

Initial Offer Precision and M&A Outcomes*

Petri Hukkanen, Boston Consulting Group

Matti Keloharju, Aalto University School of Business, CEPR, and IFN

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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 round price-per-share levels is associated with a higher purchase price for target shares and a lower probability to complete the deal.

Keywords: Initial offers, precision, mergers and acquisitions, anchoring

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* Corresponding author: Matti Keloharju, email matti.keloharju@aalto.fi. Petri Hukkanen can be reached at petri.hukkanen@gmail.com. We are grateful to Leo Niemeläinen for superb research assistance, and to Malcolm Baker, Manuel Bagues, Harrison Hong, Juhani Linnainmaa, Matthijs Lof, Tim Loughran (discussant), Mikko Niemenmaa, Øyvind Norli, Florian Peters (discussant), Raghu Rau, Sami Torstila, Jeffrey Wurgler, an anonymous referee, and seminar participants at Aalto University, Goethe University, Karlsruhe Institute of Technology, the University of Strasbourg, and Wharton as well as to the participants at the American Finance Association and European Finance Association meetings for their helpful comments. We thank the Marianne and Marcus Wallenberg Foundation for financial support.

1. Introduction

What is the better way to start a negotiation about money: by offering a round sum, like \$10, or a more precise one, like \$10.20? Recent evidence from the social psychology literature suggests the latter: a precise offer price makes the bidder appear more informed, tempering the other party's willingness to bargain on the price.¹ A precise offer may thus improve the initial bidder's bargaining outcome.²

Do precise initial offers lead to better bidder outcomes in M&A deals? To our knowledge, this study is the first to explore this question. The mergers and acquisitions market offers 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.

The market for corporate control gives rise to complex strategic behavior.³ 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.

¹ Janiszewski and Yu (2008) are the first to present the hypothesis that precise initial offers lead the final price to deviate less from the initial offer price, and they 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), Zhang and Schwarz (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. 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.

² Chertkoff and Conley (1967), Galinsky and Mussweiler (2001), Gunia et al. (2013), and others show that the maker of the first offer has a bargaining advantage; the first offer serves as an anchor for the negotiation. Tversky and Kahneman (1974) are the first to formally document an anchoring effect. Apart from negotiation outcomes, anchoring has been shown to influence borrowing rates (Dougal et al., 2015), valuations (Northcraft and Neale, 1987; 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 For a review of the literature, see e.g. Dasgupta and Hansen (2007) and Eckbo (2009).

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 coarse level, placing a precise bid to bluff the target cannot be common.

We next test our main hypothesis: that offers with more precise initial prices are associated with a smaller price change. The evidence is consistent with the hypothesis. For example, 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 significant at the 1% level and suggest that coarse 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 four (14–17) million dollars higher expected transaction price than one made at a precision greater than one quarter.

We also test the hypothesis that precise offers increase the likelihood that the initial bidder is able to close a deal with the target. There are at least two reasons why this could be the case. First, competing bidders may view precise offers as more informed, and, perhaps because of the winner's curse, may not wish to enter a bidding contest against an ostensibly more informed bidder (Fishman, 1988; Povel and Singh, 2006). Second, targets may interpret precise offers as evidence that the acquirer is informed and knows what it is doing. Given the many challenges associated with post-merger integration (see, for example, Shrivastava, 1986 and Epstein, 2004), targets may be more willing to close the deal with a party they consider competent. Our results are consistent with the hypothesis: an initial offer placed at a precision greater than one quarter is 9% (6%) more likely to lead to a deal than an offer placed at the precision of five dollars (one dollar). These results are significant at the 1% (5%) level.

Are the favorable outcomes associated with precise bids outweighed by other, unfavorable outcomes? We examine four alternative outcomes but find no support for this conjecture. More specifically, precise bids are not associated with a lower announcement return for the bidder, 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.

The monetary cost of making a precise offer is very small: the bidder can change a round offer price to a non-round one by adding or subtracting a few cents per share. To give a conservative

example, a 10-cent increase in offer price would add 1.5 million dollars to the cost of the median offer; this is about one third of the four million dollars expected cost in adjustment implied by our regression estimates.⁴ Non-rounding would naturally be necessary only in the rare case where the bidder's valuation recommends a round offer price. On an expected basis, the cost-benefit ratio of non-rounding would thus be considerably better than one-third.

If round offers generate worse outcomes, why do almost five-sixths of the bidders make them? We think this is because people are hardwired to do so: round numbers are cognitively least costly. A sizeable literature suggests that 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). Compared to coarse expressions (e.g., one year), fine-grained expressions (e.g., 12 months) are more likely to be used when communicators have confidence in what they say (Channel, 1994; Yaniv and Foster, 1995; Goldsmith, Koriat, and Weinberg-Eliezer, 2002; Welsh, Navarro, and Begg, 2011). Mason et al. (2013) find that these tacit norms also apply to negotiations, including those involving sophisticated parties. In a negotiation experiment, they document that experienced executives and MBA students tend to make round initial offers if not told otherwise. The preference for round numbers shows up even in high-stake games played by sophisticated parties. Using data from individual polling stations from Russia's parliamentary elections in 2011 (presidential elections in 2012), Kobak et al. (2012) show that the share of votes for the ruling United Russia party (Vladimir Putin) displayed sharp peaks at the round numbers of 65%, 70%, 75% etc. The supernatural character of the peaks strongly suggests that the votes for the winners were manipulated a posteriori to fix the vote shares at appealing round values. Klimek et al. (2012) study election results around the world and show that many elections leave statistical fingerprints of fraud that can be uncovered using elementary statistical methods.

Why do targets respond differently to round and precise offers? In cooperative 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. Recipients consider precise offers more informed and are more likely to rely on what they convey (Zhang and Schwarz, 2012; Schley and Peters, 2013). Recipients can detect others' confidence based on the precision,

⁴ Note that the change in the offer price could also be negative, which would lower the cost of the offer. Moreover, the change in the price may be smaller than 10 cents per share.

which influences their judgments and preferences for seeking advice (Jerez-Fernandez, Angulo, and Oppenheimer, 2014).

Both acquirers and targets are advised by investment banks which have lots of experience on merger negotiations. Why don't investment banks recommend all of their acquirer-clients to make precise bids? And why don't the advisors of targets see through and discount the gaming aspect of precise bids? It appears that many bankers are simply unaware of the gaming aspect associated with precise offers and go with the market practice, i.e. the cognitively least costly option. The first research on the effect of precise offers on negotiation outcomes was published in 2008, and it is safe to assume that the results of this research are not yet well known outside a few fields in the academia, let alone among acquirers, targets, and their advisors. To assess whether bankers intuitively understand the strategic implications of the precision of the initial offer price, we conducted semi-structured interviews with ten current or former investment bankers with on average 14 years of experience on M&A deals. When asked whether they as the advisor of the bidder would tend to recommend a round or a precise bid price, only one of them expressed a clear preference for precise prices. This banker had the same story as us in his mind. Two bankers expressed a weak preference for precise bids, but they could not properly explain why. The remaining seven bankers either did not express a preference for precise or round bids, or preferred round bids because of the prevailing market practice. All in all, the bankers' responses are in agreement with the observation that precise bids are relatively uncommon.

