Cash is King
Revaluation and the Medium of Exchange in Merger Bids*

Ulrike Malmendier
UC Berkeley and NBER
ulrike@econ.berkeley.edu

Marcus Matthias Opp
UC Berkeley
mopp@haas.berkeley.edu

Farzad Saidi
New York University
saidi@nyu.edu

June 30, 2011

Abstract

Returns to merger announcements are commonly used to measure the expected value created by mergers. We provide evidence that a significant portion reflects, instead, a revaluation of the target. Using a sample of unsuccessful merger bids from 1980 to 2008, we show that targets of cash offers are revalued by +15% after deal failure. Stock bids, on the other hand, do not seem to provide target information: targets with equity offers revert to their pre-announcement levels after deal failure. The results are not driven by future takeover activity since cash targets are not significantly more likely to receive future merger bids. The results are also independent of the specific type of reason for deal failure. Our findings, as well as the observed value changes in acquirers, are consistent with cash bids indicating target undervaluation while stock bids signal acquirer overvaluation.

JEL classification: G14, G34, D03, D82

Keywords: mergers & acquisitions, private information, misvaluation, cash offer, stock offer

*We are extremely grateful to comments and suggestions by Viral Acharya, Yakov Amihud, Malcolm Baker, Alberto Bisin, Hui Chen, Lauren Cohen, Francesca Cornelli, Slava Fos, Julian Franks, Xavier Gabaix, Victoria Ivashina, Owen Lamont, Alessandro Lizzeri, Gustavo Manso, Atif Mian, Stewart Myers, Terrance Odean, Matthew Rhodes-Kropf, Antoinette Schoar, Andrei Shleifer, David Sraer, Jeremy Stein, Daniel Wolfenzon, Jeffrey Wurgler, David Yermack, as well as seminar participants at Princeton, LSE, NYU Stern, Ohio State, Harvard, and MIT Sloan. Research assistance by Javed Ahmed and collaboration with Marlena Lee on an earlier draft of the paper were greatly appreciated.

1 Introduction

Much of the research on mergers and acquisitions revolves around the question: do mergers create value? With mergers being among the most important and, possibly, most disruptive events in a corporation's lifetime, this question has been of foremost interest to policymakers and researchers alike, including a recent debate about "massive wealth destruction" through mergers in the late 1990s and at the beginning of this century (Moeller, Schlingemann, and Stulz (2005)). Empirically, the measurement of value creation is challenging. Using stock market data is standard in the literature, and has the advantage of being available on a day-to-day basis. However, stock market reactions to merger announcements do not only reflect the present value of synergies, but also encode information about the stand-alone value of the entities as well as information about the closure of the deal. To the extent that a) markets are efficient, b) mergers are unanticipated (and very likely to go through) and c) little information about the stand-alone value of the two merging entities is revealed, the combined change in market values should capture total value creation. In fact, various studies document a small positive combined announcement return of targets and bidders, and interpret this finding as evidence in favor of surplus creation.[1]

Our paper implicitly sheds light on this central question, by revealing that the last above-mentioned assumption – lack of information revelation – is not warranted by the data. We provide evidence that a bid reveals economically and statistically important information about the stand-alone value of the target. Our empirical analysis is motivated by a significant body of existing theories that predict that the bidder's private information will be reflected in his choice of acquisition currency, i.e., cash or stock.[2] While the negative information effect of stock bids on the bidder's stand-alone value is well understood at least since Myers and Majluf (1984), we focus on information revelation about the target's (under)valuation and show empirically that there is a large revaluation effect for cash targets (+15%) but no effect for stock targets. For the average deal completed between 1980 and 2008 this translates into approximately $132m (in 2010 dollars).

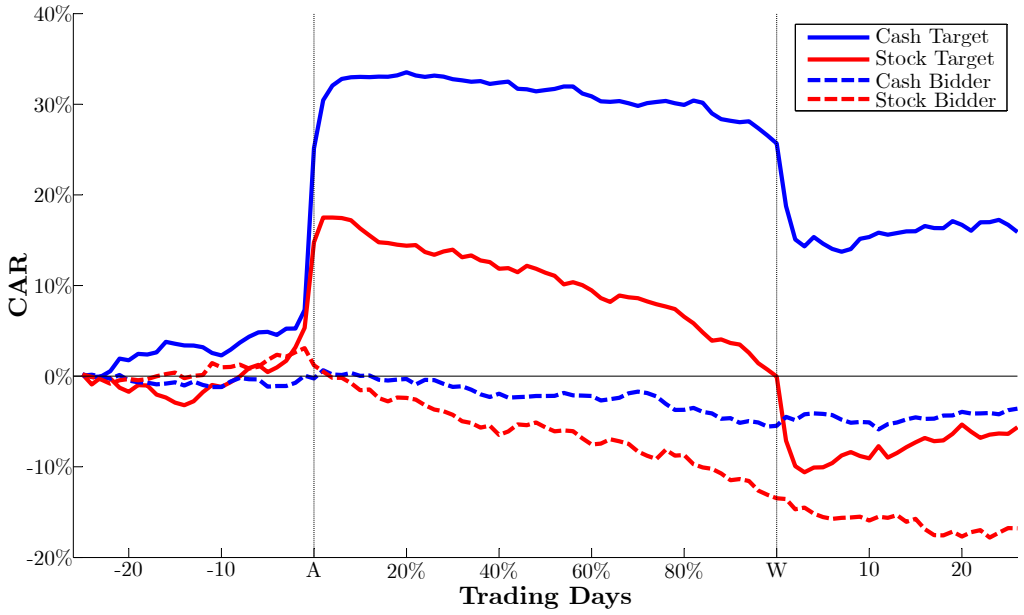
Our identification strategy uses the sample of unsuccessful merger bids to measure information revelation: we compare the value of targets prior to the announcement and after deal failure. To see the intuition for our approach, consider the following thought experiment. Suppose a target company is currently trading at $100 and obtains a takeover offer in cash for $125. Moreover, assume that the deal fails within a short time period. After the failure of the deal, the information revealed through the choice of the medium of exchange is no longer confounded with merger effects, including the split-up of surplus between target and acquirer and match-specific synergies. If the stock price trades at $115 after deal failure, we can attribute $15 to the revision of beliefs about the stand-alone value of the target as a result of the offer. This enables us to identify information revelation in the sample of unsuccessful bids.

Figure 1 previews our key empirical result. It plots the evolution of cumulative abnormal returns in the sample of unsuccessful pure cash and stock bids between 1980 and 2008, separately for acquirers and targets. The pre-announcement and post-failure differences are striking.

[1] See Jensen and Ruback (1983), Jarrell, Brickley, and Netter (1988), or Andrade, Mitchell, and Stafford (2001).

[2] In Fishman (1989), bidders use cash offers for valuable targets to preempt competing offers. If the first bidder signals a sufficiently high valuation for the target by using cash, bidder 2 does not find it worthwhile to start a bidding war. In Hansen (1987) as well as the extension by Eckbo, Giammarino, and Heinkel (1990), the bidder's choice of the medium of exchange reflects private information about his own value.

Figure 1: Deal Announcement and Failure Effects



Notes: Cumulative Abnormal Returns (CARs) from 25 trading days pre-announcement to 25 trading days after deal failure. The sample consists of 94 cash and 114 stock deals. See Table 1 for the construction of the sample.

Starting 25 trading days prior to the announcement, we observe a run-up among targets of stock offers and targets of cash offers, yielding announcement effects of 15% and 25%, respectively – consistent with earlier evidence by Huang and Walkling (1987). At the time of deal failure, however, which is normalized to occur 50 synthetic trading days (the median of the sample) later in the graph,[3] the value of stock targets falls below the pre-announcement level, to which it ultimately returns, while the value of cash targets remains significantly higher than prior to the bid: cash targets earn 15% cumulative abnormal returns relative to the pre-announcement level. Hence, despite the small upward trend for both cash and stock targets after deal failure, stock target returns remain more than 15% below cash target returns. In addition, we find that stock acquirers trade at significantly lower prices post-failure (−15%) while cash acquirers return to their pre-announcement level, consistent with findings in previous studies.[4]

Our results indicate that cash bids induce the market to positively revalue the target. One explanation for the revaluation is positive private information of the acquirer about the target, which is revealed by the cash bid. A related explanation is limited attention, i.e., bids drawing

[3] We use linear interpolation to normalize deals with different window lengths to the same number of synthetic trading days (see Appendix B).

[4] For example, Savor and Lu (2009) compare the stock price performance of stock bidders in the *unsuccessful* deal sample to that of stock bidders in the *completed* deal sample, and find that bidders in the unsuccessful deal sample do worse. Further evidence on stock market driven acquisitions is provided in Friedman (2006).

investors' attention to the target company and inducing them to process information about the target that was already available. Since in both cases the market learns from the bidder's action, we will dub both interpretations *information revelation* in a broad sense. An alternative explanation is that the value increase in cash targets does not reflect a revaluation of the targets themselves but of their being lucrative merger opportunities relative to stock targets. However, we find that failed cash deals are not significantly more likely than failed stock deals to be followed by another takeover attempt over the next two years.

We address several concerns about our identification strategy. A main concern is that transactions are not canceled randomly or, more specifically, that deal failure is not exogenous with respect to target value. However, such exogeneity is also not required. Our identification of a cash-versus-stock effect solely requires that post-announcement news do not differentially affect the likelihood of completion in the cash and stock samples. Most shocks leading to deal failure, such as material adverse changes on the target side or financing shocks on the bidder side, are not obviously related to a particular acquisition currency. To partially address the concern of differential effects, we test whether cash deals are more or less prone to deal failure. The results indicate that the medium of exchange does not predict deal failure, whereas hostile and large deals (in terms of relative size of the transaction) are more likely to be associated with deal failure. While this outcome provides evidence in favor of our identification, it still does not prove that we can generalize with ease our revaluation estimate beyond the sample of unsuccessful mergers.[5] Still, the magnitudes of the observed valuation differences between cash and stock targets underpin the importance of the impact of information revelation on announcement returns, and make it worthwhile to investigate the economic mechanism behind the sample selection.

Beyond providing new empirical facts about the informational content of merger bids, our findings have important implications for the efficiency of mergers and acquisitions. From a policymaker's perspective, it is crucial to know whether these deals quantitatively affect total surplus (allocative role), as in the Q-theory model of Jovanovic and Rousseau (2002), or whether they merely have distributional consequences, such as in the model of Shleifer and Vishny (2003), including value adjustment due to the revelation of information. While total value creation might be the most relevant measure of the desirability of merger activities, the (ex-post irrelevant) split-up of surplus influences the ex-ante incentives to engage in value-maximizing transactions. If target shareholders can extract all the surplus from a transaction, a value-maximizing bidder would have no incentive to start a takeover attempt. This is the powerful logic of Grossman and Hart (1980). The rationale applies regardless of the source of the surplus, that is, also if the bidder simply has private information about the value of the target: if a bidder's private information about the target is fully revealed to the market and target shareholders would, once the bidder has announced his bid, demand the full surplus, potential acquirers may abstain from bidding in the first place. An initial stake in the target company (see Shleifer and Vishny (1986) and Hirshleifer and Titman (1990)) dampens this mechanism as the bidder would benefit from a revaluation of his initial stake. In summary, the division of surplus, including a valuation increase due to information revelation, affects ex-ante incentives and thus the efficiency of the takeover market mechanism.

In addition to the research cited above, our findings relate to several strands of the prior literature. A large literature evaluates the returns to mergers and acquisitions. Most studies

[5] Only exogenous cancelations (with respect to target valuations) would allow us to fully tackle this identification issue.

based on announcement returns find that tender offers generate small overall value with virtually all the gains accruing to the target (see overview papers by Jensen and Ruback (1983), Andrade, Mitchell, and Stafford (2001), and Betton, Eckbo, and Thorburn (2008)). Using probability scaling methods, Bhagat, Dong, Hirshleifer, and Noah (2005) find larger estimates of combined value creation (7.3%) than the conventional CAR estimate (5.3%) by Bradley, Desai, and Kim (1988). Following Travlos (1987), studies of announcement returns distinguish between cash and stock transactions. Consistent with the pecking order model of Myers and Majluf (1984), bidders using stock reveal negative private information about themselves, which manifests itself in negative announcement returns for the bidder.[6]

Most closely related to our analysis are earlier papers by Dodd (1980), Bradley, Desai, and Kim (1983), Davidson, Dutia, and Cheng (1989) and Sullivan, Jensen, and Hudson (1994) which examine failed acquisitions to study information revelation about the *target*. For example, Davidson, Dutia, and Cheng (1989) find that targets of unsuccessful bids trade higher than before the announcement only because they are more likely to become future targets, whereas stock prices of targets that do not obtain a future offer revert to pre-announcement levels. They interpret this result as evidence against information revelation about the stand-alone value of the target. In contrast to our analysis, their study does not distinguish between cash and stock transactions. This conditioning information allows us to separate targets for which (almost) no information is revealed (stock targets) and targets that are revalued (cash targets). The striking difference between stock and cash targets has already been documented in an overlooked paper by Sullivan, Jensen, and Hudson (1994). However, due to limited sample size (22 stock and 44 cash deals) and lack of relevant control variables (such as any accounting data), their suggestive results were not cleanly identified. Our extensive analysis, robustness checks, and identification discussion reveal that their main raw result holds up in a multivariate context and can be reasonably attributed to information revelation through the bidder's choice of currency. Our analysis indicates that this effect is not driven by cash targets being more prone to becoming takeover targets in the future. Moreover, our results are robust to controlling for hostile deals even though these deals are more likely to be financed with cash. Thus, the disciplinary channel of hostile bids (see Franks and Mayer (1996)) does not drive our results either.[7]

Long-run post-takeover performance studies by Rau and Vermaelen (1998) and Loughran and Vijh (1997) document strong negative abnormal returns for *bidders* of stock transactions and positive abnormal returns for bidders using cash. As Savor and Lu (2009) note, this result does not necessarily imply that stock transactions are value-destructive from the bidder's perspective. Since market timing stories suggest that stock bidders are on average overvalued, Savor and Lu (2009) use the performance of bidders in failed transactions as the natural counterfactual. Indeed, their results confirm that bidders of successful transactions perform significantly better than bidders of (exogenously) failed transactions. Malmendier, Moretti, and Peters (2010) use a similar identification strategy by comparing the long-run returns of competing bidders – winners and losers – in contested mergers.

