.03	0.01	0.01	0.02	0.03	0.04	0.11
Relative size	308	0.46	0.56	0.10	0.16	0.27	0.52	4.48

Table 2
Initial bid precision and offer outcomes

Columns 1−5 of this table report on offer outcomes along with the number of observations as a function of the precision of the initial bid. Column 6 reports the difference between the least and the most precise bids, and column 7 the test statistic associated with this difference. All variables are defined in Table 1. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

	Round				Precise		
Decimal digits	Five dollars	Dollar	Half dollar	Quarter	Other	Diff. (1)-(5)	*z*- / *t*-value
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
N	252	592	341	261	323		
Initial bidder wins	69.0 %	74.8 %	74.2 %	76.2 %	84.2 %	−15.2 %	−4.32***
Competed	12.3 %	9.6 %	13.8 %	6.1 %	7.7 %	4.6 %	1.83*
Contest duration	130	122	117	112	113	17	2.87***
N	40	101	52	23	44		
Relative price change	17.6 %	14.3 %	19.1 %	8.3 %	6.0 %	11.6 %	3.43***
N	186	470	269	205	278		
Price change dummy	21.5 %	21.5 %	19.3 %	11.2 %	15.8 %	5.7 %	1.56
N	54	105	63	36	50		
Acquirer announcement return	0.1 %	0.2 %	2.3 %	2.9 %	2.3 %	−2.3 %	−1.91*
N	237	550	313	243	298		
Target announcement return	27.8 %	27.9 %	25.8 %	27.8 %	24.1 %	3.8 %	1.58

Table 3
Initial bid precision and completing a deal

This table reports results from logit regressions which explain the likelihood that one of the initial bidder's bids is completed, with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. Marginal effects evaluated at variable means are reported in brackets; dummy variables are evaluated at zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Initial bidder completes a deal		
	(1)	(2)	(3)
Five dollars	−0.872***		−0.661***
	(−4.26)		(−2.60)
	[−0.116]		[−0.079]
Dollar	−0.584***		−0.477**
	(−3.25)		(−2.01)
	[−0.078]		[−0.057]
Half dollar	−0.618***		−0.533**
	(−3.14)		(−2.11)
	[−0.082]		[−0.064]
Quarter	−0.508**		−0.639**
	(−2.41)		(−2.45)
	[−0.068]		[−0.076]
Tender offer		1.369***	1.408***
		(7.08)	(7.29)
		[0.220]	[0.168]
Hostile offer		−3.432***	−3.397***
		(−18.47)	(−18.12)
		[−0.552]	[−0.405]
Inverse price		−3.693**	−4.217**
		(−2.15)	(−2.39)
		[−0.594]	[−0.503]
Horizontal offer		0.293*	0.280*
		(1.84)	(1.74)
		[0.047]	[0.033]
Premium		0.000	0.009
		(0.00)	(0.20)
		[0.000]	[0.001]
Ln (Transaction value)		0.116**	0.123**
		(2.05)	(2.13)
		[0.019]	[0.015]
Public acquirer		0.516***	0.514***
		(3.53)	(3.50)
		[0.083]	[0.061]
Toehold		−0.010	−0.009
		(−0.93)	(−0.83)
		[−0.002]	[−0.001]
Constant	1.674***	1.004**	1.448***
	(10.97)	(2.43)	(3.11)
N	1769	1769	1769
Pseudo R^2	0.010	0.313	0.318
Wald-χ^2	19.07***	360.35***	371.34***
Wald-χ^2 (Five dollars=...=Quarter=0)	19.07***		8.25*

Table 4
Initial bid precision and relative offer price change

This table reports results from OLS regressions which explain the relative price change from initial bid to final price for a completed offer with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Relative offer price change		
	(1)	(2)	(3)
Five dollars	0.116***		0.101***
	(3.40)		(2.88)
Dollar	0.083***		0.076***
	(3.17)		(2.74)
Half dollar	0.132***		0.124***
	(3.73)		(3.71)
Quarter	0.024		0.002
	(0.46)		(0.04)
Tender offer		0.030	0.025
		(1.15)	(0.98)
Hostile offer		0.085***	0.075***
		(3.37)	(3.14)
Inverse price		0.593	0.741**
		(1.53)	(2.00)
Horizontal offer		0.020	0.021
		(0.72)	(0.73)
Premium		0.018	0.012
		(0.52)	(0.38)
Ln (Transaction value)		0.006	0.007
		(0.65)	(0.71)
Public acquirer		0.002	0.002
		(0.09)	(0.08)
Toehold		0.000	−0.000
		(0.14)	(−0.57)
Volatility		0.304	0.310
		(0.22)	(0.24)
Constant	0.060***	−0.007	−0.078
	(2.93)	(−0.09)	(−0.95)
N	260	260	260
R^2	0.064	0.091	0.147
F-statistic	5.20***	3.00***	3.38***
F-statistic (Five dollars=...=Quarter=0)	5.20***		4.22**