It is also useful to note that target bankers often have an incentive to advise their clients to accept an offer. In the average contract, over 80% of the fee is paid only if the acquisition is completed (McLaughlin, 1990); advising the client to decline the initial bid would jeopardize this fee. Given that there is no uncertainty in the valuation of a cash offer, and that about two thirds of all initial offers are accepted as such, the reputational risk of advising a client to accept the offer is probably small. The target's bank writes in about 80% of the deals a fairness opinion on the offer price (Kisgen, Qian, and Song, 2009), but the uncertainties related to the valuation task should make it easy to write an opinion that is consistent with the initial offer price being fair to target shareholders. Cain and Denis (2013) document that in target-side fairness opinions the high minus low valuation range is on average 60% of the offer price. Both the mean and the median valuations are below the offer price.

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. What makes us then think that the relationship we uncover is about bid precision and not some other attribute (say, private communication between the bidder and the target prior to the public initial bid, or the level of stock price) that happens to be correlated with precision?

First, we discard observations where the target is known to have been seeking a buyer or negotiating on a deal before the first formal offer. We further minimize the effect of omitted variables by including in our regressions all the usual suspects (including the inverse of stock price) that might account for our findings; any remaining variables are likely to be unobservable not only to us but also to potential rival bidders and to investors at large. Omitted variables such as potential private pre-offer communications between the acquirer and the target would have a hard time explaining why our results are qualitatively unchanged in a subsample of hostile offers, where pre-offer communication is unlikely (Boone and Mulherin, 2007). To avoid peeking into the future, our tests only include controls that are known at the time of the initial offer.

Second, offer precision is a choice variable that can be mimicked without any and at worst with a relatively small monetary cost (and perhaps with a marginally larger cognitive cost). Here, the fact that precise offers are rare works in our favor, as there are plenty of untapped opportunities for making precise offers. To the extent that more precise offers are associated with better outcomes, rational bidders (that are aware of the benefits of precision) would be expected to make precise offers regardless of whether any of the variables potentially omitted from our regressions recommend a round or precise offer price.

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, relatively coarse. 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 offers made on publicly listed US-based targets and announced between January 1, 1985 and December 31, 2015 from Securities Data Corporation's (SDC) mergers and acquisition database. To be included in the sample, the bidder must be based in the US and the proposal must be an initial cash offer to obtain a majority interest of a target listed on the New York Stock Exchange (NYSE), NASDAQ, or American Stock Exchange (AMEX). We focus on initial offers (and not on potential intermediate offers) because of their unique anchoring role and strong predictive power on negotiation outcomes in the social psychology literature.⁵ We limit our analysis to cash offers because the SDC data does not indicate whether the exchange ratio in a stock offer applies to the initial or a later bid.⁶

The bidder does not need to be publicly listed. 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 require the initial offer 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, to identify genuine initial offers (as opposed to offers preceded by private negotiations), we exclude observations where SDC's synopsis or event history file suggest the target was seeking a buyer or negotiating on a deal before the first formal offer.

SDC reports two key price per share items, the 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. The 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

⁵ In addition, the number of initial bids is much larger than the number of subsequent bids. Even if subsequent bids would be expected to be associated with M&A outcomes, the relation would likely to be too noisy to detect because of the small number of observations.

⁶ 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).

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 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. Only 18% of the bids are expressed at a precision greater than one quarter.⁹ In other words, bidders rarely place precise bids, neither in the absolute sense nor when compared with closing prices.¹⁰ 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.

⁸ See, for example, Officer, Poulsen, and Stegemoller (2009).

⁹ Here, unlike in Bhattacharya et al.'s (2012) study of buy-sell imbalances, there is little evidence of bids being clustered slightly below or above round numbers.

¹⁰ 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). Table IA1 in the Internet appendix shows that the precision distribution of initial bid prices is broadly similar both before and after the decimalization in 2001. For example, offers with precision greater than one quarter accounted for 15% of the bids in the pre-decimalization period and 20% in the post-decimalization period.

Table 1 reports means, standard deviations, medians and extreme values for the precision variables (Panel A), offer outcomes (Panel B), and offer, bidder, and target characteristics (Panel C–E). The initial bidder wins the deal in about three-fourths of all bids. Nine percent of all bids are contested, and the median contest duration is 108 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 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 2%. Three quarters of the offer prices are between \$5 and \$30 per share. The median transaction value is \$270 million.

Table 2 tabulates offer outcomes and offer, bidder, and target characteristics as a function of bid precision. Column 7, which reports the test statistics for the difference between the coarsest and the most precise bid categories, finds that the significant differences are concentrated in offer outcomes (Panel A) and offer characteristics (Panel B). There is only one statistically significant difference among bidder characteristics in Panel C (and even that is significant only at the 10% level), and none among target characteristics (Panel D).

The first row of Panel A finds that 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 85% of the time. The difference between these two numbers is significant at the 1% level (z -value = -4.80) and suggests that precise bids tend to be more successful. The relationship between bid precision and offer success is almost monotonic.

The second row of Panel A suggests that greater bid precision is associated with a smaller price change from the initial bid price to final price. Conditional on a price change, bids made at the precision of five dollars generate on average a price change of 16%, whereas the corresponding price change for bids made at a precision greater than one quarter is 5%. The difference between these numbers is significant at the 1% level (t -value = 3.26). Except for a bump at the half dollar level, the association between bid precision and relative price change is monotonic. These results are consistent with the idea that targets anchor more on precise initial offers than on round offers.

Panel A also finds significant associations between bid precision and four other offer outcomes. Compared with precise bids, bids made at the accuracy of five dollars have a six percentage points higher likelihood of being competed and a seven percentage points higher

likelihood of having their price revised (z -values 2.34 and 2.08, respectively). The takeover contest takes on average 18 days longer (z -value = 3.04) for coarse bids. Perhaps because of the lower chance of offer success and the higher purchase price, the acquirer's three-day acquirer announcement return is two percentage points lower (t -value = -1.70).

Table 2 Panel B studies the association between bid precision and offer characteristics. Three differences between coarse and precise bids stand out: inverse offer price ($t = -5.78$), the log of transaction value ($t = 5.47$), and the fraction of hostile offers ($z = 6.06$). The significant difference in inverse offer price may be driven by the fact that changes in precision translate into larger percentage changes when the offer price is small than when it is large. For example, precision may matter less if the initial offer price is \$240 (the highest price in the sample) than if it is \$18.38 per share (the median offer price). The difference in the log of transaction value likely reflects this result and the fact that stock price and firm size, as proxied by transaction value, have a strong positive correlation: the correlation coefficient between the offer price (inverse offer price) and the log of transaction value is 0.58 (-0.57). In the next subsection, we will repeat out tests in a multivariate framework controlling, among others, for the inverse of offer price. Our robustness checks will further repeat our main tests in a subsample of hostile offers (Table IA7 and Table IA8) and limit the variation in offer prices (Table IA9 and Table IA10).