However, apart from statistical issues in computing long-run abnormal returns (see Barber and Lyon (1997), Fama (1998), and Brav (2000)), long-run post-takeover studies face a fundamental problem: if markets respond efficiently to stock mergers, even a value-destructive merger

[6] Jovanovic and Braguinsky (2004) generate bidder discounts in a Q-theory framework without resorting to the informational content revealed through the medium of exchange.

[7] Bhagat, Shleifer, Vishny, Jarrel, and Summers (1990) interpret the hostile takeover activity in the 1980s mostly as a return to corporate specialization and deconglomeration.

(attempt) should be correctly incorporated in the price immediately after announcement. Thus, stock bidders should not exhibit negative abnormal returns after the announcement. In an efficient market, long-run empirical studies would solely pick up the extent of asset pricing model misspecification. If stock markets are not efficient, it is not clear how to use stock market data to make quantitative assessments.

The remainder of the paper is organized as follows. In Section 2, we develop a brief classification of merger rationales linked to the medium of exchange before discussing our identification in greater detail. In Section 3, we describe the selection and composition of our data set. Section 4 contains the main results of our empirical analysis, while Section 5 discusses robustness checks. Section 6 concludes.

2 Theoretical Framework

2.1 Medium of Exchange and Stand-alone Valuation

To better understand the role of the medium of exchange in merger transactions, it is useful to investigate why mergers are initiated in the first place. Broadly speaking, the rationales can be categorized in three, mutually non-exclusive, buckets:

1. Synergies
2. Market timing
3. Managerial / Agency reasons.

We interpret the first, classical motivation, synergies, in a broad sense, and define it in such a way that it encompasses any rationale of increasing the joint *real* cash flows regardless of whether this is driven by increased revenue potential or operational cost synergies. This also includes (anti-)competitive considerations. From a social planner's perspective, an increase in joint cash flows of firms is only desirable if it is not outweighed by a counterbalancing decrease in consumer surplus.[8]

Market timing refers to merger rationales that are sourced in the (temporary) mispricing of securities, which may be driven by private information of managers (Myers and Majluf (1984)) or market irrationality (Shleifer and Vishny (2003)).[9] In this case, real firm cash flows are unaffected by the merger itself, and potential gains accruing to the bidder are purely redistributive.

The last category summarizes managerial reasons for pursuing a merger. For instance, bidding firms' managers are willing to overpay for an acquisition target due to private benefits

[8] The effect of mergers on consumer surplus is difficult to measure in large-scale studies because consumer surplus is non-traded. With that caveat in mind, Jensen and Ruback (1983) document that merger transactions do not systematically lead to an abuse of market power.

[9] Note that throughout the paper we focus on the private information of the bidder relative to the market, which is relevant as a motivation for the merger. Asymmetric information between the bidder and target management may also be relevant *after* the decision to approach the target, and may cause deal failure. For instance, Rhodes-Kropf and Viswanathan (2004) introduce private information between the bidder and the target by breaking down misvaluation into a firm-specific and a separate industry-wide component.

of control (empire building) or (irrational) hubris (Roll (1986)) / overconfidence (Malmendier and Tate (2008)). To the extent that overconfident managers gain control of the target, efficiency could actually be decreased as a result of the merger.

Out of the three rationales, only market timing has a first-order relation to the medium of exchange. Here, mispricing of securities is the underlying source of private "value generation" whereas the medium of exchange only plays a secondary (execution) role for the other motivations (see Hansen (1987) or Fishman (1989)).[10]

We develop a simple model in Appendix C that captures the main ingredients of mispricing-driven transactions. The model predicts that the use of stock is more likely if the (hypothetical) combined entity of the bidder and the target is overvalued, and the use of cash if it is undervalued. A bidder is willing to buy an overvalued target with stock as long as the target is less overvalued than the bidder's own stock. On the other hand, a bidder prefers to use cash for undervalued targets because it enables him to fully extract the long-run price appreciation. By receiving a fixed payment, target shareholders in cash deals do not benefit from a positive long-run revaluation.

With a rational stock market, bidders can only benefit from their private information if it is not fully revealed by their choice of the medium of exchange. Put differently, it is required that there exist other reasons for choosing cash or stock which allow the informed bidder to partially hide his private information about the target. Consider the following simple example in which a target currently trading at \$100 is worth either \$80 or \$120 with equal probability. Now suppose that, *conditional* on a cash offer for the target, there is a 50% chance that the bidder is (perfectly) informed, i.e., the true value of the target is \$120, and a 50% chance that the bid was driven by uninformed managerial considerations, implying that the fair value is still \$100. Then, the market would update its beliefs about the target's stand-alone value (not accounting for the takeover premium) to \$110. This allows the bidder with private information to make a potential private gain, namely if the transaction succeeds with an offer price between \$110 and \$120. Thus, it is the existence of an uninformed bidder that enables the informed bidder to gain financially from such a deal.[11]

2.2 Identification

The main idea for our identification of information revelation is as follows: after a deal has been canceled, match-specific synergies should no longer be priced, so that the difference between the post-failure price and the pre-announcement price should reflect the informational content revealed through the medium of exchange. In the above example, the difference amounts to 10%. Note that this information effect cannot be cleanly identified in the sample of completed deals. The stock price of targets that receive some takeover price P, whether in cash or stock, will simply converge to the offered takeover price (until the deal is sealed). In contrast, the sample of unsuccessful bids allows us to separately identify the information effect on the target's stand-alone valuation to the extent that the market rationally processes the offer.[12]

[10] A potential exception would be the case of an overconfident manager who may have a tendency to use cash in merger transactions because he believes that his own stock is undervalued by the market.

[11] Moreover, an uninformed bidder with an empire-building objective may actually prefer to hide behind the informed bidder, so that his true intentions (empire building) do not become public.

[12] In the model of Shleifer and Vishny (2003), the stock market does not respond to the medium of exchange offered in a transaction. As a result, one would not expect to see any revaluation effects.

Having discussed the intuition behind our approach, we now turn to the validity of our identification strategy. Since the main part of our analysis focuses on the comparison of cash and stock deals in the sample of unsuccessful merger bids, one wonders whether and how our identification is affected by sample selection. Put differently, can we argue that our results also hold in the sample of completed deals (if it were possible to obtain stand-alone values for targets after the deal has materialized)?

Realistically, deals (in general) do not fail randomly, which makes it difficult to claim that the sample of unsuccessful deals is representative of the completed sample in terms of relevant *observable* and *unobservable* characteristics.[13] With respect to *observable* characteristics, the summary statistics (to be discussed in Section 3) reveal that unsuccessful deals are remarkably similar across many dimensions. The point of this section is to discuss the economics of *unobservable* characteristics.

Since we are comparing cash and stock deals *within* the sample of unsuccessful deals and not across the unsuccessful *and* completed deal samples, our identification does not necessarily require strictly exogenous failures (as in Savor and Lu (2009)).[14] For example, deals can fail because of material adverse changes of the target. Targets experiencing such a shock are expected to be found in the unsuccessful deal sample regardless of the medium of exchange. Moreover, in such a case, one would expect the target's stock to trade below its pre-announcement level. However, such a shock would not explain any potential revaluation difference between cash and stock deals. Likewise, a negative shock to bidder financing will most likely render both the bidder of cash and of stock deals to be unable to complete the deal.[15] While deal failures of this sort would have to be excluded from the sample of Savor and Lu (2009), they can be legitimately included in our analysis, which focuses on information revelation about the target. In general, our identification is robust to any shock causing failure as long as it does not differentially affect cash and stock deals. This is the main assumption that we are going to entertain. Indeed, most of the shocks that one can reasonably relate to deal failure are not distinct to cash or stock deals.

In order to pin down the potential source of differential effects, it is useful to link the motivations for mergers discussed in the previous section to deal failure, in particular the mispricing channel. Unlike in the cases of synergies and managerial reasons for pursuing mergers, market-timing gains are almost by definition temporary as they can only be reaped until the information is priced in the market and mispricings disappear. In contrast, (match-specific) synergies are not destroyed by information dissemination to the market – because they are real, not purely financial gains. Similarly, managerial motives for mergers, such as private benefits of control, are theoretically unrelated to price discovery in the stock market.[16]

Therefore, leakage makes information-based deals more susceptible to failure than, for instance, synergy-based deals: if an overvalued bidder's mispricing had been the primary rationale for the merger offer (such as in the famous case of AOL and Time Warner) and mispricing disappeared before the deal could be closed, we would expect the deal to be more likely to be

[13] Although it is oftentimes labeled as random, even regulatory intervention is not truly exogenous.

[14] Savor and Lu (2009) address this problem by restricting their analysis to deals that fail exogenously (relative to bidder valuations) using a careful news search around the withdrawal date.

[15] Since financing has to be secured before public *tender offers* are made, such a breakdown of financing is only possible for (non-tender) *merger offers.*

[16] Managerial motives are potentially encoded in the type of merger (e.g., hostile mergers) which, as argued by Lambrecht and Myers (2007), could be related to stand-alone values.

withdrawn.[17] Since the mispricing direction is the opposite for cash (undervaluation) and stock deals (overvaluation), leakage of the deal rationale of market timing would yield differential effects for cash and stock deals. Still, these differential effects are perfectly consistent with our main information-based story. Mispricings may induce merger offers which cause the market to revalue the entities. However, if, in addition, the revaluation effect is sufficiently large, the deal may also be less likely to go through because the underlying source of private gains has vanished. Should these types of endogenous failures be sufficiently prevalent, then our estimate of information revelation – but not of the amount of private information per se – in the sample of unsuccessful deals would presumably be upward-biased (compared to information revelation for the entire deal sample).

To summarize, shocks that drive failure (but not differentially for stock and cash deals) are unproblematic for our analysis. Differential effects could theoretically be caused by leakage for information-based deals. Thus, a conservative interpretation of our revaluation estimates would only apply to the failed sample.

3 Data Description

Our main sources are CRSP, Compustat, and SDC. We match CRSP market data with targets and acquirers in the SDC database using the six-digit CUSIP provided in the SDC database. In determining which CUSIP identifier to use from the CRSP database, we always choose the CUSIP with the lowest possible 7th digit (typically 1). Regarding the deals in the SDC database, we drop those for which the announcement and/or completion/failure dates are missing. Furthermore, we also drop deals with announcement dates after their completion/failure (this criterion is labeled as "valid deal dates" in Table 1).

Sample selection. We focus on merger agreements and tender offers between 1980 and 2008 that were completed/canceled within at least five and at most 250 trading days. Out of $12,846$ deals that fulfill the criteria listed so far, $1,478$ deals are dropped due to the deal window restriction. Note that, for effective deals, if targets stopped trading before the announcement date, we use the last trading day to calculate the number of trading days between deal announcement and completion. Lastly, we restrict our analysis to deals for which no competing offers were outstanding (i.e., deals for which SDC does not report a competing deal number). The conventional rationale for this is to avoid capturing new deal announcements when calculating returns after an offer for the same target was withdrawn.

Table 1 summarizes the sample construction outlined above, and displays the composition of the final regression sample of unsuccessful deals involving public acquirers and targets (as in Figure 1). Henceforth, we refer to the "regression sample" as the subsample of 287 unsuccessful merger bids comprising balance sheet data up to the level of the acquirer's and target's q ratios, but excluding their Kaplan and Zingales (1997) indices. That is, the samples in our main tables vary only in dependence of whether we consider successful bids (alongside unsuccessful ones), whether we include the KZ indices on the right-hand side of the regression specifications, and/or whether we consider the subsample of pure cash and stock deals, i.e., deals that are financed either with 100% cash or with 100% stock.

[17] This may not even require the bidder to formally withdraw (which is not even feasible in case of a tender offer). The stock offer would just no longer seem attractive to the target, and would simply be rejected.

Variable definitions. In our analysis, we use the following return measures:

$$CAR_{it} = \sum_{j=1}^{t} (r_{ij} - r_{mj}) \tag{1}$$

$$1 + BHR_{it} = \prod_{j=1}^{t} (1 + r_{ij}) \tag{2}$$

$$BHAR_{it} = \prod_{j=1}^{t} (1 + r_{ij}) - \prod_{j=1}^{t} (1 + r_{mj}) \tag{3}$$

where r_{ij} and r_{mj} denote firm i's equity return and the CRSP value-weighted market return at time j, respectively.