Table 5
Initial bid precision and the acquirer's stock market reaction

This table reports results from OLS regressions which explain the acquirer's cumulative abnormal return computed over trading days [−1,+1] surrounding the initial bid, with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Acquirer cumulative abnormal return [−1,+1]		
	(1)	(2)	(3)
Five dollars	−0.023*		−0.020*
	(−1.92)		(−1.68)
Dollar	−0.022**		−0.020*
	(−2.12)		(−1.90)
Half dollar	−0.000		−0.003
	(−0.01)		(−0.22)
Quarter	0.005		0.000
	(0.30)		(0.00)
Tender offer		0.015*	0.013*
		(1.80)	(1.66)
Hostile offer		−0.027***	−0.024***
		(−3.06)	(−2.68)
Inverse price		−0.080	−0.105
		(−0.90)	(−1.19)
Horizontal offer		−0.007	−0.006
		(−0.86)	(−0.72)
Premium		−0.005	−0.003
		(−0.42)	(−0.20)
Ln (Transaction value)		−0.008***	−0.008***
		(−2.85)	(−2.83)
Ln (Relative size)		0.017**	0.016***
		(2.58)	(2.60)
Constant	0.023***	0.091***	0.101***
	(2.88)	(3.92)	(4.33)
N	308	308	308
R^2	0.029	0.085	0.104
F-statistic	2.31*	3.26***	2.77***
F-statistic (Five dollars=...=Quarter=0)	2.31*		1.61

Table 6
Time variation in the initial bid precision

Panel A reports the relative frequencies of offers made at various levels of precision in the pre- and post-decimalization periods (1985−2001, and 2001−2012, respectively). Column 3 reports the difference in relative frequency between the time periods, and column 4 the test statistic associated with this difference. Panel B reports results from two logit regressions which explain the selected bid precision variables, with the post-decimalization period dummy and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share and *Post-decimalization* is a dummy for the post-decimalization period. *t*-values based on robust standard errors are reported in parentheses. Marginal effects evaluated at variable means are reported in brackets; dummy variables are evaluated at zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. The number of observations is smaller in Table 6 Panel B than in Table 3, because all stocks do not have a time series of returns long enough to calculate volatility. All initial bids are cash-only bids for listed companies for at least five dollars per share.

Panel A: Precision distribution of initial bids

Time period	Pre-decimalization	Post-decimalization	Diff. (1)-(2)	*z*-value
	(1)	(2)	(3)	(4)
Five dollars	18.1 %	12.1 %	6.0 %	3.46***
Dollar	33.8 %	33.3 %	0.5 %	0.23
Half dollar	18.4 %	19.8 %	−1.4 %	−0.70
Quarter	14.3 %	15.0 %	−0.7 %	−0.40
Rest	15.4 %	19.9 %	−4.5 %	−2.32**
N	636	1133		

Panel B: Determinants of bid precision

Dependent variable	Five dollars	Precision greater than one quarter
	(1)	(2)
Post-decimalization	−0.647***	0.205
	(−4.04)	(1.21)
	[−0.097]	[0.029]
Tender offer	−0.095	−0.314*
	(−0.60)	(−1.89)
	[−0.014]	[−0.044]
Hostile offer	0.493***	−1.059***
	(2.92)	(−4.68)
	[0.074]	[−0.150]
Inverse price	−0.108	9.861***
	(−0.05)	(5.91)
	[−0.016]	[1.395]
Horizontal offer	0.081	0.238*
	(0.50)	(1.68)
	[0.012]	[0.034]
Premium	0.188	−0.311
	(1.37)	(−0.83)
	[0.028]	[−0.044]
Ln (Transaction value)	0.229***	−0.214***
	(3.75)	(−3.80)
	[0.034]	[−0.030]
Public acquirer	−0.078	−0.045
	(−0.51)	(−0.32)
	[−0.012]	[−0.006]
Toehold	0.010	−0.022*
	(1.21)	(−1.84)
	[0.002]	[−0.003]
Volatility	0.118	−17.350***
	(0.02)	(−2.62)
	[0.018]	[−2.454]
Constant	−2.880***	−0.349
	(−6.09)	(−0.87)
N	1735	1735
Pseudo R^2	0.033	0.082
Wald-χ^2	47.98***	122.93***