C. Multivariate results

C.1. Likelihood of making 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 adds control variables to the regression equation. The controls include the inverse of offer price (Baker et al., 2012), tender offers (e.g. Betton et al, 2009), hostile offers (Schwert, 2000), premium (Betton and Eckbo, 2000), toehold (Betton and Eckbo, 2000), horizontal offers (Betton et al, 2009), 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. All controls are known at the time of the first bid; therefore, for example, we do not include information on rival bidders.

All the precision variables survive the addition of controls and remain significantly negative at least at the 10% level. Moreover, our results suggest that offers made at higher prices, tender offers, large offers, horizontal offers, and public acquirers 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 further adds announcement year fixed effects to the regression equation. Apart from controlling for potentially different offer outcomes at different parts of a merger wave, fixed effects capture any effect decimalization may have had on the use of precise offers. This additional layer of controls leaves the results qualitatively unchanged. For example, placing a bid at the precision of five dollars has a marginal effect of 0.086 (t -value = -2.84), i.e. it is associated with a 9% 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 = -1.99). These results are consistent with the idea that targets prefer precise offers.

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 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 includes both the bid precision variables and control variables in the regression. We use the same battery of control variables as in specification 2 in Table 3, except that we add the target's return volatility to account for the degree of uncertainty in the valuation of the target. The results for the bid precision variables are similar to those in specification 1. Among the control variables, only one variable, the hostile offer dummy, is significantly related to the price change at conventional levels.

Specification 3 further adds announcement year fixed effects to the regression equation. 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 9.5% (7.6%) greater price change than those made at a precision greater than one quarter. Assessed at the median (mean) transaction value of 270 (1016) million, and taking into account the unconditional probability for a price change of 17.5%, these two coefficient estimates translate into coarse bidders paying 4.5 (16.9) and 3.6 (13.5) million dollars more for their targets, respectively. Note that these calculations ignore any association between the bid precision variables and the probability of price change. Subsection C.3 documents that if anything, precise offers are associated with a smaller likelihood of price change. Thus, our estimates on the benefits of precise offers err on the side of caution.

C.3. Alternative outcomes

Our tests suggest that precise bids are associated with a number of positive outcomes for the bidder. In this subsection we test whether these favorable outcomes are outweighed by other, potentially unfavorable outcomes. We examine the following four outcomes: the announcement reaction for the bidder (Table IA2), the likelihood of competing offers (Table IA3 and Table IA4), the likelihood of a price change (Table IA5), and contest duration (Table IA6). All analyses are structured in the same way as Table 3 and Table 4. They also use the same battery of controls except that Table IA2 additionally controls for the relative size of the transaction (e.g. Chang, 1998, and Fuller, Netter, and Stegemoller, 2002) and Table IA3 and Table IA4 additionally control for the number of same-industry firms and the annual share of firms acquired in that industry. The announcement reaction sample is considerably smaller than the sample 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 of Table IA2 regresses the three-day cumulative market-adjusted return against the bid precision variables. Consistent with Table 2, the coarsest bid precision variable is significantly negatively associated with the announcement return at the 10% level. However, the variable loses its significance in specifications 2 and 3, which add control variables to the regression equation. The other precision variables also remain insignificant.

Table IA3 studies whether bid precision is associated with the likelihood of competing offers. Specification 1 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: 2.31 and 2.58, respectively). These results are consistent with the idea that precise offers appear more informed and discourage rivals to enter a bidding contest against an ostensibly more informed bidder (Fishman, 1988, and Povel and Singh, 2006). Adding controls for bid, acquirer, and target attributes in specification 2 makes the bid precision variables lose their statistical significance; here, the only significant variable is the hostile offer dummy with a t -value of 10.47. In specification 3, the half dollar dummy is significant at the 10% level (t -value = 1.88), but the other bid precision variables are not (and two of them even have the wrong sign).

What weakens the bid precision results in specifications 2 and 3? The most plausible candidate is hostile offers, which are highly significantly related both to bid precision (as shown in Table 2 Panel B) and to competed offers. Table IA4 explores the association between bid precision and competed offers further in a hostile offer subsample, where the correlation between the hostile offer dummy and bid precision cannot affect our results and where the tests likely have more power due to the larger fraction of competed offers. Here, all three specifications agree that round bids are associated with a greater likelihood of a competed offer. In specification 3, for example, the three coarsest bid precision variables are all significantly positive at least at the 5% level. These results support the idea that precise offers discourage rivals to enter a bidding contest.

We also consider the possibility that the likelihood of a price change could be a function of bid precision. To test this conjecture, Table IA5 regresses the likelihood of a price change on the bid precision variables and controls. Specification 1 shows that bids made at the precision of five dollars and one dollar are significantly more likely to be associated with price change than bids made at the precision greater than one quarter (t -values: 2.06 and 1.72, respectively). Specifications 2 and 3 add controls for bid, acquirer, and target attributes to the regression, which makes the bid precision variables lose their significance. None of the specifications suggests that round bids would be associated with a lower probability of price change. In specification 3, for example, all precision variables have a positive sign.

Finally, we test whether offer precision is associated with the duration of the bidding contest. Specification 1 in Table IA6 finds that bids made at a precision greater than one quarter have a

significantly shorter contest duration than those made at the precision of five dollars (t -value = -3.93), or one dollar (t -value = -2.36). (A negative coefficient value indicates a lower hazard and thereby longer duration.) The five-dollar coefficient retains its significance even when other bid attributes are controlled for; in specification 3, for example, it is significant at the 5% level (t -value = -2.02). The coefficients for one dollar and half dollar are also negative but not significant at conventional levels. These results indicate that if anything, deals initiated by a coarse bid take a longer (and not shorter) time to close. All in all, none of the alternative outcomes analyzed in this subsection speaks against the idea that round bids are associated with unfavorable acquirer outcomes.

C.4. Robustness checks

We perform two additional robustness checks. First, we offer additional evidence suggesting our results are not being driven by unobserved pre-offer communications between the bidder and the target. We perform our analyses solely on hostile offers, which rarely are preceded by negotiations between the acquirer and the target (Boone and Mulherin, 2007). Even though hostile offers only constitute 17% of the sample, our results are qualitatively similar with most of the key variables remaining statistically significant. For example, in the relative offer price change regression in Table IA8, the five- and one-dollar coefficients are 0.18 (t -value = 2.77) and 0.11 (t -value = 1.77), while the corresponding coefficients in the full sample are 0.10 and 0.08 respectively. In the likelihood to complete the deal regression in Table IA7, the five- and one-dollar marginal effects are -0.32 ($t = -3.02$) and -0.24 ($t = -2.53$), i.e. considerably larger than the corresponding marginal effects of -0.09 and -0.06 in the full sample. If anything, these results suggest that confining our sample to observations where pre-offer communications are especially unlikely strengthens the economic significance of our results.

Second, we consider the possibility that price precision could mean different things for high and low large price per share offers. Although our tests already omit all offers below \$5 per share and control for the inverse of offer price, Table IA9 homogenizes the sample further by excluding all offers for over \$30 per share, i.e. about one-fourth of the sample. This change has no discernible effect on our main results. All four price precision coefficients have a significantly negative association at the 5% level with the likelihood to win the offer, and three of the price precision coefficients have a significantly positive association with the relative offer price change.