For most of our analysis, we focus on the CAR, but our main finding is robust to using buy-and-hold returns, buy-and-hold abnormal returns, and to using industry rather than market returns for the specification of abnormal returns.[18] Note that cumulative abnormal returns can be meaningfully compared across deals with different window lengths as long as the underlying equilibrium asset pricing model is correctly specified. Due to the relatively short time length of our event window (see summary statistics in Table 2a), the misspecification of the asset pricing model to compute "normal" returns is a second-order concern. Thus, the short horizon is a strength for our identification.[19]

Table 1 reveals that the availability of deal premia is an important constraint for the sample construction. In particular, whenever SDC does not report the deal premium (over the target's stock price one month prior to the bid) but the transaction value, we divide the latter by the target's market capitalization one month prior to the bid, and regress SDC premia on the resulting measure based on transaction values to predict out-of-sample premia. Furthermore, as suggested by Officer (2003), we truncate deal premia below 0 and above 200%. Other important variables in our analysis are the firms' q ratios and KZ indices. The former are defined as the market value of equity plus assets minus the book value of equity all over assets. As a measure of financial constraints, we use the four-variable version of the KZ index given in Lamont, Polk, and Saa-Requejo (2001) and Baker, Stein, and Wurgler (2003), namely:

$$KZ_{it} = -1.002\frac{CF_{it}}{A_{i,t-1}} - 39.368\frac{DIV_{it}}{A_{i,t-1}} - 1.315\frac{C_{it}}{A_{i,t-1}} + 3.139LEV_{it} \tag{4}$$

where CF_{it}, DIV_{it}, C_{it}, and LEV_{it} denote cash flows, cash dividends, cash balances, and leverage, respectively, and $A_{i,t-1}$ is the firm's lagged assets.

Summary statistics. The summary statistics are in Tables 2a and 2b. We summarize the characteristics of completed and unsuccessful deals separately for the entire regression sample in Table 2a, and then focus on the subsample of unsuccessful pure cash and stock bids in Table 2b.

[18] Figure 2 also plots the CARs for 100 days pre-announcement and post-failure. The results are robust.

[19] Detailed discussions of the statistical issues with calculating long-run returns are given by Barber and Lyon (1997), Fama (1998), and Brav (2000).

In general, completed and unsuccessful deals are similar along many dimensions. Naturally, they differ (and significantly so at the 1% level) in their time to completion/failure, the proportion of hostile deals and tender offers, and the ratio between the target's and acquirer's market values of equity: deals take longer to be completed than to be withdrawn or rejected, and the targets' market values of equity are higher in unsuccessful than in completed deals. Most importantly, the firms' q ratios and the target's KZ index do not vary significantly between the completed and unsuccessful samples. While unsuccessful bids are more likely to be financed with stock rather than cash, the regression analysis in Table 4 will reveal that this difference can be explained by deal characteristics (most notably the log of the relative deal size).

The pure cash and stock subsamples add up to more than two-thirds of the total regression sample, revealing that the majority of deals do not involve hybrid financing structures. As can be seen in Table 2b, among unsuccessful bids,[20] pure cash deals differ from pure stock ones in that the former are more likely to be hostile (significant at the 1% level), and involve acquirers and targets with lower q ratios (significant at the 1% level). The differences in the q ratios resemble the findings of Rhodes-Kropf, Robinson, and Viswanathan (2005) who, by decomposing pre-announcement market-to-book ratios (also in unsuccessful deals), argue – in line with this paper – that cash targets are more undervalued than stock targets whereas stock acquirers are more overvalued than cash acquirers, and that these differences are primarily due to firm-specific idiosyncratic misvaluations.

Reasons for deal failure. We collect deal synopses as provided in the SDC database, categorize the failure reasons for the subsample of pure cash and stock deals, and report their relative frequencies in Table 3. The first three categories – acquirer withdrawal, target rejection, and mutual consent – summarize the most common reason for deal failure, namely failure to find an agreement. Note that acquirers may decide to withdraw deals due to (anticipated) target rejection, so the classification is not unambiguous/exclusive in these cases. Overall, only two failure reasons are clearly more frequent for cash than for stock deals, namely deals canceled due to target rejection and due to active target defense. We will exclude such deals from our regression sample as a robustness check.

4 Empirical Results

4.1 Medium of Exchange and Deal Failure

Before measuring the impact of cash bids on post-failure returns, we first investigate whether the medium of exchange has explanatory power for deal failure. Note that it is (in theory) not necessarily problematic if the probability of deal failure is different given a cash or a stock offer, i.e., as long as this is unrelated to the target valuation.[21] However, as argued in Section 2.2, different failure probabilities are a cause of concern to the extent that they potentially reflect differential sample selection.

To this end, we estimate a linear probability model for the event that a deal fails as a function of a continuous cash variable, which indicates what fraction of the total payment was offered in

[20] The characteristics of completed pure cash and stock deals can be found in Table A.1.

[21] Consider the following extreme example. Suppose x% of stock deals fail exogenously and y% of cash deals fail exogenously. Then, clearly, our revaluation estimates are unbiased despite the different failure probabilities.

cash. The results are presented in Table 4. Without any controls, cash deals are less likely to be canceled. However, after controlling for the relative deal size, the impact of the medium of exchange on deal failure becomes insignificant. Not surprisingly, hostile deal announcements are also less likely to be successful. In the last specification, we include the target's announcement return, $CAR\,(A-25, A+1)$, which should control for market expectations of deal failure that are based on all other publicly available information at the time of the announcement (but are unavailable to the econometrician).[22] Again, the cash coefficient remains insignificant. Our results are also robust to reducing our sample to the subset of pure cash and stock deals only (cf. Table A.3). Thus, stock deals do not seem to be more likely to be canceled than cash deals. This is an important validity check for our identification procedure.

4.2 Revaluation Estimates

Our main result is presented in Table 5. We regress the target CAR from 25 days before announcement until 25 days after withdrawal, $CAR\,(A-25, W+25)$, on the fraction of cash offered as well as other control variables: bids with higher cash fractions are associated with higher post-failure target CARs compared to their pre-announcement levels.

In the second and third columns – besides the q ratios, the target's market value of equity, and the relative deal size – we control for deal characteristics that are correlated with the medium of exchange and potentially reflect the target's stand-alone value.[23] First, we control for the offer premium (over the target's share price one month prior to the bid). Moreover, we include leveraged buyouts, some of which are management buyouts, as these deals are naturally in cash and involve well-informed bidders. However, due to the seldom occurrence of LBOs in the regression sample, the respective coefficient – although it has the predicted positive sign – is not always precisely estimated. We also control for the disciplinary channel of hostile bids, which are more likely to be in cash (see summary statistics in Table 2b) and turn out to have a positive impact on target revaluation.

Given an average market capitalization of targets in the unsuccessful deal sample of \$1.29bn (cf. Table 2a), our estimates in the second column imply that – all else equal – targets which received 100% cash were revalued by approximately \$177m (in 2010 dollars).

In the fourth column of Table 5, we add the acquirer's KZ index to control for financial constraints. We do so because, for instance, post-announcement news about the target might differentially affect the withdrawal decision of financially constrained acquirers offering cash rather than stock. However, if financial constraints of the acquirer were driving our results, one would expect the interaction of the medium of exchange with the acquirer's KZ index to show up significantly, which is not the case. We also control for the target's KZ index, as its financial constraints might impact its attractiveness to potential buyers, but the respective coefficient is not significant either. Despite a rich variety of deal- and entity-specific controls, only the medium of exchange and the deal premium consistently matter for target CARs. Intuitively, these two variables reflect the value of the target.

[22] The announcement return should approximately be given by the return captured if the deal goes through, i.e., the premium, weighted by the probability of a successful takeover, p, plus the return that results from learning if the deal does not go through, i.e., $CAR_T\,(a) \approx p\cdot\text{Premium} + (1-p)\cdot\text{Learning}(a)$ where $a \in \{cash, stock\}$ denotes the medium of exchange. Since we control for the premium and learning encoded in the choice of the medium of exchange, a, variations in CAR should capture variations in the deal probability.

[23] Further correlates of cash deals are investigated in Table A.2.

When comparing only pure cash and stock deals, we yield the maximum distinction and therefore expect the revaluation effect of cash to be strongest in the respective subsample. This is because the implicit linearity assumption of the revaluation effect (as reflected by the use of the cash fraction variable) is likely inappropriate, and can thus generate additional noise. Consistent with this explanation, we find our results to be stronger in the subsample of pure cash and stock deals (see last two columns of Table 5). We also find that while hostile mergers tend to be in cash, the hostility dummy loses its explanatory power for target revaluation in the subsample of pure cash and stock deals where, instead, the cash effect seems stronger for targets with low q ratios. This can be interpreted as reflecting the idea that the revaluation process is more emphasized for potentially undervalued targets once cash is offered for them.

As alluded to before, our results are robust to using industry-adjusted abnormal returns, buy-and-hold abnormal returns, and buy-and-hold returns. In Table 6, we first show the raw cash effects in the subsample of pure cash and stock deals (cf. first, third, and fifth columns), which match the magnitude encountered in Figure 1. In the remaining columns, we re-run the regression of the fifth column of Table 5: while the estimates for industry-adjusted abnormal returns are closest to those of the previous regression, the main cash effect is significant for all three dependent variables.

4.3 Future Takeover Activity

Our results so far suggest that a cash bid reveals private information of the bidder about the target. It is important to disentangle whether this private information is related to the revaluation of existing target assets, i.e., the stand-alone value, or whether it reveals to the market that the target is a particularly attractive takeover object, e.g., through high synergies with other companies in the sector. In the latter case, our revaluation estimates should be driven by (expected) future takeover activity.

To investigate this, we consider the sample of unsuccessful bids, and run OLS regressions with a dummy variable indicating another merger bid within the next two years (but after a grace period of half a year to avoid capturing bidding wars) as the dependent variable.[24] The results are summarized in Table 7. We find that cash targets are not more likely to receive future merger bids. Targets with high previous market capitalizations and with low q ratios are significantly more likely to become targets in the future, which shows that we have in part controlled for future merger bids in Table 5 by including the respective variables. In order to test directly whether the revaluation effect, i.e., the total return from announcement to failure, captures future merger activity, we also add the target $CAR\,(A-25, W+25)$ in the last specification. We cannot find evidence for this. Once again, our results are also robust to considering the subset of pure cash and stock deals only (cf. Table A.4).

Furthermore, we also replace the dependent variable by the actual takeover premium in future deals, and consider OLS regressions with the same set of control variables as before. The results in Table A.5, and in Table A.6 for the subsample of pure cash and stock deals, demonstrate that cash targets do not receive significantly higher future takeover premia. We therefore conclude that the positive impact of cash offers on post-failure target CARs is not an

[24] Our results are robust to other specifications of the grace period (such as one month, six weeks, or three months).

artifact of future merger activity.

5 Robustness Checks

5.1 Sample Selection

To further address sample selection, we restrict our analysis to deals with failure categories that are not empirically related to the medium of exchange. According to our discussion in Section 2.2, the inclusion of such deals could bias our estimates. In Table 8, we re-run the regressions of the second and third columns of Table 5 for different subsets of pure cash and stock deals, and find that our results are robust to dropping deals that are canceled due to target rejection, active target defense, or both (cf. Table 3). Given that the respective cash coefficients are higher than the previous estimates in Table 5, this may indicate that target rejection and active target defense reflect (value-destructive) managerial entrenchment.

5.2 Other Rationales for the Medium of Exchange

While mispricing is first-order related to the medium of exchange, there exist other rationales for choosing cash or stock (for an overview of theories, see Section 3.2 in Betton, Eckbo, and Thorburn (2008)). We consider one particular alternative. The use of stock might be driven by accounting interests rather than by overvaluation. A very prominent accounting motivation used to be the pooling of interests method (valid until 2001) to avoid the creation and subsequent amortization of goodwill (as required under the purchase method of accounting).[25] As goodwill is increasing in the offer premium, we interact the interaction between the premium and our cash variable with a dummy for the two decades (the 1980s and 1990s) in which paying a high premium in stock might not necessarily have been a sign of overvaluation. Indeed, in the first column of Table 9, we find that the triple interaction is significantly negative, indicating that targets of stock offers involving high premia in the 1980s and 1990s were not as overvalued as the more recent ones in the 2000s. Note that the intercept effect of cash offers on post-failure target CARs becomes larger and remains significant.

5.3 Information Channel

The remaining columns of Table 9 present further robustness checks. It might be insightful to relate our revaluation estimates to channels of private information. To this end, we will incorporate interaction effects with variables that proxy for the availability of insider information such as the existence of an initial stake (toehold), within-industry mergers, or the quality of advice by an investment banking firm. Before discussing the results, it is important to note that the signs of the information proxies and the respective interaction effects are not obvious ex ante. For example, while it seems intuitive that a firm has more likely private information about another firm within the same industry, it is *unclear* whether this effect is still true once we *condition* on the fact that we observe an offer. In fact, if the medium of exchange was a

[25] See Lys and Vincent (1995) for an extreme case – AT&T's acquisition of NCR – of the bidder's interest in having the acquisition qualify as a pooling of interests.

sufficient statistic for private information, any variable that is correlated with the availability of information should not matter in itself or through its interaction with cash. Thus, the selection effect into our sample through the announcement of a merger makes it difficult to relate information to revaluation.

The empirical results in Table 9 confirm the non-triviality of these interaction effects. Our first information proxy is given by the toehold, indicating whether the bidder has an initial stake in the target before launching the bid. It seems natural that a bidder can more likely obtain private information if he already possesses a stake in the company (see also Betton, Eckbo, and Thorburn (2009)). The individual effect of the toehold variable is positive, and the interaction effect with cash is negative at a similar absolute value. These effects are even stronger in the subsample of pure cash and stock deals (cf. Table A.7). Our second information proxy is given by an investment banking dummy variable which indicates whether the bidder was advised by a tier-one investment bank (as a proxy for the quality of due diligence). We define the top 4 investment banks by their total deal volume in our data set: Goldman Sachs, Morgan Stanley, Merrill Lynch, and JPMorgan. The resulting variable does not seem to be related to revaluation effects. Our last information proxy is given by a within-industry (horizontal) merger dummy. This information variable is (weakly) positively related to revaluation through its interaction with the cash variable. To summarize, we cannot establish a clear pattern between information proxies and our revaluation estimates. The previous discussion reveals that these results are not surprising, even if cash drives revaluation through information.

