Sold below value? Why some targets accept very low and even negative takeover premiums.

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Abstract

Although many studies acknowledge negative premiums, there exists no theoretical or dedicated empirical analysis of the phenomenon. In our sample of 1,937 US mergers (1995 to 2011), 8.4 percent of all targets received offers with negative premiums where the initial bid undercuts the pre-announcement market price. We theoretically show that target overvaluation, market liquidity and 'hidden earnouts', where target shareholders participate in the bidder's share of joint synergies, can explain negative premiums. The theory for negative premiums also generalizes to very low premiums (VLPs), which include positive premiums. Empirical tests provide substantial support for explanations pertaining to overvaluation and hidden earnouts. As discriminating hypotheses we predict and confirm that target shareholders' market reaction to negative premiums with hidden earnouts (with overvaluation) is positive (negative). Relative size and method of payment play an important role. When a big target is paid with stock, a combination of hidden earnouts and VLPs can be the only way for the bidder to prevent loss of control. Our explanations for VLPs predict lower values for most premiums below the median and thus apply to a significant proportion of the takeover market.

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1 Introduction

Suppose you own some shares of a company, and a potential acquirer announces a takeover bid with a negative premium. That is, the bidder proposes to purchase the shares of this company for less than their market price before the announcement. Would it be rational to sell your shares? Could it make sense to buy even more shares? Above all: is this scenario realistic? And if yes, why would a target give such a bid any serious thought?

Despite the many open questions, this hypothetical scenario has played out in numerous transactions. In fact, our data shows that negative premiums were announced in every single year from 1995 to 2011 and that they are economically significant: 8.4% of all mergers and acquisitions (M&As), and up to 14.1% per year (in 2004) exhibited negative premiums. Besides the evidence presented in this paper, many earlier studies acknowledged the existence of negative premiums.[1] Officer (2003, p.443) reports that "(a)ll premium measures also result in troubling outliers, with a substantial fraction of each distribution lying below zero (an economically meaningful bound) and above two (an arbitrary bound)." (Schwert, 1996, p.186, Table 11) finds at least 6.5% negative markups and at least 10.1% negative control premiums. When censoring or truncating negative premiums, he obtains markedly different and 'disturbing' estimation results. In fact, Schwert (1996, p.187) concludes that "(a)ll of these results are an artefact of truncating or censoring the sample to eliminate negative runups and markups (or negative runups and premiums)."

Yet, no theoretical explanation has been offered for this phenomenon, nor did it attract any dedicated empirical analysis. Quite to the contrary, negative premiums are often truncated or omitted in M&A samples, because they are thought to be noise, or theoretically not explainable.[2] For the first time, we propose a theory and test several explanations for negative premiums. Moreover, we show that negative premiums are just the tip of the iceberg of *very low premiums* (VLPs), which include negative and non-negative premiums. Actu-

[1] See, e.g., Schwert (1996, p.184-187), Officer (2003, p.443-444), Bates and Lemmon (2003, p.492), Moeller et al. (2004, p.220), Dong et al. (2006, p.731).

[2] Most studies truncate negative premiums at zero (Officer (2003, p.443), Bates and Lemmon (2003, p.492), Moeller et al. (2004, p.220)), or omit cases where the premium is negative (Schwert, 1996, p.184-187), or use combinations thereof in robustness checks. Dong et al. (2006, p.731, Footnote 8) and (Officer, 2007, p.585) omit negative premiums that are smaller than -50%.

ally, we find that the theory of negative premiums generalizes to the much larger phenomenon of VLPs and a significant proportion of the takeover market, as the same determinants predict lower values for premiums up to the 40th percentile.