Table IA10 takes the homogenization even further by repeating the analysis of Table 3 in four subsamples, split according to the price per share of the initial offer: \$5–\$10, \$10–\$20, \$20–\$30, and over \$30. These results are noisy due to small subsample sizes, but they collectively tell the same story as our main line of analysis. Fourteen of the 16 initial offer price coefficients are negative as expected, and three of them are statistically significant at least at the 10% level.

D. Evidence from semi-structured interviews

Do bankers and corporate professionals responsible for M&A deals intuitively understand the strategic implications of the precision of the initial offer price? We explore this by contacting ten senior M&A professionals for a semi-structured interview. All of them agreed to be interviewed. Four of them work and two have worked as an investment banker in a bulge-bracket bank. The remaining four individuals draw their investment banking experience from Finland. Apart from their investment banking experience, two of the interviewees have experience from senior corporate roles in M&A transactions, and one from a senior role in private equity. Table 5 Panel A reports descriptive statistics on the interviewees. Table 5 Panel B reports descriptive statistics on their experience (on average 14 years) and the length of the interview (on average 23 minutes).

We asked the respondents to assume that they serve as the advisor of an acquirer and that they have done all the preparatory steps needed to make the initial offer of a public target. The respondents were asked to assume that the offer is a cash-only offer and assume away any elements that would complicate the deal. They were then asked to compare two hypothetical initial cash offers, one made at \$15.00 per share (referred to later as “round” bid) and another made at \$15.20 per share (referred to later as “precise” bid). The interviewees were asked to ignore the price difference between these two options; those interviewees who felt that the offer price difference was important were asked for symmetry to assume a third bid price option, \$14.80 per share. The interviewees were also asked how strongly they felt about their choice.

Only one of the interviewees strongly preferred the precise bid option. His argument was the same as ours: a round bid signals that the bidder does not have a good idea of the appropriate price and that the price is subject to negotiation. Two of the interviewees weakly preferred the precise option. Neither of them could properly explain why without being helped by the interviewer. When a third option of \$14.80 per share was introduced, one of these respondents

came up with the same argument as we have in our paper. He added that he had not thought of this argument before the interview. Two interviewees did not prefer either option. Five interviewees preferred a round bid because it reflects the market convention. Two of them had a strong preference for a round price. Panel C reports the distribution of the respondents' preference for round vs. precise bids.

We also asked whether the interviewees remember having discussed bid precision with their colleagues. Three of them did; of these interviewees, two preferred precise bids and one preferred round bids. None of the interviewees were aware of the academic literature on the effect of rounding on negotiation outcomes. Table 5 Panel D summarizes the other responses of the interviewees.

To sum up, our results cast doubt on the idea that corporate acquirers and their advisors would generally be knowledgeable of the effect initial offer precision has on acquisition outcomes. The absence of insight of a better option makes it natural for advisors to recommend, and acquirers to follow, the market convention of placing a round offer.

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 first document that the initial offer price per share is usually expressed at coarse terms. We then show that this widely spread practice is associated with two unfavorable outcomes for the bidder: a higher purchase price and a lower probability of completing the deal.

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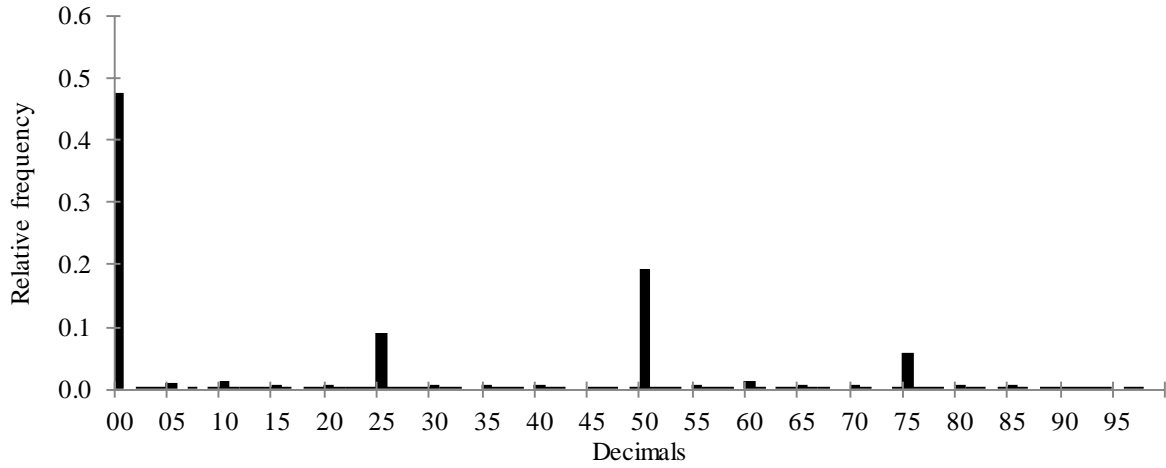
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Figure 1
Initial bid price frequency at various decimal and digit levels

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 2015.