5.4 Disciplining Channel

Lastly, we discuss the possibility that post-failure target CARs reflect performance or other operational improvements as a response to disciplinary bids, i.e., hostile and LBO bids. Mikkelson and Partch (1997) provide evidence of the positive relationship between takeover activity and top management turnover during the hostile merger wave in the 1980s. Thus, a hostile takeover attempt should be interpreted as a warning sign to management. We control for LBOs and hostile bids, which are typically in cash (cf. Table A.2), and both coefficients often show up significantly in Tables 5 and 9. The disciplining channel is distinct from the information channel to the extent that the bid induces managerial changes, i.e., the bid provides information on and incentives for operational improvement, rather than just a revaluation of existing assets. Since hostile bids and cash bids are highly correlated, we can compare these effects best in the subsample of pure cash and stock deals (cf. last two specifications of Table 5, as well as Table 8). Our results indicate that, within this subsample, the revaluation channel dominates the disciplining channel.

One prominent restructuring activity that may be induced by a disciplining bid is recapitalization (as measured by the target's leverage ratio). In Table A.8, we investigate the determinants of post-failure changes in the target's debt on its balance sheet. The estimates reveal that hostile bids and LBOs are associated with higher target leverage (the effects are, however, not precisely estimated). This may be interpreted as evidence that target managers lever up to deter (further) takeover attempts, as described in Hirshleifer and Thakor (1992). Furthermore, targets that are less financially constrained are also somewhat more likely to increase their debt levels. These measures seem to capture changes in the target's debt well, and, indeed, including the target's change in debt on the right-hand side of the regressions explaining post-failure target CARs has no additional explanatory power (the effect is small and insignificant in the

corresponding regressions that are unreported in this paper).

Note that our default regression sample (adopted in the first and third columns of Table A.8) requires the acquirer to be public. The corresponding LBOs are relatively seldom in the sample of unsuccessful bids, and non-public financial sponsors might exhibit characteristics that distinguish them from public ones. As similar concerns hold for all acquirers in general, we re-run previous regression specifications for which the constraints of the regression sample are binding, and drop the sample restrictions (as in the second and fourth columns of Table A.8). The corresponding results for Tables 4, 5, 7, and A.5 can be found in Tables A.9, A.10, A.11, and A.12, respectively, and demonstrate that all our findings – when imposing the regression sample size across all tables – are robust to not dropping the respective observations.

5.5 Relative Importance of the Revaluation Effect

In order to assess the magnitude of the revaluation effect in the context of all mergers, we provide a back-of-the-envelope calculation. Under the identifying assumption that the relationship between deal failure and the target's valuation is independent of the medium of exchange, one can use our main regression estimates in Table 5 to predict changes in the target's market value of equity (by multiplying the target's CAR by its market capitalization). In particular, the revaluation effect corresponds to the *difference* in the changes of the target's market value of equity between pure cash and stock deals. For example, based on the coefficients from the second column in Table 5, that difference amounts to \$134m (in 2010 dollars) in the sample of unsuccessful deals, and reflects the average target revaluation due to information revelation.

Given our identifying assumption, one can also predict the difference in the changes of the target's market value of equity between pure cash and stock deals in the sample of successful deals, which adds back synergies and the split-up of surplus to the pure revaluation effect. Using the coefficients from the second column in Table 5, the respective difference between cash and stock deals turns out to be \$218m (in 2010 dollars). This gives a rough indication of the relative importance of the revaluation effect: in the above calculation, it accounts for more than 60% of the theoretical effect of merger announcements on target valuations in our sample of both completed and failed deals.

6 Conclusion

In this paper, we have presented robust evidence that the medium of exchange used by the bidder in merger transactions provides economically and statistically significant information about the stand-alone value of the target: targets of cash offers trade 15% above pre-announcement levels whereas hardly any information is revealed about the targets of stock offers. The previous literature has primarily focused on the information content of the medium of exchange related to the bidder, and thus ignored this channel. Our analysis has important implications for the quantitative assessment of value creation in merger transactions.

Building on the findings of this paper, an important next step would be the generalization of our results to completed deals. Exploiting exogenous variation in the probability of deal failure in a subsample of our cases, and other sources of identification, it might be possible to build a credible structural model that allows to jointly estimate the endogenous withdrawal selection,

information revelation, and value creation (or destruction) for cash and stock transactions. Such an analysis would deepen our understanding of these important company decisions, and would help quantify the economic benefits of mergers.

References

Andrade, G., M. Mitchell, and E. Stafford (2001): "New Evidence and Perspectives on Mergers," *Journal of Economic Perspectives*, 15(2), 103–120.

Baker, M., J. C. Stein, and J. Wurgler (2003): "When Does The Market Matter? Stock Prices And The Investment Of Equity-Dependent Firms," *The Quarterly Journal of Economics*, 118(3), 969–1005.

Barber, B. M., and J. D. Lyon (1997): "Detecting Long-run Abnormal Stock Returns: The Empirical Power and Specification of Test Statistics," *Journal of Financial Economics*, 43(3), 341–372.

Betton, S., B. E. Eckbo, and K. S. Thorburn (2008): "Corporate Takeovers," in *Handbook of Corporate Finance: Empirical Corporate Finance*, ed. by B. E. Eckbo, vol. 2, chap. 15, pp. 291–430. Elsevier/North-Holland.

——— (2009): "Merger Negotiations and the Toehold Puzzle," *Journal of Financial Economics*, 91(2), 158–178.

Bhagat, S., M. Dong, D. Hirshleifer, and R. Noah (2005): "Do Tender Offers Create Value? New Methods and Evidence," *Journal of Financial Economics*, 76(1), 3–60.

Bhagat, S., A. Shleifer, R. W. Vishny, G. Jarrel, and L. Summers (1990): "Hostile Takeovers in the 1980s: The Return to Corporate Specialization," *Brookings Papers on Economic Activity. Microeconomics*, 1990, 1–84.

Bradley, M., A. Desai, and E. H. Kim (1983): "The Rationale behind Interfirm Tender Offers: Information or Synergy?," *Journal of Financial Economics*, 11(1-4), 183–206.

——— (1988): "Synergistic Gains from Corporate Acquisitions and their Division between the Stockholders of Target and Acquiring Firms," *Journal of Financial Economics*, 21(1), 3–40.

Brav, A. (2000): "Inference in Long-Horizon Event Studies: A Bayesian Approach with Application to Initial Public Offerings," *Journal of Finance*, 55(5), 1979–2016.

Davidson, Wallace N, I., D. Dutia, and L. Cheng (1989): "A Re-examination of the Market Reaction to Failed Mergers," *Journal of Finance*, 44(4), 1077–1083.

Dodd, P. (1980): "Merger Proposals, Management Discretion, and Stockholder Wealth," *Journal of Financial Economics*, 8(2), 105–137.

Eckbo, B. E., R. M. Giammarino, and R. L. Heinkel (1990): "Asymmetric Information and the Medium of Exchange in Takeovers: Theory and Tests," *Review of Financial Studies*, 3(4), 651–675.

Fama, E. F. (1998): "Market Efficiency, Long-term Returns, and Behavioral Finance," *Journal of Financial Economics*, 49(3), 283–306.

Fishman, M. J. (1989): "Preemptive Bidding and the Role of the Medium of Exchange in Acquisitions," *Journal of Finance*, 44(1), 41–57.

Franks, J., and C. Mayer (1996): "Hostile Takeovers and the Correction of Managerial Failure," *Journal of Financial Economics*, 40(1), 163–181.

Friedman, J. (2006): "Stock Market Driven Acquisitions: Theory and Evidence," Mimeo, Harvard University.

Grossman, S. J., and O. D. Hart (1980): "Takeover Bids, The Free-Rider Problem, and the Theory of the Corporation," *The Bell Journal of Economics*, 11(1), 42–64.

Hansen, R. G. (1987): "A Theory for the Choice of Exchange Medium in Mergers and Acquisitions," *Journal of Business*, 60(1), 75–95.

Hirshleifer, D., and A. V. Thakor (1992): "Managerial Conservatism, Project Choice, and Debt," *Review of Financial Studies*, 5(3), 437–470.

Hirshleifer, D., and S. Titman (1990): "Share Tendering Strategies and the Success of Hostile Takeover Bids," *Journal of Political Economy*, 98(2), 295–324.

Huang, Y.-S., and R. A. Walkling (1987): "Target Abnormal Returns Associated with Acquisition Announcements: Payment, Acquisition Form, and Managerial Resistance," *Journal of Financial Economics*, 19(2), 329–349.

Jarrell, G. A., J. A. Brickley, and J. M. Netter (1988): "The Market for Corporate Control: The Empirical Evidence Since 1980," *Journal of Economic Perspectives*, 2(1), 49–68.

Jensen, M. C., and R. S. Ruback (1983): "The Market for Corporate Control : The Scientific Evidence," *Journal of Financial Economics*, 11(1-4), 5–50.

Jovanovic, B., and S. Braguinsky (2004): "Bidder Discounts and Target Premia in Takeovers," *American Economic Review*, 94(1), 46–56.

Jovanovic, B., and P. L. Rousseau (2002): "The Q-Theory of Mergers," *American Economic Review*, 92(2), 198–204.

Kaplan, S. N., and L. Zingales (1997): "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?," *The Quarterly Journal of Economics*, 112(1), 169–215.

Lambrecht, B. M., and S. C. Myers (2007): "A Theory of Takeovers and Disinvestment," *Journal of Finance*, 62(2), 809–845.

Lamont, O., C. Polk, and J. Saa-Requejo (2001): "Financial Constraints and Stock Returns," *Review of Financial Studies*, 14(2), 529–554.

Loughran, T., and A. M. Vijh (1997): "Do Long-Term Shareholders Benefit from Corporate Acquisitions?," *Journal of Finance*, 52(5), 1765–1790.

Lys, T., and L. Vincent (1995): "An Analysis of Value Destruction in AT&T's Acquisition of NCR," *Journal of Financial Economics*, 39(2-3), 353–378.

Malmendier, U., E. Moretti, and F. Peters (2010): "Winning by Losing: Evidence on Overbidding in Mergers," Mimeo, University of California, Berkeley.

Malmendier, U., and G. Tate (2008): "Who Makes Acquisitions? CEO Overconfidence and the Market's Reaction," *Journal of Financial Economics*, 89(1), 20–43.

Mikkelson, W. H., and M. M. Partch (1997): "The Decline of Takeovers and Disciplinary Managerial Turnover," *Journal of Financial Economics*, 44(2), 205–228.

Moeller, S. B., F. P. Schlingemann, and R. M. Stulz (2005): "Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave," *Journal of Finance*, 60(2), 757–782.

Myers, S. C., and N. S. Majluf (1984): "Corporate Financing and Investment Decisions when Firms Have Information that Investors Do Not Have," *Journal of Financial Economics*, 13(2), 187–221.

Officer, M. S. (2003): "Termination Fees in Mergers and Acquisitions," *Journal of Financial Economics*, 69(3), 431–467.

Rau, P. R., and T. Vermaelen (1998): "Glamour, Value and the Post-Acquisition Performance of Acquiring Firms," *Journal of Financial Economics*, 49(2), 223–253.

Rhodes-Kropf, M., D. T. Robinson, and S. Viswanathan (2005): "Valuation Waves and Merger Activity: The Empirical Evidence," *Journal of Financial Economics*, 77(3), 561–603.

Rhodes-Kropf, M., and S. Viswanathan (2004): "Market Valuation and Merger Waves," *Journal of Finance*, 59(6), 2685–2718.

Roll, R. (1986): "The Hubris Hypothesis of Corporate Takeovers," *Journal of Business*, 59(2), 197–216.

Savor, P. G., and Q. Lu (2009): "Do Stock Mergers Create Value for Acquirers?," *Journal of Finance*, 64(3), 1061–1097.

Shleifer, A., and R. W. Vishny (1986): "Large Shareholders and Corporate Control," *Journal of Political Economy*, 94(3), 461–488.

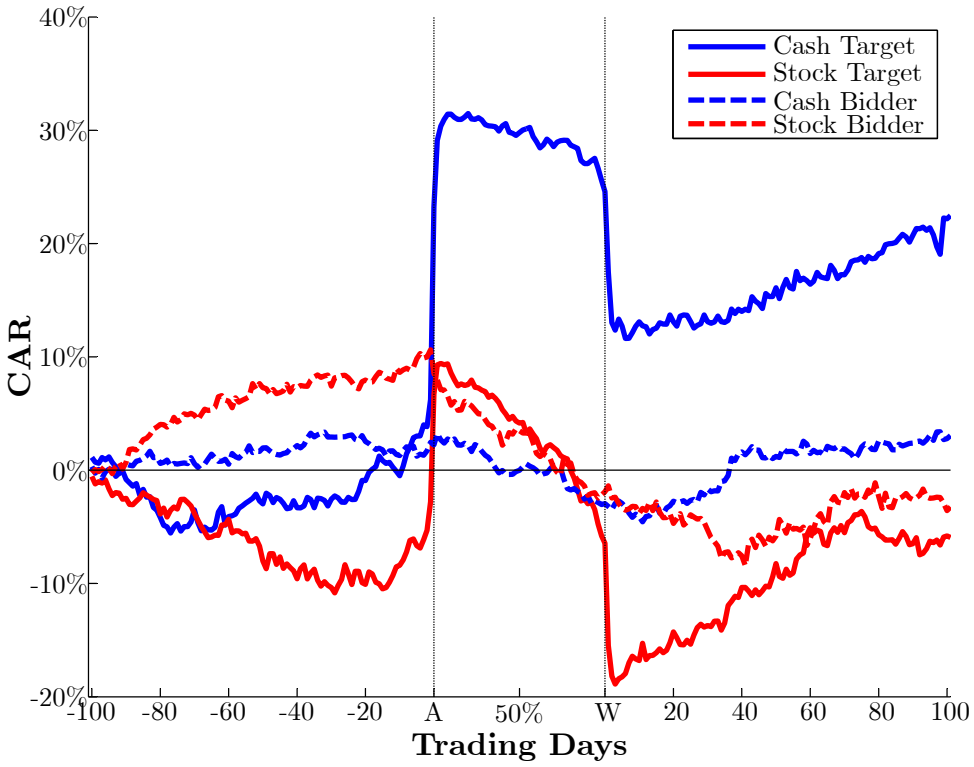
Shleifer, A., and R. W. Vishny (2003): "Stock Market Driven Acquisitions," *Journal of Financial Economics*, 70(3), 295–311.