The first explanation for negative premiums refers to target overvaluation. If a target is overvalued, its market value may exceed a fair bid, which constitutes a negative offer premium at the merger announcement. Bidders often have the opportunity to conduct several rounds of detailed valuations of the target, including a due diligence, prior to the announcement of their offer Boone and Mulherin (2007). Thus, both parties may reach a consensus on the target's fair value. If the target management anticipates that the overvaluation will soon become public knowledge, they may accept the disclosure of this overvaluation with the merger announcement of a negative premium. Everything else equal, the market should react to this announcement with negative abnormal returns to the target, which correct for the overvaluation. The lower, post-announcement share price then reflects the announced bid, consisting of the target's fair stand-alone value plus a (positive) premium. As an alternative to fundamental overvaluation, pre-bid runups may constitute speculative overvaluation of anticipated merger gains to the target. If runups reflect the expectation of a target's share of future synergies, they do not only substitute the premium, but also leave room for error. Excessive runups may therefore overshoot the actually announced offer, which leads to a negative premium and to a corresponding negative market reaction.

The second explanation for negative premiums refers to the fact that bidders pay with ownership when they offer a consideration with stock. Through this ownership in the merged entity, target shareholders profit twice from merger synergies: first by negotiating a share of synergies for the target that is included in the offer premium (by means of the share exchange ratio), and second by participating in the bidder's share of synergies that accrue to the merged entity (by means of the target shareholders' ownership in the joint entity). We refer to the latter as 'hidden earnouts' as they are not only hidden in the bidder's negotiated share, but also conditional upon synergy realization after the consummation of the merger. Hidden earnouts can be large enough to compensate for negative premiums. Thus, even though a bidder offers a target less than its market value, a favorable share exchange ratio may provide target shareholders with sufficient ownership that hidden earnouts make the deal worthwhile. In fact, if the target is relatively large compared to the bidder, a combination of negative premiums and hidden earnouts may be the only way for the bidder to pay the target in stock without risking to lose control over the merged entity. As target shareholders expect to be compensated for negative offer premiums with even higher hidden earnouts, the market reaction to such a merger announcement is positive.

The third explanation pertains to liquidity in the market for corporate control and, in extension, liquidity of target's stock. Although firms prefer to sell their corporate assets in liquid markets (Schlingemann et al., 2002), targets may accept prices below their fundamental value (negative premiums) if they are financially distressed and forced to sell, for example, in fire-sales (Shleifer and Vishny, 1992). If distressed targets (or sellers of targets) anticipate sufficiently low stand-alone values, they may prefer a going-concern merger, despite negative premiums.

We derive discriminatory propositions for the three explanations and show theoretically that the mechanisms behind negative premiums are also able to explain non-negative VLPs. The empirical tests provide strong support for overvaluation and for hidden earnouts as most promising explanations for negative premiums.

Overvaluation of the target's value (Tobins' Q and the price-to-residual-income-model-value) and of the target's expected merger gains (runups) predict a higher likelihood of negative premiums. A negative interaction with Tobins' Q indicates that the positive effects of runups do not only reflect a higher valuation of the target, but represent a separate explanation for negative premiums. Using a sequential logistic model, we further confirm that the announcement of negative premiums for overvalued targets triggers a negative market reaction by target shareholders.

In line with the hidden earnout hypothesis, a number of proxies indicate that negative premiums are more likely if target shareholders can gain from the bidder's share of synergies through joint ownership. These include the equity portion of the deal, bidders' new equity issues to finance the deal (indicating the magnitude of transfer of ownership to target shareholders), and relative target size. We further discriminate between the effects of hidden earnouts and overvaluation by showing that the market reaction to the announcement of negative premiums for targets with hidden earnouts is not negative (as in the case of target overvaluation), but positive.

In line with the market liquidity hypothesis and with Schlingemann et al. (2002), we find that a low monthly M&A transaction value in the target's industry predicts negative premiums. However, the statistical significance is weak and a closely related measure, the number of monthy M&A deals, lacks any predictive power. The latter also applies to proxies for the target's stock market liquidity.

As negative premiums only represent the most extreme and salient form of VLPs, we find, as expected, that the above results can be replicated for all negative and non-negative premiums in the lowest decile. Quantile regressions show that our results on hidden earnouts, overvaluation and market liquidity apply to all premiums up to the 40th percentile. This is a substantial share of the takeover market in which the theory of negative premiums is also able to explain and predict lower positive premiums.