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

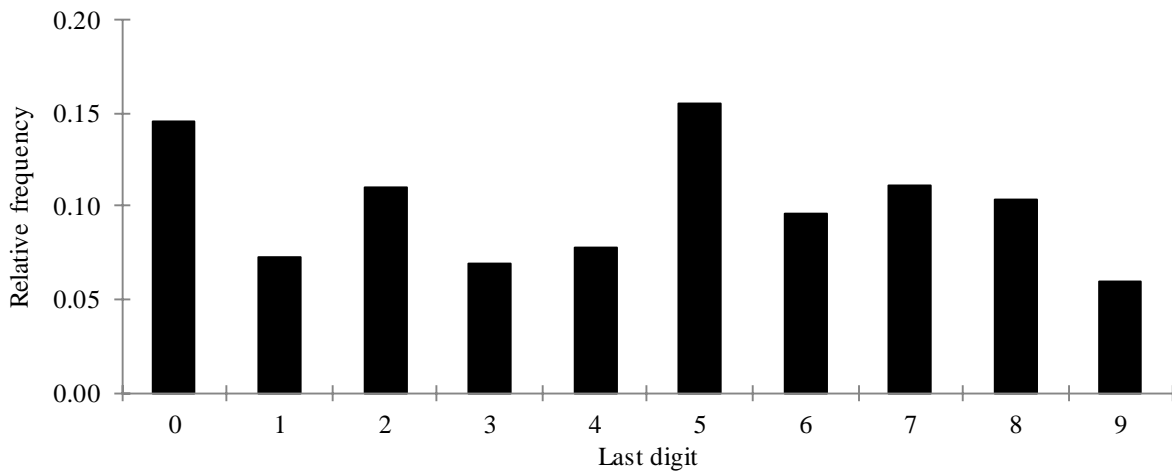


Table 1
Summary statistics

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 offer outcomes. *Initial bidder wins* equals one if one of the initial bidder's offers is completed. *Relative price change* is the relative change from the initial bid price per share to the final price per share of a completed offer. *Acquirer announcement return* is cumulative abnormal return computed over trading days [-1, +1] surrounding the initial bid. *Competed* equals one if the initial bid is challenged by some other control bidder. *Price change dummy* equals one if the price change differs from zero. *Contest duration* is the number of calendar days from the initial offer announcement to completion of a deal or censored at 365 days. Panel C reports offer characteristics. *Offer price* is the offer price per share in the initial offer. *Tender offer* equals one if the SDC classifies the offer as a tender offer. *Hostile offer* refers to an unsolicited offer or hostile target management reaction in the SDC data. *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. *Relative size* is the ratio of the transaction value and acquirer equity market value. Panel D reports bidder characteristics. *Horizontal offer* equals one if the bidder is in the same 3-digit SIC code industry as the target. *Public acquirer* equals one if the bidder is listed on an exchange. *Toehold* is the bidder's percentage ownership in the target at the time of the announcement. *Repeat acquirer* equals one if the bidder has made five or more unique bids in the preceding five years before the bid. *Bulge bracket advisor* equals one if the bidder is advised by one of the top-8 investment banks in Golubov, Petmezas, and Travlos (2012). *Acquirer age* is the age of the acquirer at the time of the initial offer in years. Panel E reports target characteristics. *Volatility* is the target's daily stock return standard deviation, calculated over event days [-239, -20]. *Amihud illiquidity measure*, originating from Amihud (2002), is the target's absolute daily return, divided by absolute daily dollar volume, averaged over trading days [-239, -20] with non-zero volume. The measure is multiplied by a factor of 100,000. *Analyst forecast error* is the absolute difference between actual fiscal year (FY) earnings per share (EPS) and FY 11th month FY EPS mean forecast, divided by the absolute actual FY EPS, in the preceding year, and capped by one. *# same-industry firms* is the number of firms belonging to the same 3-digit SIC code as the target in the announcement year. *Same-industry acquisition share* is the ratio between the number of acquisitions in the target's 3-digit SIC industry divided by the average size of the industry in the preceding five years before the bid. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2015.

	<i>N</i>	Avg	Std.dev	Min	25%	Md	75%	Max
<i>Panel A: Bid precision</i>								
Five dollars	1889	0.14	0.35	0	0	0	0	1
Dollar	1889	0.33	0.47	0	0	0	1	1
Half dollar	1889	0.19	0.39	0	0	0	0	1
Quarter	1889	0.15	0.36	0	0	0	0	1
<i>Panel B: Offer outcomes</i>								
Initial bidder wins	1889	0.77	0.42	0	1	1	1	1
Competed	1889	0.09	0.29	0	0	0	0	1
Contest duration	1889	117	71	23	64	108	133	365
Relative price change	267	0.14	0.18	-0.61	0.04	0.12	0.21	0.92
Price change dummy	1526	0.18	0.38	0	0	0	0	1
Acquirer announcement return	347	0.02	0.07	-0.24	-0.02	0.01	0.05	0.38
<i>Panel C: Offer characteristics</i>								
Offer price	1889	24.25	21.54	5	10.5	18.38	29.55	240
Tender offer	1889	0.30	0.46	0	0	0	1	1
Hostile offer	1889	0.17	0.38	0	0	0	0	1
Premium	1889	0.41	0.53	-0.57	0.19	0.32	0.51	12.87
Transaction value	1889	1016	2417	2	100	270	877	31,802
Relative size	347	0.48	0.64	0.10	0.16	0.26	0.52	5.61
<i>Panel D: Bidder characteristics</i>								
Horizontal offer	1889	0.33	0.47	0	0	0	1	1
Public acquirer	1889	0.46	0.50	0	0	0	1	1
Toehold	1889	2.01	6.97	0	0	0	0	49.9
Repeat acquirer	1710	0.06	0.24	0	0	0	0	1
Bulge bracker advisor	1244	0.55	0.50	0	0	1	1	1
Acquirer age	744	25.88	15.84	0	12	23	41	57
<i>Panel E: Target characteristics</i>								
Volatility	1856	0.03	0.02	0.01	0.02	0.03	0.04	0.22
Amihud illiquidity measure	1889	0.15	1.04	0	0.00	0.00	0.04	24.70
Analyst forecast error	1125	0.20	0.30	0	0.02	0.07	0.21	1
# same-industry firms	1889	114	142	1	16	44	188	738
Same-ind. acquisition share	1889	0.09	0.11	0	0.05	0.07	0.10	1

Table 2
Initial bid precision and offer outcomes

Columns 1–5 of this table report on offer outcomes (Panel A), offer characteristics (Panel B), bid characteristics (Panel C), and target characteristics (Panel D) 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, except that *Inverse price* is the inverse of the offer price per share. ***, **, 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 2015.

Decimal digits Column	Round			Precise		Diff. (1)-(5)	z- / t-value
	Five dollars (1)	Dollar (2)	Half dollar (3)	Quarter (4)	Other (5)		
<i>Panel A: Bid precision and offer outcomes</i>							
Initial bidder wins	0.69	0.76	0.75	0.79	0.85	-0.16	-4.80***
Relative price change	0.16	0.14	0.20	0.10	0.05	0.11	3.26***
Acquirer announcement return	0.00	0.01	0.03	0.04	0.02	-0.02	-1.70*
Competed	0.13	0.09	0.13	0.06	0.07	0.06	2.34**
Price change dummy	0.22	0.20	0.18	0.10	0.15	0.07	2.08**
Contest duration	129	120	113	109	111	18	3.04***
<i>Panel B: Bid precision and offer characteristics</i>							
Inverse price	0.06	0.06	0.07	0.08	0.09	-0.03	-5.78***
Tender offer	0.31	0.31	0.34	0.32	0.24	0.08	2.07**
Hostile offer	0.26	0.20	0.18	0.11	0.08	0.18	6.06***
Premium	0.46	0.42	0.40	0.41	0.38	0.07	1.60
Ln (Transaction value)	6.00	5.86	5.72	5.56	5.30	0.70	5.47***
Ln (Relative size)	-1.19	-1.16	-1.22	-1.03	-1.25	0.06	0.37
<i>Panel C: Bid precision and bidder characteristics</i>							
Horizontal offer	0.31	0.33	0.30	0.31	0.37	-0.05	-1.39
Public acquirer	0.45	0.49	0.47	0.41	0.43	0.02	0.45
Toehold	2.41	2.24	2.46	1.36	1.35	1.06	1.95*
Repeat acquirer	0.08	0.07	0.05	0.04	0.05	0.03	1.39
Bulge bracker advisor	0.58	0.57	0.55	0.53	0.51	0.07	1.37
Acquirer age	26.89	26.50	26.69	23.53	24.80	2.09	1.01
<i>Panel D: Bid precision and target characteristics</i>							
Volatility	0.03	0.03	0.03	0.04	0.03	0.00	-0.31
Amihud illiquidity measure	0.26	0.09	0.10	0.19	0.21	0.05	0.42
Analyst forecast error	0.21	0.18	0.17	0.23	0.26	-0.05	-1.59

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 2015.