Sullivan, M. J., M. R. H. Jensen, and C. D. Hudson (1994): "The Role of Medium of Exchange in Merger Offers: Examination of Terminated Merger Proposals," *Financial Management*, 23(3), pp. 51–62.

Travlos, N. G. (1987): "Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock Returns," *Journal of Finance*, 42(4), 943–963.

7 Figures

Figure 2: Deal Announcement and Failure Effects



Notes: Cumulative Abnormal Returns (CARs) from 100 trading days pre-announcement to 100 trading days post-failure. The sample consists of 78 cash and 96 stock deals. See Table 1 for the construction of the sample; note that there are fewer than 208 deals fulfilling the stock market data availability requirement for 100 rather than 25 trading days.

8 Tables

Table 1: Sample Construction (Merger Bids in 1980-2008)

Criterion	# Deals	
Availability of any CRSP data for target	14,552	
Availability of valid deal dates	12,846	
Deal window of 5 to 250 trading days (between announcement and completion/failure)	11,368	
No competing offers	10,285	
	of which	
	completed	unsuccessful
	7,071	3,214
Subsamples		
Unsuccessful bids	3,214	
Availability of major deal characteristics (premium, medium of exchange, etc.)	1,212	
Availability of stock data for target (at least 25 days before announcement and 25 days after deal failure)	1,067	
Availability of stock data for acquirer (at least 25 days before announcement and 25 days after deal failure)	385	
Regression sample (including target's and acquirer's q ratios, but not their KZ indices)	287	
	of which	
Unsuccessful pure cash and stock bids	208	
Regression sample (including KZ indices)	252	
	of which	
Unsuccessful pure cash and stock bids	183	

Notes: The availability of valid deal dates requires that announcement and failure/completion dates are not missing and consistent, e.g., completion not prior to announcement of original bid.

Table 2a: Summary Statistics – All Deals

	Completed deals				Unsuccessful deals				
Variable	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max	p-value
Cash in %	48.76	45.89	0	100	38.97	45.74	0	100	0.002
Stock in %	44.47	45.65	0	100	51.61	46.53	0	100	0.020
Other payment in %	6.77	17.23	0	100	9.42	25.29	0	100	0.043
Time to completion/failure	75.85	43.82	5	245	64.34	50.76	5	238	0.000
LBO in %	0.12	3.41	0	100	0.79	8.89	0	100	0.028
Premium (to 1 month prior) in %	46.71	38.35	0	200	44.67	39.68	0	200	0.516
Hostile deal in %	1.86	13.53	0	100	15.48	36.24	0	100	0.000
Tender offer in %	26.17	43.97	0	100	10.71	30.99	0	100	0.000
Transaction value in 2010 $bn	1.39	4.13	0.00	70.51	1.61	6.83	0.00	77.04	0.495
Relative deal size	1.11	17.04	0.00	682.90	2.16	15.28	0.00	240.44	0.362
% of target sought	95.27	16.98	1.80	100	93.82	15.97	15.80	100	0.224
New deal announced within 2 years in %	n/a	n/a	n/a	n/a	23.19	42.31	0	100	n/a
Experienced acquirer in %	82.05	38.39	0	100	69.44	46.16	0	100	0.000
Target MVE in 2010 $bn	0.88	2.78	0.00	65.16	1.29	5.45	0.00	56.04	0.068
q of acquirer	2.50	2.39	0.51	15.20	2.27	2.36	0.51	15.20	0.170
q of target	2.06	1.71	0.50	9.91	1.92	1.74	0.50	9.91	0.219
q of acquirer $>$ q of target in %	62.30	48.48	0	100	57.54	49.53	0	100	0.169
KZ index of acquirer	-0.09	1.47	-10.46	3.73	0.12	1.47	-5.94	3.73	0.034
KZ index of target	0.10	1.68	-10.05	5.22	0.21	1.56	-10.73	4.28	0.435
Same industry (1 digit SIC) in %	74.30	43.71	0	100	70.24	45.81	0	100	0.138
Same industry (2 digits SIC) in %	60.26	48.95	0	100	51.59	50.07	0	100	0.008
N	1,716				252				

Notes (Tables 2a and 2b): Time to completion/failure is in trading days. The historical transaction value was converted using Consumer Price Index (CPI) Conversion Factors. Relative deal size is the transaction value over market value of equity of the acquirer. New deal announced within 2 years is conditional on the deal being announced at least half a year after the previous one. Experienced acquirers appear at least five times in the data set. MVE stands for market value of equity. KZ index is the four-variable version in Lamont, Polk, and Saa-Requejo (2001). All non-deal-related variables (e.g., q ratios) are measured at the end of the year prior to the deal's announcement. Premia are truncated between 0 and 2, and all q and KZ variables are winsorized at the 1st and 99th percentiles. The sample is restricted to deals that include all variables used in any of the specifications in Tables 4-9, except for New deal announced within 2 years (207 observations in the unsuccessful deal sample of which 55 are pure cash and 96 are pure stock deals).

Table 2b: Summary Statistics – Unsuccessful Bids

	Cash deals				Stock deals				
Variable	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max	p-value
Time to failure	58.46	45.27	5	178	58.47	46.95	5	232	0.998
LBO in %	2.53	15.81	0	100	0	0	0	0	0.104
Premium (to 1 month prior) in %	51.57	38.12	0	200	42.26	40.69	0	200	0.117
Hostile deal in %	25.32	43.76	0	100	3.85	19.32	0	100	0.000
Tender offer in %	22.78	42.21	0	100	0.96	9.81	0	100	0.000
Transaction value in 2010 $bn	0.63	1.41	0.00	8.93	1.36	5.73	0.01	55.64	0.267
Relative deal size	1.22	2.53	0.00	11.77	0.79	1.11	0.01	8.49	0.123
% of target sought	93.25	14.08	20.00	100	94.06	17.27	19.10	100	0.734
New deal announced within 2 years in %	25.45	43.96	0	100	19.79	40.05	0	100	0.421
Experienced acquirer in %	65.82	47.73	0	100	72.12	45.06	0	100	0.363
Target MVE in 2010 $bn	0.47	0.96	0.00	6.42	1.38	5.71	0.00	56.04	0.163
q of acquirer	1.73	1.62	0.51	13.72	2.77	2.86	0.58	15.20	0.004
q of target	1.46	1.25	0.50	9.91	2.46	2.11	0.50	9.91	0.000
q of acquirer $>$ q of target in %	62.03	48.84	0	100	53.85	50.09	0	100	0.270
KZ index of acquirer	0.14	1.53	-5.94	3.41	0.08	1.37	-4.30	3.73	0.778
KZ index of target	0.23	1.04	-2.29	2.90	-0.10	1.91	-10.73	4.28	0.161
Same industry (1 digit SIC) in %	74.68	43.76	0	100	71.15	45.52	0	100	0.598
Same industry (2 digits SIC) in %	45.57	50.12	0	100	54.81	50.01	0	100	0.218
N	79				104				

Table 3: Synopses of Unsuccessful Bids

Failure reason	Cash deals	Stock deals	p-value
Acquirer withdrawal	46.81%	58.77%	0.086
Target rejection	21.28%	7.89%	0.005
Mutual consent	5.32%	11.40%	0.122
$\sum$	73.40%	78.07%	0.436
Target defense	9.57%	1.75%	0.012
Financing & other closing problems	2.13%	1.75%	0.846
Regulatory & other exogenous reasons	13.83%	15.79%	0.695
(Stock) market conditions	1.06%	2.63%	0.415
N	94	114	

Notes: The sample is restricted to pure cash and stock deals as in the fifth column of Table 5. Acquirer withdrawals comprise the subset of deals that are withdrawn by the acquirer without any mention of the target in the deal synopsis. Similarly, target rejections comprise the subset of bids that are rejected by the target's board and/or shareholders (this includes cases where insufficient shares are tendered). We classify deals as canceled by mutual consent if the deal synopsis explicitly states this (as opposed to deals canceled primarily due to one party's concerns). Deals canceled due to target defense include, most notably, the adoption of a shareholder rights plan and other active defense mechanisms. By Financing & other closing problems we denote practical reasons for deal failure, e.g., shortcomings in financing commitments, lacking due diligence and customary closing conditions, etc. Regulatory & other exogenous reasons include deals that were subject to regulatory approval and sudden cancelations triggered by events such as acquisition of the bidder (which naturally leads to a withdrawal of the bidder's offer). The last category comprises the subset of deals that are canceled due to shifting market conditions (typically stock market plunges).

Table 4: Determinants of Deal Failure (All Deals)

	Deal failure				
Cash $\in [0,1]$	-0.041***	-0.010	-0.002	-0.025	-0.017
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Log(relative deal size)		0.032***	0.028***	0.022***	0.024***
		(0.00)	(0.00)	(0.00)	(0.00)
Premium to 1 month prior				-0.018	0.051*
				(0.02)	(0.03)
Hostile				0.410***	0.370***
				(0.06)	(0.06)
LBO					0.279
					(0.27)
Log(target MVE)					-0.015***
					(0.01)
% of target sought					-0.001
					(0.00)
q of acquirer					0.006
					(0.00)
q of target					0.004
					(0.01)
KZ index of acquirer					0.004
					(0.01)
KZ index of target					-0.000
					(0.00)
Experienced acquirer					-0.032
					(0.02)
Target CAR (A-25, A+1)					-0.143***
					(0.04)
Industry & year FE	N	N	Y	Y	Y
N	2,213	2,213	2,207	2,207	1,972

Notes: OLS regressions with a dummy variable for deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. An acquirer is experienced if the firm appears at least five times in the data set. Target CAR is measured on the [-25, 1] window around deal announcement. All non-deal-related independent variables are measured at the end of the year prior to the deal's announcement. Robust standard errors are in parentheses.

Table 5: Target Returns (Unsuccessful Bids)

	Target CAR (A-25, W+25)					
Cash	0.269***	0.137**	0.392**	0.299*	0.508***	0.338*
	(0.07)	(0.07)	(0.16)	(0.16)	(0.19)	(0.19)
LBO		0.480*	0.504*	0.549	0.646*	0.660
		(0.25)	(0.27)	(0.41)	(0.35)	(0.44)
Premium to 1 month prior		0.383***	0.449***	0.408***	0.406***	0.294**
		(0.11)	(0.10)	(0.12)	(0.11)	(0.12)
Premium × Cash			-0.263	-0.192	-0.266	-0.135
			(0.28)	(0.27)	(0.27)	(0.26)
Hostile		0.156***	0.138**	0.126*	0.054	0.004
		(0.06)	(0.06)	(0.07)	(0.10)	(0.12)
Log(target MVE)			-0.003	0.000	-0.028	-0.022
			(0.02)	(0.02)	(0.02)	(0.03)
Log(relative deal size)			0.018	0.017	0.011	0.004
			(0.02)	(0.02)	(0.02)	(0.03)
q of acquirer			0.018	0.013	0.020	0.026
			(0.02)	(0.03)	(0.02)	(0.04)
q of target		-0.018	-0.016	-0.015	0.013	0.009
		(0.02)	(0.03)	(0.04)	(0.03)	(0.03)
q of target × Cash			-0.059	-0.042	-0.080*	-0.046
			(0.04)	(0.04)	(0.05)	(0.05)
KZ index of acquirer				-0.030		-0.026
				(0.04)		(0.04)
KZ index of acquirer × Cash				0.007		0.028
				(0.05)		(0.06)
KZ index of target				0.023		0.050
				(0.03)		(0.03)
Industry & year FE	Y	Y	Y	Y	Y	Y
Deal sample	All	All	All	All	Pure C/S	Pure C/S
N	287	287	287	252	208	183

Notes: OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. Cash is expressed as a fraction of the total payment (and hence equal to a dummy for cash in the sample of pure cash and stock deals in the last two columns). MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table 6: Target Returns (Unsuccessful Pure Cash & Stock Bids) – Alternative Return Specifications