This study adds to the literature on target premiums, which, compared to the extensive and long standing literature on M&A from the acquirer's perspective, is still relatively limited. Since the first systematic analysis on offer prices by Bradley (1980), large-sample evidence is only starting to emerge.[3] The pertinent literature contains papers that primarily focus on antecendents of initial premiums and papers that analyze the whole bidding process including multiple bids with intermediate and final premiums. The second strand often refers to bidding strategies in auction settings, or merger negotiations in the shadow of auctions as outside option (Aktas et al., 2010; Boone and Mulherin, 2008), with special emphasis on target shareholder free-riding (Grossman and Hart, 1980; Bradley, 1980), jumps in consecutive and/or competing bids, pre-emptive bidding and the role of toeholds (Fishman, 1988; Betton and Eckbo, 2000; Betton et al., 2009). The first of the two strands analyzes offer prices and their determinants more directly. Early studies by Huang and Walkling (1987) and Hayn (1989) show that target premiums are significantly greater when offered in cash than in bidder's stock. Empirical evidence by Ayers et al. (2003) suggests that, because cash offers include a capital gains tax penalty, target shareholders demand higher cash premiums as compensation. Another premium determinant is the price-to-book ratio of the target and/or the bidder. Walkling and Edmister (1985) find that the target price-to-book ratio is related to the offer premium. Dong et al. (2006) report that higher price-to-book ratios of bidders (targets) are associated with higher (lower) bid premiums, which indicates that targets accept bidder stock although it is relatively overvalued.[4] The public status also plays a role. While public bidders offer significantly higher premiums (Bargeron et al., 2008), unlisted targets often accept a discount (Officer, 2007). Premiums discounts are also reported for financially distressed or bankrupt targets (Hotchkiss et al., 2008). Deal protection devices such as termination fees and lockup clauses have been shown to affect premiums positively (Officer, 2003; Bates and Lemmon, 2003; Burch, 2001), while shareholder tender agreements seem to have the opposite effect (Bargeron, 2012). The majority of tender offers include such shareholder agreements, which may be a reason why tender offer premiums are often lower (Eckbo, 2009). Evidence on takeover hostility and anti-takeover provisions is mixed (Schwert, 2000; Bates et al., 2008), although

[3]Please refer to Betton et al. (2008a) and Eckbo (2009) for an excellent survey on the literature.

[4]Shleifer and Vishny (2003) provide a behavioral and Rhodes-Kropf and Viswanathan (2004) a rational explanation for this finding.

there is some indication on an inverse relationship between target management entrenchment and premiums (Moeller, 2005; Hartzell et al., 2004). Finally, and as discussed in more detail in Section 2.1, pre-announcement runups can partially substitute premiums although the net effect is, on average, additive (Jarrell and Poulsen, 1989; Schwert, 1996; Betton et al., 2008b). Our paper contributes to this literature by providing a theory and empirical evidence for the existence of negative premiums. In doing so, we also identify and explain antecendents for very low premiums.

The remainder of the paper is organized as follows. Section 2 provides a theoretical model for negative premiums, derives formal propositions and explains how this research is connected to the existing literature. Section 3 provides a description of the data sources and outlines the estimates of negative premiums and VLPs in greater detail. Section 4 provides univariate and multivariate analyses of negative premiums and market reactions to their announcement. Section 5 shows that the findings for negative premiums generalize to VLPs up to the 40th percentile of the premium distribution. Section 6 offers robustness checks for different premium measures. Section 7 summarizes the findings and concludes.

2 Theoretical explanations

Many researchers consider negative premiums as noise and exclude them from their analyses. Indeed, there are several technical reasons, mostly related to data recording and measurement issues, that can produce such noise. In Section 3, we will discuss these technical reasons in detail as they play an important role in the selection of a clean sample with unbiased premium measures.

Apart from technical reasons, however, there also exist a number of theoretical reasons for negative premiums. Before we discuss these theoretical explanations , we introduce some basic definitions.

In line with the pertinent literature (e.g., Betton et al., 2008a) we compute premiums at the announcement of a takeover offer and refer to them either as *offer premiums* or simply as *premiums* $p \in (-1, \infty)$, with

$$p = \frac{b}{v^T} - 1 \tag{1}$$

where $b > 0$ is the initial public bid for a target and $v^T > 0$ is the target's stand-alone market value prior to this bid. The initial public bid is the very first, publicly announced offer for the target, free of information on subsequent events such as competing bids. For simplicity, we assume that the target only has one type of (common) share and that the bidder offers to acquire all outstanding shares of the target.