Table IA1
Initial bid precision and the likelihood of competing offers

This table reports results from a logit regression which explains the likelihood that the initial bid is challenged by some other control bidder, with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Likelihood of competing offers		
	(1)	(2)	(3)
Five dollars	0.514*		0.101
	(1.82)		(0.33)
	[0.037]		[0.006]
Dollar	0.239		−0.054
	(0.95)		(−0.20)
	[0.017]		[−0.003]
Half dollar	0.645**		0.386
	(2.47)		(1.39)
	[0.046]		[0.023]
Quarter	−0.250		−0.367
	(−0.76)		(−1.05)
	[−0.018]		[−0.022]
Tender offer		−0.133	−0.139
		(−0.74)	(−0.78)
		[−0.008]	[−0.008]
Hostile offer		1.850***	1.832***
		(10.85)	(10.60)
		[0.113]	[0.110]
Inverse price		1.302	1.478
		(0.63)	(0.70)
		[0.080]	[0.088]
Horizontal offer		−0.213	−0.205
		(−1.09)	(−1.04)
		[−0.013]	[−0.012]
Premium		0.101**	0.092**
		(2.52)	(2.23)
		[0.006]	[0.005]
Ln (Transaction value)		−0.010	−0.012
		(−0.15)	(−0.18)
		[−0.001]	[−0.001]
Public acquirer		−0.071	−0.082
		(−0.41)	(−0.47)
		[−0.004]	[−0.005]
Toehold		0.010	0.008
		(1.07)	(0.89)
		[0.001]	[0.000]
Constant	−2.478***	−2.758***	−2.778***
	(−11.90)	(−5.72)	(−5.31)
N	1769	1769	1769
Pseudo R^2	0.012	0.112	0.119
Wald-χ^2	12.86**	155.70***	160.01***
Wald-χ^2 (Five dollars=...=Quarter=0)	12.86**		7.22

Table IA2
Initial bid precision and contest duration

This table reports results from Cox proportional hazards model regressions which explain the duration from initial offer announcement to completion of the offer with variables measuring initial bid precision and controls. A negative coefficient value indicates a lower hazard and thereby longer duration. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote the statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Contest duration		
	(1)	(2)	(3)
Five dollars	−0.351***		−0.200*
	(−3.76)		(−1.87)
Dollar	−0.189**		−0.074
	(−2.38)		(−0.78)
Half dollar	−0.122		−0.142
	(−1.41)		(−1.28)
Quarter	−0.054		−0.025
	(−0.60)		(−0.25)
Tender offer		1.206***	1.209***
		(14.99)	(14.88)
Hostile offer		−1.747***	−1.738***
		(−16.04)	(−15.84)
Inverse price		0.868	0.715
		(1.11)	(0.91)
Horizontal offer		0.013	0.009
		(0.19)	(0.14)
Premium		−0.004	0.001
		(−0.15)	(0.02)
Ln (Transaction value)		0.031	0.034
		(1.39)	(1.51)
Public acquirer		0.220***	0.229***
		(3.50)	(3.68)
Toehold		−0.023***	−0.023***
		(−5.39)	(−5.22)
N	1769	1769	1769
Number of failures	1415	1415	1415
Wald-χ^2	17.13***	404.39***	414.77***
Wald-χ^2 (Five dollars=...=Quarter=0)	17.13***		4.98

Table IA3
Initial bid precision and the likelihood of price change

This table reports results from a logit regression which explains the likelihood that the final price of a completed offer differs from the initial bid, with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. Marginal effects evaluated at variable means are reported in brackets; dummy variables are evaluated at zero. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Likelihood of price change		
	(1)	(2)	(3)
Five dollars	0.376		0.037
	(1.55)		(0.11)
	[0.050]		[0.005]
Dollar	0.375*		0.197
	(1.89)		(0.75)
	[0.050]		[0.027]
Half dollar	0.242		0.066
	(1.08)		(0.22)
	[0.032]		[0.009]
Quarter	−0.397		−0.530
	(−1.44)		(−1.54)
	[−0.053]		[−0.074]
Tender offer		−0.543**	−0.544**
		(−2.49)	(−2.49)
		[−0.076]	[−0.076]
Hostile offer		4.555***	4.542***
		(12.13)	(11.95)
		[0.638]	[0.633]
Inverse price		0.478	0.891
		(0.19)	(0.35)
		[0.067]	[0.124]
Horizontal offer		−0.408**	−0.414**
		(−2.03)	(−2.05)
		[−0.057]	[−0.058]
Premium		−0.178	−0.197
		(−0.83)	(−0.89)
		[−0.025]	[−0.027]
Ln (Transaction value)		−0.027	−0.033
		(−0.38)	(−0.45)
		[−0.004]	[−0.005]
Public acquirer		−0.611***	−0.633***
		(−3.25)	(−3.33)
		[−0.086]	[−0.088]
Toehold		0.068***	0.068***
		(6.37)	(6.36)
		[0.010]	[0.009]
Volatility		7.203	7.053
		(1.21)	(1.14)
		[1.009]	[0.982]
Constant	−1.671***	−1.739***	−1.726***
	(−10.17)	(−3.14)	(−2.91)
N	1408	1408	1408
Pseudo R^2	0.010	0.326	0.331
Wald-χ^2	12.24**	181.75***	180.58***
Wald-χ^2 (Five dollars=...=Quarter=0)	12.24**		5.66