	Ind. CAR (A-25, W+25)		BHAR (A-25, W+25)		BHR (A-25, W+25)	
Cash $\in \{0, 1\}$	0.207***	0.517***	0.230***	0.250*	0.239***	0.281*
	(0.07)	(0.18)	(0.07)	(0.15)	(0.07)	(0.15)
LBO		0.540		0.760*		0.744**
		(0.36)		(0.39)		(0.37)
Premium to 1 month prior		0.428***		0.085		0.136
		(0.10)		(0.14)		(0.14)
Premium × Cash		-0.325		0.112		0.057
		(0.25)		(0.23)		(0.24)
Hostile		0.030		0.193*		0.218**
		(0.10)		(0.10)		(0.10)
Log(target MVE)		-0.028		0.007		0.013
		(0.02)		(0.02)		(0.02)
Log(relative deal size)		0.013		0.001		-0.001
		(0.02)		(0.02)		(0.02)
q of acquirer		0.023		-0.022		-0.023
		(0.02)		(0.02)		(0.02)
q of target		0.016		0.043		0.038
		(0.03)		(0.03)		(0.03)
q of target × Cash		-0.072		-0.092*		-0.091**
		(0.05)		(0.05)		(0.05)
Industry & year FE	N	Y	N	Y	N	Y
N	208	208	208	208	208	208

Notes: OLS regressions with industry-adjusted target CAR (first two columns), buy-and-hold abnormal return (third and fourth columns), and buy-and-hold return (last two columns) from 25 days before announcement to 25 days after deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table 7: Future Takeover Attempts (Unsuccessful Bids)

	New deal announced 2 years after failure				
Cash $\in [0,1]$	0.081	0.060	0.079	0.056	0.066
	(0.06)	(0.07)	(0.08)	(0.08)	(0.08)
Premium to 1 month prior			-0.014	-0.017	-0.027
			(0.07)	(0.07)	(0.08)
Hostile			-0.061	-0.016	-0.038
			(0.10)	(0.11)	(0.11)
Log(target MVE)			0.035**	0.032*	0.024
			(0.02)	(0.02)	(0.02)
q of target			-0.036**	-0.032**	-0.031**
			(0.01)	(0.02)	(0.02)
KZ index of target				0.009	0.010
				(0.02)	(0.02)
Target CAR (A-25, W+25)					-0.039
					(0.05)
Industry & year FE	N	Y	Y	Y	Y
N	243	243	243	227	220

Notes: OLS regressions with a dummy variable indicating another merger bid within the next two years as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table 8: Target Returns (Unsuccessful Pure Cash & Stock Bids) – No Target Defense and/or Rejection

	Target CAR (A-25, W+25)					
Cash $\in \{0, 1\}$	0.249**	0.233**	0.255**	0.658***	0.545***	0.711***
	(0.10)	(0.09)	(0.10)	(0.20)	(0.19)	(0.20)
LBO	0.548	1.110***	1.404***	0.617	1.214***	1.605***
	(0.48)	(0.32)	(0.33)	(0.53)	(0.32)	(0.34)
Premium to 1 month prior	0.333**	0.313**	0.314**	0.414***	0.388***	0.404***
	(0.14)	(0.13)	(0.14)	(0.10)	(0.11)	(0.11)
Hostile	0.081	0.080	0.149	0.130	0.059	0.149
	(0.12)	(0.11)	(0.14)	(0.13)	(0.11)	(0.15)
q of target	-0.012	0.001	-0.010	0.007	0.014	0.008
	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Premium × Cash				-0.335	-0.294	-0.368
				(0.28)	(0.27)	(0.27)
Log(target MVE)				-0.045**	-0.033	-0.053**
				(0.02)	(0.02)	(0.02)
Log(relative deal size)				0.010	0.025	0.030
				(0.03)	(0.02)	(0.03)
q of acquirer				0.027	0.021	0.029
				(0.02)	(0.02)	(0.02)
q of target × Cash				-0.138**	-0.084*	-0.148**
				(0.05)	(0.05)	(0.06)
Industry & year FE	Y	Y	Y	Y	Y	Y
Deal sample	(I)	(II)	(III)	(I)	(II)	(III)
N	179	197	168	179	197	168

Notes: OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. Deal samples are as follows: (I) no target rejection; (II) no target defense; (III) no target rejection or defense. MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table 9: Target Returns (Unsuccessful Bids) – Robustness Checks

	Target CAR (A-25, W+25)				
Cash $\in [0,1]$	0.417***	0.442**	0.372**	0.298*	0.379**
	(0.15)	(0.17)	(0.16)	(0.15)	(0.17)
LBO	0.503**	0.529**	0.516*	0.514*	0.528**
	(0.25)	(0.26)	(0.26)	(0.29)	(0.26)
Premium to 1 month prior	0.465***	0.442***	0.442***	0.442***	0.449***
	(0.11)	(0.10)	(0.10)	(0.10)	(0.11)
Premium × Cash	0.117	-0.278	-0.245	-0.251	0.101
	(0.23)	(0.28)	(0.28)	(0.27)	(0.24)
Hostile	0.134**	0.120*	0.129**	0.112*	0.102
	(0.06)	(0.06)	(0.06)	(0.06)	(0.07)
Log(target MVE)	0.010	-0.004	-0.004	-0.001	0.011
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Log(relative deal size)	0.008	0.020	0.018	0.020	0.012
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
q of acquirer	0.016	0.021	0.020	0.019	0.020
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
q of target	-0.011	-0.014	-0.017	-0.017	-0.012
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
q of target × Cash	-0.067*	-0.062	-0.064	-0.064	-0.073*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
1980s & 1990s × Premium × Cash	-0.630**				-0.596**
	(0.25)				(0.25)
Toehold		0.151*			0.124
		(0.08)			(0.08)
Toehold × Cash		-0.170			-0.140
		(0.12)			(0.12)
Tier-one IB			-0.051		-0.050
			(0.13)		(0.13)
Tier-one IB × Cash			0.193		0.094
			(0.16)		(0.18)
Same industry (2 digits SIC)				-0.091	-0.075
				(0.08)	(0.08)
Same industry × Cash				0.193*	0.131
				(0.12)	(0.11)
Industry & year FE	Y	Y	Y	Y	Y
N	287	287	287	287	287

Notes: OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is the transaction value over the market value of equity of the acquirer. Toehold is an indicator equal to one if the acquirer owned a share of the target before announcement, and Tier-one IB indicates whether the acquirer was advised by Goldman Sachs, Morgan Stanley, Merrill Lynch, or JPMorgan. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

A Appendix Tables

Table A.1: Summary Statistics (Completed Deals)

	Cash deals				Stock deals				
Variable	Mean	Std. dev.	Min	Max	Mean	Std. dev.	Min	Max	p-value
Time to completion	58.34	37.52	5	230	83.32	38.64	16	239	0.000
LBO in %	0.31	5.55	0	100	0	0	0	0	0.188
Premium (to 1 month prior) in %	46.73	35.14	0	200	48.74	42.97	0	200	0.373
Hostile deal in %	2.77	16.43	0	100	0.89	9.39	0	100	0.016
Tender offer in %	50.23	50.04	0	100	3.91	19.39	0	100	0.000
Transaction value in 2010 $bn	0.70	1.51	0.00	17.40	1.47	5.37	0.00	70.51	0.001
Relative deal size	0.70	6.06	0.00	137.03	0.58	3.39	0.00	79.38	0.662
% of target sought	91.96	22.29	1.80	100	96.38	14.70	7.70	100	0.000
New deal announced within 2 years in %	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Experienced acquirer in %	83.05	37.55	0	100	78.86	40.86	0	100	0.063
Target MVE in 2010 $bn	0.53	1.13	0.00	11.40	0.97	3.78	0.00	65.16	0.005
q of acquirer	2.09	1.69	0.51	15.20	3.41	3.29	0.51	15.20	0.000
q of target	1.85	1.38	0.50	9.91	2.62	2.27	0.50	9.91	0.000
q of acquirer $>$ q of target in %	60.09	49.01	0	100	64.48	47.90	0	100	0.117
KZ index of acquirer	-0.14	1.29	-6.03	3.73	-0.41	1.69	-10.46	3.01	0.002
KZ index of target	-0.04	1.57	-10.05	5.22	-0.28	1.89	-9.57	4.70	0.016
Same industry (1 digit SIC) in %	69.65	46.01	0	100	75.13	43.26	0	100	0.034
Same industry (2 digits SIC) in %	53.31	49.93	0	100	63.41	48.21	0	100	0.000
N	649				563				

Notes: Time to completion is in trading days. The historical transaction value was converted using Consumer Price Index (CPI) Conversion Factors. Relative deal size is the transaction value over market value of equity of the acquirer. New deal announced within 2 years is conditional on the deal being announced at least half a year after the previous one. Experienced acquirers appear at least five times in the data set. MVE stands for market value of equity. KZ index is the four-variable version in Lamont, Polk, and Saa-Requejo (2001). All non-deal-related variables (e.g., q ratios) are measured at the end of the year prior to the deal's announcement. Premia are truncated between 0 and 2, and all q and KZ variables are winsorized at the 1st and 99th percentiles. The sample is restricted to deals that include all variables used in any of the specifications in Tables 4-9, except for New deal announced within 2 years (207 observations in the unsuccessful deal sample).

Table A.2: Determinants of Cash Offers (All Deals)

	Cash $\in [0,1]$			Cash $\in \{0,1\}$		
Log(relative deal size)	-0.054***	-0.063***	-0.063***	-0.066***	-0.072***	-0.076***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
% of target sought	-0.002***	-0.001**	-0.002**	-0.002***	-0.001*	-0.001**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Experienced acquirer	-0.012	-0.021	-0.022	-0.016	-0.017	-0.029
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
Log(target MVE)		0.006	0.004		0.007	0.002
		(0.01)	(0.01)		(0.01)	(0.01)
q of acquirer		-0.029***	-0.031***		-0.029***	-0.028***
		(0.00)	(0.00)		(0.00)	(0.01)
q of target		-0.031***	-0.033***		-0.037***	-0.037***
		(0.01)	(0.01)		(0.01)	(0.01)
LBO			0.358***			0.310***
			(0.09)			(0.10)
Premium to 1 month prior			0.053**			0.039
			(0.03)			(0.03)
Hostile			0.219***			0.323***
			(0.05)			(0.06)
KZ index of acquirer			-0.001			0.001
			(0.01)			(0.01)
KZ index of target			-0.016***			-0.011
			(0.01)			(0.01)
Industry & year FE	Y	Y	Y	Y	Y	Y
Deal sample	All	All	All	Pure C/S	Pure C/S	Pure C/S
N	2,207	2,207	1,972	1,577	1,577	1,429

Notes: OLS regressions include acquirer and target industry controls. Cash is expressed as a fraction of the total payment (and hence equal to a dummy for cash in the sample of pure cash and stock deals in the last three columns). MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. An acquirer is experienced if the firm appears at least five times in the data set. All non-deal-related independent variables are measured at the end of the year prior to the deal's announcement. Robust standard errors are in parentheses.

Table A.3: Determinants of Deal Failure (All Pure Cash & Stock Bids)

	Deal failure				
Cash $\in \{0, 1\}$	-0.030*	0.004	0.013	-0.013	-0.012
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Log(relative deal size)		0.037***	0.031***	0.025***	0.027***
		(0.00)	(0.00)	(0.00)	(0.01)
Premium to 1 month prior				-0.001	0.038
				(0.02)	(0.04)
Hostile				0.392***	0.332***
				(0.07)	(0.07)
LBO					0.316
					(0.27)
Log(target MVE)					-0.016**
					(0.01)
% of target sought					-0.000
					(0.00)
q of acquirer					0.003
					(0.00)
q of target					0.005
					(0.01)
KZ index of acquirer					0.010
					(0.01)
KZ index of target					0.001
					(0.01)
Experienced acquirer					-0.015
					(0.03)
Target CAR (A-25, A+1)					-0.082*
					(0.05)
Industry & year FE	N	N	Y	Y	Y
N	1,580	1,580	1,577	1,577	1,429

Notes: OLS regressions with a dummy variable for deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. An acquirer is experienced if the firm appears at least five times in the data set. Target CAR is measured on the [-25, 1] window around deal announcement. All non-deal-related independent variables are measured at the end of the year prior to the deal's announcement. Robust standard errors are in parentheses.