The offer premium p is negative if $b < v^T$. However, despite a negative premium at the merger announcement, the target shareholders must be convinced that they will gain from the consummation of the merger. After all, both parties pursue the merger voluntarily. Hence, a theory that explains negative offer premiums must do so in the light of sufficiently high post-merger synergies for the target, so that its shareholders give up their equity. To satisfy this participation constraint, the premium that the target shareholders expect to receive after the consummation of the deal must be positive. We henceforth refer to this premium as *post-merger premium* $p_m \in (0, \infty)$.

According to (1), two approaches can explain negative offer premiums: one that focuses on target's stand-alone valuations and explains why $v^T > b$, and one that focuses on the initial bid and explains why $b < v^T$. We present the explanations in this order.

2.1 Target overvaluation

If the target is overvalued, its stand-alone value in (1) may be higher than the initial public bid, leading to negative premiums at the merger announcement. For this to occur, two conditions have to be satisfied. First, the bidder is able to estimate the fair value of the target before announcing the bid. This may particularly but not exclusively apply to solicited bids. For example, Boone and Mulherin (2007) report that invited bidders often have the opportunity to conduct several rounds of detailed valuations of the target, including a due diligence, in order to determine its fair value and possible synergies prior to the announcement of their offer. Second, based on the target's fair valuation, the offer premium is smaller than the overvaluation.

Let the target's stand-alone value v^T comprise a fair or fundamental value, $v_f^T > 0$, and a possible overvaluation, $\delta \geq 0$, such that $v^T = v_f^T + \delta$. The expected joint synergy gains from the takeover, $s > 0$, are shared such that the target receives λs, where $\lambda \in [0, 1]$ is determined by bargaining power and bidder competition. We assume that the bidder offers a fair bid:

$$b = v_f^T + \lambda s \tag{2}$$

Then the offer premium p, as defined in (1), is

$$p = \frac{v_f^T + \lambda s}{v_f^T + \delta} - 1 = \frac{\lambda s - \delta}{v_f^T + \delta} \tag{3}$$

If $\lambda s \geq \delta$, the target's share of joint merger synergies fully compensates for the overvaluation and the offer premium will be non-negative. However, if $\delta >$

λs, the offer premium is negative, as summarized in the following proposition.

Proposition 1. *If the target is sufficiently overvalued, with $\delta > \lambda s$, a fair bid $b = v_f^T + \lambda s$ results in a negative premium $p<0$.*

The post-merger premium will nevertheless be positive. Remember that the management teams of both merger parties have a consensus view on the target's fair value. Hence, by *ex ante* correcting for the overvaluation, such that $\delta = 0$ in (3), the two parties always negotiate a positive and fair post-merger premium $p_m = \lambda s / v_f^T$. This implies that the target management accepts the disclosure of the overvaluation at the merger announcement. A reason could be that the overvaluation would soon become public knowledge anyway. Target management may, for example, anticipate that it has to announce unexpectedly low profits or other bad news to its shareholders. If this, willingly or unwillingly, coincides with pre-announcement merger negotiations, target management may choose to rather announce a negative premium than an even worse overvaluation.

Besides the overvaluation of the target's fundamental value, pre-bid runups play a special role, because they may constitute speculative overvaluation that is triggered by the merger itself. The conventional view is that runups reflect takeover anticipation based on diverse information, such as other mergers in the same industry, rumors and speculations in the media, street talk, or any kind of news that puts the target into play (Jarrell and Poulsen, 1989; Eckbo, 2009). According to this view, which is referred to as *substitution hypothesis*, the runup reflects some portion of the target's share of future synergies and thus partially substitutes the premium. An alternative view is that runups do not reflect future merger gains, but contain new information about the target's fundamental stand-alone value. A dollar increase in the runup then forces the bidder to respond by marking up the planned offer price by a dollar. According to this *markup hypothesis*, the offer premium is always positive, because if the runup signals an increase in the target's stand-alone value the markup pricing follows naturally. Empirical evidence does not provide exclusive support for the one or the other view. While Jarrell and Poulsen (1989) report results that are consistent with the substitution hypothesis, Schwert (1996) finds support for the markup hypothesis. Betton et al. (2008b) estimate that the initial bid is marked up by 75-80 percent of the runup and substituted by the remaining 20-25 percent.[5]