Table IA4
Initial bid precision and the target's stock market reaction

This table reports results from an OLS regression which explains the target's cumulative abnormal return computed over trading days [−1,+1] surrounding the initial bid, with variables measuring initial bid precision and controls. All variables are defined in Table 1, except that *Inverse price* is the inverse of the offer price per share. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Target cumulative abnormal return [−1,+1]		
	(1)	(2)	(3)
Five dollars	0.038		0.015
	(1.59)		(0.52)
Dollar	0.038*		0.031
	(1.93)		(1.24)
Half dollar	0.017		0.022
	(0.81)		(1.05)
Quarter	0.037		0.022
	(1.55)		(0.94)
Tender offer		0.058***	0.056***
		(3.20)	(3.23)
Hostile offer		−0.040***	−0.043***
		(−3.11)	(−2.91)
Inverse price		0.201	0.244
		(1.16)	(1.25)
Horizontal offer		0.042***	0.042***
		(3.45)	(3.45)
Premium		0.347***	0.346***
		(3.51)	(3.47)
Ln (Transaction value)		0.009**	0.009**
		(2.48)	(2.39)
Constant	0.241***	0.040	0.019
	(15.14)	(0.95)	(0.51)
N	1641	1641	1641
R^2	0.003	0.374	0.375
F-statistic	1.26	21.50***	15.45***
F-statistic (Five dollars=...=Quarter=0)	1.26		0.68

Table IA5
Time variation in initial bid precision and offer outcomes

This table reports the results from three regressions that build on the regressions reported in the rightmost column in Table 3 through Table 5. In specification 1, estimated with logit, the left-hand side variable is the likelihood that one of the initial bidder's bids is completed. In specification 2, estimated with OLS, the LHS variable is the relative price change from initial bid to final price for a completed offer. In specification 3, also estimated with OLS, the LHS variable is the acquirer's cumulative abnormal return computed over trading days [−1,+1] surrounding the initial bid. The right-hand-side variables include variables measuring initial bid precision, a dummy for the post-decimalization period (2001 onwards), interactions between the post-decimalization dummy and bid precision variables, and controls. Apart from the variables defined above, and *Inverse price* that is the inverse of offer price per share, all variables are defined in Table 1. *t*-values based on robust standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2012.

Dependent variable	Initial bidder wins	Relative price change	Acquirer announcement return
	(1)	(2)	(3)
Post-decimalization	0.091	−0.044	0.009
	(0.23)	(−0.99)	(0.46)
Post * Five dollars	0.712	−0.001	0.014
	(1.36)	(−0.02)	(0.51)
Post * Dollar	0.724	0.104**	−0.001
	(1.57)	(2.04)	(−0.06)
Post * Half dollar	0.773	0.001	−0.019
	(1.51)	(0.01)	(−0.74)
Post * Quarter	0.190	−0.018	−0.015
	(0.36)	(−0.13)	(−0.45)
Five dollars	−1.032**	0.096**	−0.024
	(−2.55)	(2.11)	(−1.17)
Dollar	−0.924**	0.025	−0.019
	(−2.47)	(0.73)	(−0.94)
Half dollar	−1.036**	0.120**	0.009
	(−2.49)	(2.17)	(0.40)
Quarter	−0.762*	−0.000	0.009
	(−1.76)	(−0.00)	(0.39)
Tender offer	1.612***	0.029	0.014*
	(8.06)	(1.09)	(1.67)
Hostile offer	−3.317***	0.076***	−0.023**
	(−17.75)	(3.26)	(−2.48)
Inverse price	−5.104***	0.792**	−0.119
	(−2.88)	(2.12)	(−1.28)
Horizontal offer	0.228	0.016	−0.005
	(1.38)	(0.57)	(−0.66)
Premium	0.016	0.025	−0.003
	(0.25)	(0.72)	(−0.23)
Ln (Transaction value)	0.045	0.006	−0.009***
	(0.75)	(0.65)	(−2.84)
Public acquirer	0.552***	−0.001	
	(3.49)	(−0.04)	
Toehold	−0.005	−0.001	
	(−0.49)	(−0.73)	
Volatility		0.037	
		(0.03)	
Ln (Relative size)			0.017**
			(2.57)
Constant	1.816***	−0.049	0.102***
	(3.56)	(−0.62)	(4.08)
N	1769	260	308
Pseudo R^2	0.327		
R^2		0.166	0.111
Wald-χ^2	640.60***		
F-statistic		2.86***	2.29***
Wald-χ^2 (LR / Chow)	4.18	1.80	0.48