Table A.4: Future Takeover Attempts (Unsuccessful Pure Cash & Stock Bids)

	New deal announced 2 years after failure				
Cash $\in \{0, 1\}$	0.065	0.038	0.031	0.005	0.036
	(0.07)	(0.08)	(0.09)	(0.09)	(0.10)
Premium to 1 month prior			-0.042	-0.037	-0.030
			(0.09)	(0.10)	(0.10)
Hostile			0.021	0.113	0.066
			(0.15)	(0.17)	(0.18)
Log(target MVE)			0.027	0.028	0.017
			(0.02)	(0.02)	(0.02)
q of target			-0.037*	-0.039	-0.033
			(0.02)	(0.02)	(0.03)
KZ index of target				-0.000	0.000
				(0.03)	(0.03)
Target CAR (A-25, W+25)					-0.081
					(0.07)
Industry & year FE	N	Y	Y	Y	Y
N	175	175	175	164	159

Notes: OLS regressions with a dummy variable indicating another merger bid within the next two years as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.5: Future Takeover Premia (Unsuccessful Bids)

	New offer premium 2 years after failure				
Cash $\in [0,1]$	0.029	0.033	0.017	0.010	0.013
	(0.03)	(0.03)	(0.04)	(0.05)	(0.05)
Premium to 1 month prior			0.054	0.065	0.058
			(0.06)	(0.07)	(0.07)
Hostile			0.013	0.011	-0.007
			(0.04)	(0.04)	(0.04)
Log(target MVE)			0.010	0.009	0.005
			(0.01)	(0.01)	(0.01)
q of target			-0.016***	-0.016**	-0.015**
			(0.01)	(0.01)	(0.01)
KZ index of target				-0.008	-0.008
				(0.01)	(0.01)
Target CAR (A-25, W+25)					0.001
					(0.02)
Industry & year FE	N	Y	Y	Y	Y
N	236	236	236	220	213

Notes: OLS regressions with future offer premium (to 1 month prior) in case of another merger bid within the next two years (and zero otherwise) as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.6: Future Takeover Premia (Unsuccessful Pure Cash & Stock Bids)

	New offer premium 2 years after failure				
Cash $\in \{0, 1\}$	0.032	0.037	0.008	0.006	0.015
	(0.04)	(0.04)	(0.05)	(0.06)	(0.07)
Premium to 1 month prior			0.067	0.085	0.082
			(0.08)	(0.09)	(0.09)
Hostile			0.046	0.048	0.010
			(0.06)	(0.07)	(0.07)
Log(target MVE)			0.010	0.008	0.004
			(0.01)	(0.01)	(0.01)
q of target			-0.018**	-0.022**	-0.018
			(0.01)	(0.01)	(0.01)
KZ index of target				-0.018	-0.019
				(0.01)	(0.01)
Target CAR (A-25, W+25)					0.014
					(0.04)
Industry & year FE	N	Y	Y	Y	Y
N	170	170	170	159	154

Notes: OLS regressions with future offer premium (to 1 month prior) in case of another merger bid within the next two years (and zero otherwise) as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.7: Target Returns (Unsuccessful Pure Cash & Stock Bids) – Robustness Checks

	Target CAR (A-25, W+25)				
Cash $\in \{0, 1\}$	0.524***	0.541***	0.492***	0.373**	0.464**
	(0.17)	(0.20)	(0.19)	(0.19)	(0.19)
LBO	0.600*	0.697*	0.670*	0.632*	0.629*
	(0.32)	(0.36)	(0.35)	(0.37)	(0.32)
Premium to 1 month prior	0.443***	0.394***	0.396***	0.383***	0.402***
	(0.11)	(0.11)	(0.11)	(0.10)	(0.11)
Premium × Cash	0.196	-0.256	-0.243	-0.242	0.211
	(0.26)	(0.28)	(0.27)	(0.26)	(0.27)
Hostile	0.082	0.039	0.030	0.043	0.064
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
Log(target MVE)	-0.010	-0.031	-0.032	-0.028	-0.015
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Log(relative deal size)	-0.010	0.012	0.013	0.013	-0.006
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
q of acquirer	0.018	0.024	0.023	0.023	0.026
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
q of target	0.015	0.014	0.013	0.011	0.014
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
q of target × Cash	-0.089*	-0.083*	-0.089**	-0.075*	-0.086*
	(0.05)	(0.05)	(0.04)	(0.04)	(0.04)
1980s & 1990s × Premium × Cash	-0.783***				-0.762***
	(0.27)				(0.28)
Toehold		0.239**			0.214**
		(0.10)			(0.10)
Toehold × Cash		-0.205			-0.220
		(0.15)			(0.14)
Tier-one IB			-0.030		-0.035
			(0.18)		(0.19)
Tier-one IB × Cash			0.254		0.167
			(0.23)		(0.26)
Same industry (2 digits SIC)				-0.145	-0.148
				(0.10)	(0.10)
Same industry × Cash				0.213	0.120
				(0.13)	(0.13)
Industry & year FE	Y	Y	Y	Y	Y
N	208	208	208	208	208

Notes: OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is the transaction value over the market value of equity of the acquirer. Toehold is an indicator equal to one if the acquirer owned a share of the target before announcement. Tier-one IB indicates whether the acquirer was advised by Goldman Sachs, Morgan Stanley, Merrill Lynch, or JPMorgan. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.8: Determinants of Target Debt Change (Unsuccessful Bids)

	Δ lnDebt			
Cash	0.048	-0.081	-0.084	-0.075
	(0.15)	(0.09)	(0.17)	(0.11)
LBO	3.866***	0.113	4.006***	0.135
	(0.49)	(0.09)	(0.65)	(0.11)
Premium to 1 month prior	0.024	0.095	0.117	0.149*
	(0.12)	(0.07)	(0.17)	(0.09)
Hostile	0.153	0.176*	0.214	0.078
	(0.14)	(0.09)	(0.20)	(0.10)
q of target	0.044	0.048	-0.007	0.031
	(0.05)	(0.03)	(0.06)	(0.04)
KZ index of target	-0.006	-0.042**	-0.023	-0.045*
	(0.05)	(0.02)	(0.06)	(0.03)
Industry & year FE	Y	Y	Y	Y
Deal sample	(I)	(II)	(III)	(IV)
N	228	711	165	530

Notes: OLS regressions with the one-year change (from the end of the year before deal announcement to the end of the year of deal failure) in the log of the sum of the target's long-term and short-term debt as the dependent variable, which is winsorized at the 1st and 99th percentiles. Deal samples are as follows: (I) regression sample; (II) no restrictions on sample; (III) regression sample, pure cash and stock deals; (IV) no restrictions on sample other than pure cash and stock deals. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.9: Determinants of Deal Failure (All Deals and No Sample Restrictions)

	Deal failure				
Cash $\in [0,1]$	-0.141***	0.005	0.012	-0.017	-0.017
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Log(relative deal size)		0.045***	0.032***	0.024***	0.024***
		(0.00)	(0.00)	(0.00)	(0.00)
Premium to 1 month prior				-0.011	0.051*
				(0.02)	(0.03)
Hostile				0.399***	0.370***
				(0.05)	(0.06)
LBO					0.279
					(0.27)
Log(target MVE)					-0.015***
					(0.01)
% of target sought					-0.001
					(0.00)
q of acquirer					0.006
					(0.00)
q of target					0.004
					(0.01)
KZ index of acquirer					0.004
					(0.01)
KZ index of target					-0.000
					(0.00)
Experienced acquirer					-0.032
					(0.02)
Target CAR (A-25, A+1)					-0.143***
					(0.04)
Industry & year FE	N	N	Y	Y	Y
N	9,177	4,359	3,607	3,229	1,972

Notes: OLS regressions with a dummy variable for deal failure as the dependent variable. MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. An acquirer is experienced if the firm appears at least five times in the data set. Target CAR is measured on the [-25, 1] window around deal announcement. All non-deal-related independent variables are measured at the end of the year prior to the deal's announcement. Robust standard errors are in parentheses.

Table A.10: Target Returns (Unsuccessful Bids and No Sample Restrictions)

	Target CAR (A-25, W+25)					
Cash	0.109***	0.095**	0.392**	0.299*	0.508***	0.338*
	(0.03)	(0.04)	(0.16)	(0.16)	(0.19)	(0.19)
LBO		0.019	0.504*	0.549	0.646*	0.660
		(0.04)	(0.27)	(0.41)	(0.35)	(0.44)
Premium to 1 month prior		0.374***	0.449***	0.408***	0.406***	0.294**
		(0.06)	(0.10)	(0.12)	(0.11)	(0.12)
Premium × Cash			-0.263	-0.192	-0.266	-0.135
			(0.28)	(0.27)	(0.27)	(0.26)
Hostile		0.099***	0.138**	0.126*	0.054	0.004
		(0.03)	(0.06)	(0.07)	(0.10)	(0.12)
Log(target MVE)			-0.003	0.000	-0.028	-0.022
			(0.02)	(0.02)	(0.02)	(0.03)
Log(relative deal size)			0.018	0.017	0.011	0.004
			(0.02)	(0.02)	(0.02)	(0.03)
q of acquirer			0.018	0.013	0.020	0.026
			(0.02)	(0.03)	(0.02)	(0.04)
q of target		-0.020	-0.016	-0.015	0.013	0.009
		(0.02)	(0.03)	(0.04)	(0.03)	(0.03)
q of target × Cash			-0.059	-0.042	-0.080*	-0.046
			(0.04)	(0.04)	(0.05)	(0.05)
KZ index of acquirer				-0.030		-0.026
				(0.04)		(0.04)
KZ index of acquirer × Cash				0.007		0.028
				(0.05)		(0.06)
KZ index of target				0.023		0.050
				(0.03)		(0.03)
Industry & year FE	Y	Y	Y	Y	Y	Y
Deal sample	All	All	All	All	Pure C/S	Pure C/S
N	1,399	908	287	252	208	183

Notes: OLS regressions with target CAR from 25 days before announcement to 25 days after deal failure as the dependent variable. Cash is expressed as a fraction of the total payment (and hence equal to a dummy for cash in the sample of pure cash and stock deals in the last two columns). MVE stands for market value of equity in 2010 $bn, and Relative deal size is equal to transaction value over market value of equity of acquirer. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.11: Future Takeover Attempts (Unsuccessful Bids and No Sample Restrictions)

	New deal announced 2 years after failure				
Cash $\in [0,1]$	0.065***	0.048***	-0.007	-0.016	-0.019
	(0.02)	(0.02)	(0.04)	(0.04)	(0.04)
Premium to 1 month prior			-0.042	-0.035	-0.061
			(0.04)	(0.04)	(0.04)
Hostile			-0.104*	-0.097*	-0.108*
			(0.05)	(0.06)	(0.06)
Log(target MVE)			0.011	0.010	0.005
			(0.01)	(0.01)	(0.01)
q of target			-0.026**	-0.024**	-0.023**
			(0.01)	(0.01)	(0.01)
KZ index of target				0.010	0.013
				(0.01)	(0.01)
Target CAR (A-25, W+25)					0.023
					(0.04)
Industry & year FE	N	Y	Y	Y	Y
N	2,323	2,323	721	675	654

Notes: OLS regressions with a dummy variable indicating another merger bid within the next two years as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

Table A.12: Future Takeover Premia (Unsuccessful Bids and No Sample Restrictions)

	New offer premium 2 years after failure				
Cash $\in [0,1]$	0.021**	0.024**	-0.005	-0.007	-0.007
	(0.01)	(0.01)	(0.02)	(0.03)	(0.03)
Premium to 1 month prior			-0.016	-0.015	-0.025
			(0.03)	(0.03)	(0.03)
Hostile			-0.035	-0.041	-0.047
			(0.03)	(0.03)	(0.03)
Log(target MVE)			-0.000	-0.001	-0.005
			(0.00)	(0.01)	(0.01)
q of target			-0.009*	-0.008	-0.007
			(0.00)	(0.01)	(0.01)
KZ index of target				0.004	0.005
				(0.01)	(0.01)
Target CAR (A-25, W+25)					0.004
					(0.02)
Industry & year FE	N	Y	Y	Y	Y
N	2,237	2,237	674	631	610

Notes: OLS regressions with future offer premium (to 1 month prior) in case of another merger bid within the next two years (and zero otherwise) as the dependent variable. We exclude observations with merger bids within half a year after failure since their classification as competing bid (in the previous takeover attempt) versus new bid is ambiguous. MVE stands for market value of equity in 2010 $bn. Target CAR (A-25, W+25) is the cumulative abnormal return from 25 days before announcement until 25 days after deal failure. All non-deal-related independent variables are measured at the end of the year prior to the unsuccessful deal's announcement. Robust standard errors are in parentheses.

B Linear Approximation

To account for the different length of the time interval between the announcement and withdrawal for each deal, we normalize this window to $T_S = 50$ synthetic trading days. Each synthetic trading day corresponds to $\frac{1}{T_S} = 2\%$ of the time elapsed between announcement and withdrawal. To determine the CAR of deal i with window length T_i after n synthetic trading days, we first need to determine the CAR after $\hat{n} = n\frac{T_i}{T_S}$ days:

$$\widehat{CAR}_i(n) = CAR_i(\hat{n}). \tag{5}$$

Thus, for a deal with $T_i = 100$, the CAR after 10 synthetic trading days, $\widehat{CAR}_i(10)$, would be given by the the CAR after 20 actual trading days for deal i. If $\hat{n}$ is not an integer number, we use a linear approximation between the relevant integer numbers, i.e.,

$$\widehat{CAR}_i(n) = \left(1 - w_{(i,n)}\right) CAR_i(\lfloor \hat{n} \rfloor) + w_{(i,n)} CAR_i(\lfloor \hat{n} \rfloor + 1) \tag{6}$$

with $w_{(i,n)} = \hat{n} - \lfloor \hat{n} \rfloor$ where $\lfloor x \rfloor$ refers to the floor function.
Hence, for a deal with $T_j = 10$, the CAR after 8 synthetic trading days is given by: $\widehat{CAR}_j(3) = \frac{2}{5} CAR_j(1) + \frac{3}{5} CAR_j(2)$ as $\hat{n} = n\frac{T_j}{T_S} = 8\frac{10}{50}$ and $w_{(j,n)} = \frac{8}{5} - 1$.