Dependent variable	Initial bidder completes the deal		
	(1)	(2)	(3)
Five dollars	-0.952*** (-4.71) [-0.119]	-0.764*** (-3.03) [-0.087]	-0.722*** (-2.84) [-0.086]
Dollar	-0.595*** (-3.31) [-0.074]	-0.460* (-1.96) [-0.052]	-0.479** (-1.99) [-0.057]
Half dollar	-0.655*** (-3.35) [-0.082]	-0.570** (-2.30) [-0.065]	-0.559** (-2.19) [-0.066]
Quarter	-0.464** (-2.20) [-0.058]	-0.589** (-2.28) [-0.067]	-0.581** (-2.18) [-0.069]
Inverse price		-4.025** (-2.32) [-0.456]	-5.438*** (-2.87) [-0.645]
Tender offer		1.433*** (7.20) [0.162]	1.672*** (7.71) [0.198]
Hostile		-3.467*** (-18.37) [-0.393]	-3.415*** (-14.99) [-0.405]
Premium		0.220 (1.07) [0.025]	0.308 (1.39) [0.036]
Ln (Transaction value)		0.160*** (2.83) [0.018]	0.076 (1.16) [0.009]
Horizontal offer		0.337** (2.15) [0.038]	0.315* (1.92) [0.037]
Public acquirer		0.534*** (3.66) [0.061]	0.540*** (3.56) [0.064]
Toehold		-0.012 (-1.14) [-0.001]	-0.008 (-0.77) [-0.001]
Constant	1.765*** (11.53)	1.198*** (2.58)	1.191** (2.21)
Announcement year fixed effects	No	No	Yes
<i>N</i>	1,889	1,889	1,889
Pseudo <i>R</i> ²	0.012	0.333	0.356
Wald- χ^2	23.36	383.25	421.71
Wald- χ^2 (Five dollars=...=Quarter=0)	23.36***	10.00**	8.73*

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 2015.

Dependent variable	Relative offer price change		
	(1)	(2)	(3)
Five dollars	0.108*** (3.26)	0.090*** (2.61)	0.095*** (2.75)
Dollar	0.088*** (3.46)	0.076*** (2.82)	0.076*** (2.68)
Half dollar	0.145*** (4.23)	0.133*** (4.16)	0.134*** (3.85)
Quarter	0.041 (0.81)	0.024 (0.46)	0.037 (0.71)
Inverse price		0.630* (1.74)	0.558 (1.54)
Tender offer		0.023 (0.91)	0.031 (1.20)
Hostile		0.075*** (3.20)	0.072** (2.43)
Premium		0.011 (0.36)	0.022 (0.75)
Ln (Transaction value)		0.004 (0.44)	0.007 (0.73)
Horizontal offer		0.028 (1.05)	0.033 (1.22)
Public acquirer		-0.002 (-0.09)	0.003 (0.10)
Toehold		-0.000 (-0.06)	-0.000 (-0.14)
Volatility		0.469 (0.37)	0.713 (0.55)
Constant	0.054*** (2.78)	-0.063 (-0.80)	-0.087 (-0.67)
Announcement year fixed effects	No	No	Yes
<i>N</i>	267	267	267
<i>R</i> ²	0.067	0.150	0.246
<i>F</i> -statistic	5.86***	3.46***	2.29***
<i>F</i> -statistic (Five dollars=...=Quarter=0)	5.86***	4.75***	4.16***

Table 5
Semi-structured interviews of ten senior M&A professionals

This table reports results from semi-structured interviews with ten senior M&A professionals. All interviews were conducted by the same person, three face-to-face and seven via phone or skype. Panel A reports descriptive statistics on the professional background of the interviewees. Panel B reports descriptive statistics on the length of their work experience and the interview. Panel C reports the distribution of the interviewees' preference for round vs. precise offers. Panel D reports descriptive statistics on the other results of the interview.

Panel A: Descriptive statistics on the professional background of the interviewees

	# interviewees
Experience from investment banking	10
Works in a bulge-bracket bank	4
Has worked in a bulge-bracket bank	2
Experience from corporate M&A	2
Experience from private equity	1
Total number of interviewees	10

Panel B: Descriptive statistics on the length of the interviews and interviewees' work experience

	Mean	Median	Std. dev.	Min	Max
Experience length, years	14	13	4	8	21
Interview length, minutes	23	20	5	15	35

Panel C: Distribution of the interviewees' preference for round vs. precise offers

	Preference for				
	Round offers		Neither round nor precise	Precise offers	
	Strong	Weak		Weak	Strong
# interviewees	2	3	2	2	1

Panel D: Descriptive statistics on other interview results

	# interviewees
Has discussed rounding with colleagues	3
Is aware of research on bid precision	0

Table IA1
Initial bid precision before and after decimalization

This table reports the fraction of initial bids made at various levels of precision before and after decimalization in 2001. All initial bids are cash-only bids for listed companies for at least five dollars per share, made between 1985 and 2015.

Precision	Pre-decimalization	Post-decimalization	Full sample
Five dollars	0.18	0.13	0.14
Dollar	0.35	0.33	0.33
Half dollar	0.18	0.20	0.19
Quarter	0.14	0.15	0.15
Other	0.15	0.20	0.18
<i>N</i>	609	1280	1889

Table IA2
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 2015.

Dependent variable	Acquirer cumulative abnormal return $[-1, 1]$		
	(1)	(2)	(3)
Five dollars	-0.020*	-0.016	-0.012
	(-1.71)	(-1.29)	(-0.90)
Dollar	-0.013	-0.01	-0.008
	(-1.26)	(-0.92)	(-0.65)
Half dollar	0.006	0.007	0.004
	(0.46)	(0.58)	(0.34)
Quarter	0.018	0.016	0.017
	(1.06)	(0.94)	(0.94)
Inverse price		-0.054	-0.112
		(-0.61)	(-1.12)
Tender offer		0.007	0.011
		(0.83)	(1.19)
Hostile		-0.022**	-0.012
		(-2.49)	(-1.06)
Premium		-0.002	-0.003
		(-0.19)	(-0.24)
Ln (Transaction value)		-0.008***	-0.011***
		(-2.78)	(-3.51)
Ln (Relative size)		0.012**	0.013**
		(2.06)	(1.98)
Horizontal offer		0.001	0.002
		(0.10)	(0.29)
Constant	0.020**	0.085***	0.035
	(2.50)	(3.70)	(1.23)
Announcement year fixed effects	No	No	Yes
<i>N</i>	347	347	347
<i>R</i> ²	0.028	0.075	0.147
<i>F</i> -statistic	2.21*	2.35***	2.67***
<i>F</i> -statistic (Five dollars=...=Quarter=0)	2.21*	1.69	1.07

Table IA3
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 2015.