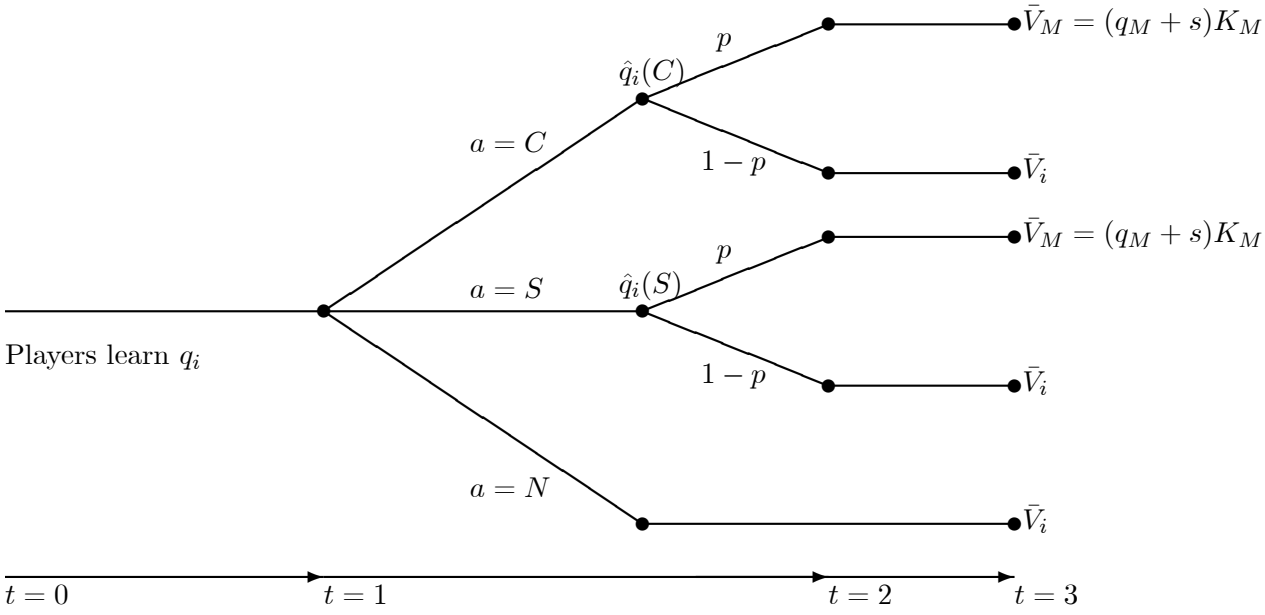
C Theory: Mispricing and Learning

We consider an asymmetric information environment in which a bidder, B, possesses private information about his own value, the value of a potential target, T, and potential synergies between the two firms. Our setting allows both for the possibility that stocks are (on average) fairly valued, and for systematic misvaluation. In either case, the assumption of asymmetric information only requires that some firms have access to information that is not fully reflected by the stock price. For ease of exposition, we assume that there are no information asymmetries, instead, between the bidder and the target. Intuitively, these assumptions could be motivated by industry-specific knowledge that is shared by the bidder and the target but is not known to the market (yet).

Building on the modeling framework and notation of Shleifer and Vishny (2003), we study how market misvaluations affect the probability of merger bids and the form of payment, i.e., the choice between a cash and a stock acquisition. However, in contrast to Shleifer and Vishny (2003), we allow market participants to learn from actions that are (potentially) motivated by misvaluations, including the form of payment offered by the bidder. This learning channel generates testable predictions for our empirical examination of stock market reactions to cash and stock offers.

Apart from information-based deals, which induce market learning, we also assume that a fraction of deals is (exogenously) motivated by unobserved managerial considerations. One can think about these deals as "noise deals." These noise deals help the informed bidder to not fully reveal his private information by his offer and his choice of the medium of exchange in particular. For the purpose of our analysis, we focus on the decisions of the informed bidder. The noise bidder will only matter for the market reaction to the deal announcement.

Figure 3: Timeline of the Model



For expositional reasons, we express market valuations of firm i, V_i, in terms of valuation multiples, $\hat{q}_i$, and the capital stock in place, K_i:

$$V_i = \hat{q}_i K_i \tag{7}$$

where $i \in \{B, T, M\}$ and M refers to the merged firm.

The capital stock is observable to the market, so that potential initial misvaluations must be caused by false market assessments of the valuation multiple. The fair long-run multiple of each firm is denoted by q_i and the true long-run synergies are given by $sK_M = s\left(K_B + K_T\right)$, whereas we assume the time-0 market beliefs about the valuations to be independently distributed with means $\hat{q}_i^0$ and $\hat{s}$, respectively.

The timeline (see Figure 3) is as follows:

0. The bidder and the target learn the fair values of their firms, q_i, including the value of the merged firm.

1. The bidder can choose between three possible actions, a. The market updates the valuation multiple and synergies estimate after observing a, denoted by $\hat{q}_i\left(a\right)$ and $\hat{s}\left(a\right)$:

   (a) All-**C**ash acquisition, $a = C$

   (b) All-**S**tock acquisition, $a = S$

   (c) **N**o acquisition, $a = N$.

2. The deal succeeds with probability p.

3. Market prices adjust to their long-run values (indicated by $\bar{V}_i$ and $\bar{V}_M$).

Since periods 1 and 2 are close events, we do not incorporate an additional learning stage after deal failure. Eventually, long after deal failure (in period 3), market prices revert to fundamentals. As in Shleifer and Vishny (2003), we assume that the target management is only concerned about short-run valuations whereas bidder management is concerned about long-run valuations.[26] Consequently, target shareholders will accept any offer price PK_T as long as $P > \hat{q}_T(a)$. Assuming that the target offer premium, P, is identical for cash and stock offers, a cash payment of PK_T corresponds to a stock deal with an exchange ratio such that a fraction x of the merged company is owned by target shareholders:

$$x = \frac{P}{\hat{q}_M(S) + \hat{s}(S)} \frac{K_T}{K_M} \tag{8}$$

where $\hat{q}_M(S) = \hat{q}_B(S) \frac{K_B}{K_M} + \hat{q}_T(S) \frac{K_T}{K_M}$ and $K_M = K_B + K_T$.

Intuitively, the target share is the ratio of the takeover premium multiple, P, relative to the combined-firm valuation multiple, $\hat{q}_M(S) + \hat{s}(S)$, times the fraction of the capital stock that the target contributes to the merged firm. Note that this specification is consistent with our data (see Section 3): the premia do not vary significantly between the cash and stock deal samples (comprising completed and unsuccessful deals).[27] Furthermore, deal failure is modeled exogenously with respect to the cash or stock choice; Section 2.2 critically discusses this important assumption.

With a slight abuse of notation, we denote the long-run value of shares owned by the acquiring company's shareholders as $\bar{V}_B$, also in the cases where the deal goes through:

Lemma 1 *The long-run market value of shares owned by the bidder's shareholders is:*

$$\bar{V}_B(S) = (1 - x)(q_M + s) K_M \tag{9}$$

$$\bar{V}_B(C) = (q_M + s) K_M - PK_T \tag{10}$$

$$\bar{V}_B(N) = q_B K_B. \tag{11}$$

Note that if the transaction fails, the long-run market valuation of the bidder is simply the long-run stand-alone value, $\bar{V}_B(N)$.

Proposition 1 *Given the updating functions of the market, $\hat{q}_M(S)$ and $\hat{s}(S)$, a bidder chooses stock over cash if:*

$$\underbrace{\hat{q}_M(S) + \hat{s}(S)}_{\text{Post-Stock Offer Combined Firm Valuation}} > \underbrace{q_M + s}_{\text{Long-run Combined Firm Valuation}}. \tag{12}$$

A transaction is made at all as long as:

$$sK_M \geq \begin{cases} (P - q_T) K_T & \text{for} \quad q_M + s > \hat{q}_M(S) + \hat{s}(S) \\ \left(P \frac{q_M + s}{\hat{q}_M(S) + \hat{s}(S)} - q_T \right) K_T & \text{otherwise} \end{cases}. \tag{13}$$

[26] Our model yields the original Shleifer and Vishny (2003) model for the following parameters: $p = 1$, $\hat{q}_i(C) = \hat{q}_i(S) = \hat{q}_i^0$, $q_B = q_T = q$, $\hat{s}(C) = \hat{s}(S) > 0$, and $s = 0$.

[27] Theoretically, the effective value of the offer could be a function of the medium of exchange.

Proof: Since the payoffs in case of failure (and the probabilities of failure) are the same for cash and stock transactions, the bidder only needs to compare the valuations upon a completed deal (see Lemma 1). The bidder chooses stock if:

$$\left(1-\frac{PK_T}{\left(\hat{q}_M\left(S\right)+\hat{s}\left(S\right)\right)K_M}\right)\left(q_M+s\right)K_M>\left(q_M+s\right)K_M-PK_T. \tag{14}$$

Simple algebra yields the desired result. ■

Thus, stock is more likely to be used if both the target and the bidder are overvalued or if the market is too optimistic about synergies, i.e., $\hat{s}\left(S\right)>s$. Intuitively, a transaction is made if either the true synergies, sK_M, are high or if the target can be purchased at a discount ($P<q_T$). For stock bidders, the price P is shaded by the long-run devaluation ratio $\frac{q_M+s}{\hat{q}_M(S)+\hat{s}(S)}<1$. As long as the combined firm is currently overvalued (relative to market expectations), i.e., $\hat{q}_M\left(S\right)+\hat{s}\left(S\right)>q_M+s$, the long-run effective price of a stock offer is lower. Note that both cash and stock bidders would prefer to buy the target at a discount ($P<q_T$). In that case, the deal adds value for the bidder regardless of the medium of exchange. However, the choice between cash and stock depends on the combined overvaluation of the bidder and the target. If the bidder is undervalued, he would not like to let the target shareholders benefit from his own undervaluation, so he uses cash. On the other hand, bidders in stock deals are willing to overpay for targets ($P>\hat{q}_T>q_T$) if and only if their own overvaluation is even higher (or synergies are high). This case exemplifies the similar logic and predictions of our model and that of Rhodes-Kropf and Viswanathan (2004) despite the different (information) setups, as alluded to earlier (see Footnote 9).

Since the informed bidder takes the updating functions of the market, $\hat{q}_i\left(a\right)$ and $\hat{s}\left(a\right)$, as given, these functions were treated as exogenous for the decision making behavior of the bidder. Assuming that the *uninformed* bidder is on average fairly valued and buys on average a fairly valued target, the market reaction will only partially reflect the information of the informed bidder. This allows the *informed* bidder to benefit from the transaction.

With partial updating by the market, the market will update all terms in the same direction upon seeing a stock offer. Define the overvaluation of a firm as:

$$v_i\left(a\right)=\hat{q}_i\left(a\right)-q_i. \tag{15}$$

Then, under the assumption that all priors are independent, the learning component of our model predicts:

Corollary 1 *Partial updating implies:*

$$v_i\left(S\right)\geq v_i\left(C\right) \tag{16}$$

$$\hat{s}\left(S\right)-s\geq\hat{s}\left(C\right)-s. \tag{17}$$

While we remain agnostic about the exact nature of the updating process (and the distribution of the market's priors about the long-run valuations q_B and q_T of the bidder and the target, respectively) in the formulation of the theory, the raw evidence in Figure 1, while consistent with our theory, implies that cash offers induce the market to update its beliefs exclusively about the target.

The model, however, predicts that the choice of the acquisition currency is a function of the overvaluation of the (hypothetical) *combined* entity of the bidder and the target. One may argue that the graph sample contains many proposed mergers of equals (the mean equity ratio, i.e., the market capitalization of the target over that of the acquirer, turns out to be 0.87 for unsuccessful bids), which would justify the magnitude of the cash effect for targets. At the same time, the cash effect also holds in samples including non-public acquirers that are typically smaller and about which the market potentially has less information. That is, even when there is greater information asymmetry between the market and the bidder, the cash effect on post-failure target CARs remains robust (although the respective coefficient is somewhat lower).[28] Thus, one may conclude that the market focuses entirely on targets when considering cash offers, and the degree of updating should be independent of the target's relative size.

To see this, assume that there are no synergies as they are not priced after deal failure, so the acquirer's optimal choice of acquisition currency according to Proposition 1 is to use cash as long as $\frac{K_T}{K_M}\hat{q}_T(C) + \frac{K_B}{K_M}\hat{q}_B(C) < \frac{K_T}{K_M}q_T + \frac{K_B}{K_M}q_B$. In order not to complicate notation, let $\hat{q}_B^0$ and $\hat{q}_T^0$ be constants (i.e., the market's priors are distributed with zero variance). The market observes K_B, K_T, $\hat{q}_B^0$ and $\hat{q}_T^0$, and upon seeing a cash offer, updates its beliefs about the target's stand-alone value. The market updates $\hat{q}_T^0$ to $\hat{q}_T(C)$ where the updating function $\hat{q}_T(C)$ is equal to:

$$\begin{aligned}\mathbb{E}(q_T|\, a = C) &= \mathbb{E}\left(q_T|\, \hat{q}_M^0 < q_M\right) \\ &= \mathbb{E}\left(q_T|\, \frac{K_T}{K_M}\hat{q}_T^0 + \frac{K_B}{K_M}\hat{q}_B^0 < \frac{K_T}{K_M}q_T + \frac{K_B}{K_M}q_B\right). \end{aligned} \tag{18}$$

Note that this expectation is conditional on the market's assessment of q_B. However, we argue that the market does not update its beliefs about acquirers once they offer cash rather than stock, that is:

$$\mathbb{E}(q_B|\, a = C) = \hat{q}_B^0. \tag{19}$$

Therefore, equation 18 simplifies to:

$$\mathbb{E}\left(q_T|\, \frac{K_T}{K_M}\hat{q}_T^0 + \frac{K_B}{K_M}\hat{q}_B^0 < \frac{K_T}{K_M}q_T + \frac{K_B}{K_M}\hat{q}_B^0\right) = \mathbb{E}\left(q_T|\, \hat{q}_T^0 < q_T\right). \tag{20}$$

The market updates its beliefs according to equation 20, so that $\hat{q}_T(C) > \hat{q}_T^0$. Most importantly, the updating function is independent of the target's relative size, and so will be the degree of updating, i.e., $\left(\hat{q}_T(C) - \hat{q}_T^0\right) \perp \frac{K_T}{K_M}$. Had we not assumed (as documented empirically) that relationship (19) holds, then the degree of updating would indeed have been a function of $\frac{K_T}{K_M}$: given that the market cannot observe the long-run valuations (and under the assumption of independence of the market's beliefs about q_B and q_T), it would have inferred a greater degree of undervaluation for the entity that is relatively larger in terms of capital.

[28] To see this, compare the first and, particularly, second columns of Tables 5 and A.10.