Dependent variable	Competing offer dummy		
	(1)	(2)	(3)
Five dollars	0.647** (2.31) [0.042]	0.178 (0.58) [0.010]	0.157 (0.48) [0.009]
Dollar	0.278 (1.10) [0.018]	-0.064 (-0.23) [-0.003]	-0.037 (-0.13) [-0.002]
Half dollar	0.678*** (2.58) [0.044]	0.413 (1.48) [0.022]	0.544* (1.88) [0.033]
Quarter	-0.174 (-0.53) [-0.011]	-0.306 (-0.88) [-0.017]	-0.254 (-0.73) [-0.015]
Inverse price		0.177 (0.08) [0.010]	3.901* (1.65) [0.236]
Tender offer		-0.177 (-0.99) [-0.010]	-0.432** (-2.13) [-0.026]
Hostile		1.827*** (10.47) [0.099]	1.414*** (6.13) [0.085]
Premium		0.004 (0.04) [0.000]	0.009 (0.08) [0.001]
Ln (Transaction value)		-0.033 (-0.49) [-0.002]	0.082 (1.01) [0.005]
Horizontal offer		-0.018 (-0.09) [-0.001]	0.049 (0.24) [0.003]
Public acquirer		-0.077 (-0.45) [-0.004]	-0.151 (-0.84) [-0.009]
Toehold		0.007 (0.74) [0.000]	-0.006 (-0.61) [-0.000]
Ln (#same-industry firms)		-0.084 (-1.50) [-0.005]	-0.098 (-1.63) [-0.006]
Same-industry acquisition share		-1.499 (-1.51) [-0.081]	-0.709 (-0.85) [-0.043]
Constant	-2.584*** (-12.20)	-2.180*** (-3.63)	-2.938*** (-2.94)
Announcement year fixed effects	No	No	Yes
<i>N</i>	1,889	1,889	1,889
Pseudo <i>R</i> ²	0.013	0.120	0.170
Wald- χ^2	14.37***	161.58***	203.17***
Wald- χ^2 (Five dollars=...=Quarter=0)	14.37***	7.80*	9.60**

Table IA4
Initial bid precision and the likelihood of competed offers in a hostile offer subsample

This table repeats the logit regressions of Table IA3 in a subsample of hostile offers.

Dependent variable	Competing offer dummy		
	(1)	(2)	(3)
Five dollars	1.232* (1.85) [0.122]	1.187* (1.80) [0.076]	1.461** (2.13) [0.098]
Dollar	1.054 (1.63) [0.104]	1.268** (2.01) [0.081]	1.422** (2.09) [0.096]
Half dollar	1.809*** (2.74) [0.179]	2.223*** (3.41) [0.142]	2.470*** (3.60) [0.166]
Quarter	0.652 (0.85) [0.064]	0.847 (1.13) [0.054]	1.215 (1.59) [0.082]
Inverse price		-7.296** (-1.98) [-0.467]	-2.333 (-0.53) [-0.157]
Tender offer		-0.045 (-0.15) [-0.003]	-0.374 (-1.06) [-0.025]
Premium		1.105** (2.35) [0.071]	1.109** (2.30) [0.075]
Ln (Transaction value)		-0.135 (-1.41) [-0.009]	0.004 (0.03) [0.000]
Horizontal offer		-0.424 (-1.35) [-0.027]	-0.43 (-1.26) [-0.029]
Public acquirer		0.906*** (3.05) [0.058]	0.877*** (2.76) [0.059]
Toehold		0.013 (0.96) [0.001]	0.004 (0.28) [0.000]
Ln (#same-industry firms)		0.05 (0.53) [0.003]	0.075 (0.68) [0.005]
Same-industry acquisition share		-2.264 (-1.63) [-0.145]	-0.689 (-0.49) [-0.046]
Constant	-2.079*** (-3.39)	-1.770* (-1.84)	-5.270*** (-3.59)
Announcement year fixed effects	No	No	Yes
<i>N</i>	320	320	320
Pseudo R^2	0.034	0.100	0.199
Wald- χ^2	11.87**	35.05***	60.07***
Wald- χ^2 (Five dollars=...=Quarter=0)	11.87**	16.84***	16.00***

Table IA5
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 2015.

Dependent variable	Price change dummy		
	(1)	(2)	(3)
Five dollars	0.484** (2.06) [0.062]	0.131 (0.41) [0.018]	0.121 (0.38) [0.016]
Dollar	0.338* (1.72) [0.043]	0.072 (0.28) [0.010]	0.053 (0.21) [0.007]
Half dollar	0.197 (0.89) [0.025]	-0.014 (-0.05) [-0.002]	0.031 (0.10) [0.004]
Quarter	-0.418 (-1.55) [-0.054]	-0.507 (-1.51) [-0.069]	-0.649* (-1.86) [-0.088]
Inverse price		1.316 (0.55) [0.180]	2.945 (1.15) [0.400]
Tender offer		-0.527** (-2.48) [-0.072]	-0.780*** (-3.13) [-0.106]
Hostile		4.540*** (12.13) [0.621]	4.406*** (9.27) [0.598]
Premium		-0.233 (-0.96) [-0.032]	-0.156 (-0.77) [-0.021]
Ln (Transaction value)		0.016 (0.21) [0.002]	0.145* (1.88) [0.020]
Horizontal offer		-0.418** (-2.12) [-0.057]	-0.386* (-1.86) [-0.052]
Public acquirer		-0.520*** (-2.83) [-0.071]	-0.681*** (-3.45) [-0.092]
Toehold		0.074*** (6.23) [0.010]	0.067*** (4.99) [0.009]
Volatility		7.364 (1.25) [1.007]	7.667 (1.18) [1.040]
Constant	-1.727*** (-10.67)	-2.042*** (-3.42)	1.606 (1.06)
Announcement year fixed effects	No	No	Yes
<i>N</i>	1,526	1,526	1,526
Pseudo <i>R</i> ²	0.011	0.321	0.369
Wald- χ^2	14.08***	182.55***	177.31***
Wald- χ^2 (Five dollars=...=Quarter=0)	14.08***	4.25	5.41

Table IA6
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 2015.

Dependent variable	Contest duration		
	(1)	(2)	(3)
Five dollars	-0.352*** (-3.93)	-0.253** (-2.21)	-0.215** (-2.02)
Dollar	-0.182** (-2.36)	-0.059 (-0.66)	-0.034 (-0.40)
Half dollar	-0.074 (-0.88)	-0.084 (-0.81)	-0.086 (-0.83)
Quarter	-0.034 (-0.38)	-0.013 (-0.13)	0.014 (0.14)
Inverse price		1.071 (1.35)	0.547 (0.64)
Tender offer		1.182*** (14.78)	1.319*** (16.09)
Hostile		-1.718*** (-15.94)	-1.642*** (-12.88)
Premium		0.049 (1.44)	0.077** (2.38)
Ln (Transaction value)		0.044* (1.96)	-0.01 (-0.36)
Horizontal offer		-0.004 (-0.06)	-0.038 (-0.58)
Public acquirer		0.204*** (3.38)	0.267*** (4.45)
Toehold		-0.021*** (-4.83)	-0.019*** (-4.06)
Announcement year fixed effects	No	No	Yes
<i>N</i>	1,889	1,889	1,889
Number of failures	1,532	1,532	1,532
Wald- χ^2	20.56***	438.46***	607.98***
Wald- χ^2 (Five dollars=...=Quarter=0)	20.56***	6.17	6.19

Table IA7
Initial bid precision and completing a deal in a hostile offer subsample

This table repeats the logit regressions of Table 3 in a subsample of hostile offers.

Dependent variable	Initial bidder completes the deal		
	(1)	(2)	(3)
Five dollars	-0.769 (-1.55) [-0.179]	-1.690*** (-2.58) [-0.345]	-2.093*** (-3.02) [-0.319]
Dollar	-0.454 (-1.02) [-0.106]	-1.118* (-1.85) [-0.228]	-1.582** (-2.53) [-0.241]
Half dollar	-1.097** (-2.12) [-0.256]	-1.727** (-2.47) [-0.353]	-1.814** (-2.45) [-0.277]
Quarter	-0.896 (-1.48) [-0.209]	-1.211 (-1.62) [-0.247]	-1.440** (-2.01) [-0.220]
Inverse price		-0.465 (-0.13) [-0.095]	1.293 (0.28) [0.197]
Tender offer		2.098*** (6.63) [0.429]	2.931*** (6.70) [0.447]
Premium		-0.908* (-1.70) [-0.186]	-0.829 (-1.24) [-0.126]
Ln (Transaction value)		0.214* (1.91) [0.044]	0.287** (1.98) [0.044]
Horizontal offer		0.353 (1.08) [0.072]	0.205 (0.51) [0.031]
Public acquirer		-0.253 (-0.77) [-0.052]	-0.195 (-0.49) [-0.030]
Toehold		0.024 (1.29) [0.005]	0.038 (1.49) [0.006]
Constant	-0.531 (-1.33)	-1.860* (-1.79)	-3.322** (-2.46)
Announcement year fixed effects	No	No	Yes
<i>N</i>	320	320	320
Pseudo <i>R</i> ²	0.017	0.186	0.313
Wald- χ^2	5.80	58.56***	75.90***
Wald- χ^2 (Five dollars=...=Quarter=0)	5.80	8.34*	9.56**

Table IA8
Initial bid precision and relative offer price change in a hostile offer subsample

This table repeats the OLS regressions of Table 4 in a subsample of hostile offers.

Dependent variable	Relative offer price change		
	(1)	(2)	(3)
Five dollars	0.130*** (2.78)	0.160*** (2.74)	0.179*** (2.77)
Dollar	0.106*** (2.98)	0.134*** (2.83)	0.113* (1.77)
Half dollar	0.228*** (4.20)	0.229*** (3.76)	0.175*** (2.65)
Quarter	-0.005 (-0.05)	-0.019 (-0.16)	-0.082 (-0.70)
Inverse price		0.970* (1.71)	1.223* (1.99)
Tender offer		0.03 (0.74)	0.045 (1.10)
Premium		-0.096 (-1.04)	-0.078 (-0.87)
Ln (Transaction value)		0.002 (0.13)	-0.002 (-0.11)
Horizontal offer		-0.038 (-0.85)	-0.033 (-0.58)
Public acquirer		0.067 (1.51)	0.076 (1.52)
Toehold		-0.000 (-0.22)	-0.000 (-0.06)
Volatility		-0.555 (-0.19)	-2.976 (-0.85)
Constant	0.073*** (2.83)	-0.006 (-0.05)	-0.028 (-0.14)
Announcement year fixed effects	No	No	Yes
<i>N</i>	112	112	112
<i>R</i> ²	0.111	0.175	0.350
<i>F</i> -statistic	5.62***	2.26**	1.87**
<i>F</i> -statistic (Five dollars=...=Quarter=0)	5.62***	4.39***	3.08**

Table IA9
Initial bid precision, completing the deal, and relative offer price change when offer price is at most \$30

This table repeats specification 3 of the logit regression of Table 3 and of the OLS regression of Table 4 for initial offer prices ranging from \$5 to \$30 per share.

Dependent variable	Initial bidder completes the deal	Relative offer price change
	(1)	(2)
Five dollars	-0.737*** (-2.61)	0.101** (2.13)
Dollar	-0.525** (-2.03)	0.080** (2.19)
Half dollar	-0.743*** (-2.74)	0.145*** (3.46)
Quarter	-0.591** (-2.09)	-0.022 (-0.37)
Inverse price	-6.347*** (-3.08)	0.601 (1.42)
Tender offer	1.752*** (7.38)	0.029 (0.87)
Hostile	-3.317*** (-12.30)	0.102** (2.55)
Premium	0.325 (1.48)	0.012 (0.33)
Ln (Transaction value)	0.032 (0.40)	0.011 (0.85)
Horizontal offer	0.432** (2.25)	0.06 (1.54)
Public acquirer	0.549*** (3.12)	0.004 (0.12)
Toehold	-0.009 (-0.84)	-0.000 (-0.35)
Volatility		1.518 (1.03)
Constant	-0.240 (-0.18)	-0.110 (-0.78)
Announcement year fixed effects	Yes	Yes
<i>N</i>	1,440	195
Pseudo R^2	0.363	
Wald- χ^2	323.86***	
Wald- χ^2 (Five dollars=...=Quarter=0)	9.36*	
R^2		0.301
<i>F</i> -statistic		1.93***
<i>F</i> -statistic (Five dollars=...=Quarter=0)		3.72***

Table IA10
Initial bid precision and completing a deal by offer price range

This table repeats the logit regression of Table 3 specification 3 for four mutually exclusive offer price ranges.

Dependent variable	Initial bidder completes a deal			
	Initial offer price			
	\$5-\$10	\$10-\$20	\$20-30	>\$30
Five dollars	-0.751*	-0.594	-1.576	-0.054
	(-1.73)	(-1.30)	(-1.58)	(-0.08)
Dollar	-0.154	-0.518	-1.264	0.087
	(-0.32)	(-1.32)	(-1.55)	(0.14)
Half dollar	-1.229***	-0.509	-1.311	0.510
	(-2.81)	(-1.18)	(-1.42)	(0.77)
Quarter	-1.163***	0.172	-0.907	-0.515
	(-2.64)	(0.35)	(-1.02)	(-0.75)
Inverse price	-7.809	13.135	-61.972	83.452**
	(-1.52)	(1.38)	(-1.51)	(2.46)
Tender offer	1.947***	2.067***	0.951*	1.855***
	(4.72)	(5.45)	(1.77)	(3.39)
Hostile	-3.745***	-3.692***	-3.570***	-4.991***
	(-7.09)	(-7.91)	(-4.80)	(-7.35)
Premium	0.159	0.304	2.300***	-0.343
	(1.16)	(0.76)	(3.25)	(-0.41)
Ln (Transaction value)	0.043	0.094	0.047	0.493***
	(0.26)	(0.72)	(0.28)	(2.84)
Horizontal offer	0.822**	0.536*	-0.356	0.017
	(2.14)	(1.80)	(-0.97)	(0.05)
Public acquirer	0.482	0.576**	0.775**	0.599
	(1.27)	(2.06)	(2.35)	(1.59)
Toehold	-0.006	-0.020	-0.022	0.034
	(-0.30)	(-1.45)	(-0.90)	(0.96)
Constant	2.607	-0.754	4.861**	-2.517
	(1.55)	(-0.59)	(2.25)	(-1.36)
Announcement year fixed effects	Yes	Yes	Yes	Yes
<i>N</i>	451	605	384	449
Pseudo <i>R</i> ²	0.422	0.374	0.376	0.43
Wald- χ^2	137.63***	163.56***	104.00***	150.38***
Wald- χ^2 (Five dollars=...=Quarter=0)	12.85**	4.29	3.24	3.03