[5]Note that a positive correlation between runups and premiums, which is the prevalent test for the markup-hypothesis in the pertinent literature, does not exclude the substitution hypothesis, because a higher runup could be an indicator for *anticipated* higher total synergies and higher premiums (Eckbo, 2009; Betton et al., 2008b). Hence, the 'markup' could be determined before the runup, which would support the substitution hypothesis. Consistent with this view, Betton et al. (2008b) report that bidders abnormal anncouncement returns

Even if average runups do not fully substitute post-merger premiums, their outliers may nevertheless be extreme enough to produce negative premiums; in particular, when we consider that negative premiums are also exceptions to the rule.[6] To see this, substitute δ in (3) by $E(\lambda s)$, which represents target's expected merger gains that are anticipated in a directly substituting runup.[7] Hence, the offer premium decreases in $E(\lambda s)$. At $E(\lambda s) = \lambda s$ the runup perfectly anticipates the premium, resulting in $p = 0$. The key for negative premiums is that substituting runups reflect expectations. Thus, there is room for error. Analogous to Proposition (1), where investors can overestimate a target's fundamental value, here investors can overestimate a target's actual gain from the merger, so that $E(\lambda s) > \lambda s$. Hence, if the anticipation of merger gains is overly optimistic, an excessive runup increases the denominator in (3) above the fair bid ($v_f^T + E(\lambda s) > v_f^T + \lambda s$), which results in a negative offer premium. We summarize this in the following proposition.

Proposition 2. *If a runup (i) substitutes and (ii) overestimates the target's share of future synergies, so that $E(\lambda s) > \lambda s$, then a fair bid $b = v_f^T + \lambda s$ results in a negative premium $p<0$.*

If a target is sufficiently overvalued, either in its stand-alone value or in its merger gains (runup), Proposition (1) and (2) show that it cannot avoid a negative premium in a merger announcement. In *argumentum e contrario*, if a target announces a negative premium due to overvaluation, the shareholders will correct this overvaluation with negative abnormal announcement returns, as summarized in the following proposition.[8]

Proposition 3. *If a target's fundamental value v_f^T, or its merger gains λs, or both, are sufficiently overestimated, such that $\delta > \lambda s$ or $E(\lambda s) > \lambda s$ in (3), the target's abnormal announcement return to negative premiums is negative.*

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are positively correlated with target runups, which supports the notion that runups are an empirical proxy for total takeover synergies in the cross-section.

[6]Edmans et al. (2012) show that merger expectation can produce substituting runups that are high enough to deter the anticipated bid.

[7]$E(\lambda s)$ reflects the probability to merge ($Prob(M)$) and the conditionally expected premium $E(\lambda s|M)$.

[8]For simplicity in our model, define announcement returns as $v_{t+1}^T/v_{t-1}^T - 1$, with $v_{t-1}^T = v_f^T + \delta$, or $v_{t-1}^T = v_f^T + E(\lambda s)$, and $v_{t+1}^T = v_f^T + \lambda s$, where $t-1$ and $t+1$ correspond to pre- and post-announcement dates, respectively. The proposition also holds, without loss of generality, for abnormal announcement returns.

2.2 Hidden earnout

When the stand-alone value of the target prior to the initial merger announcement is fair, then, according to (1), only a bid that is lower than the fair stand-alone value can explain negative premiums. One of the usual suspects for lower-than-fair valuations is agency costs, but, as discussed in Section 2.4, agency theory is not able to explain negative premiums. A different approach to explain bids that are lower than a target's fair stand-alone value, is to look at their form of payment. Here, a distinction must be made between stock-swaps and other forms of payment, such as cash or debt issued by the acquirer to target shareholders. In stock-swaps the acquirer partially transfers ownership and, in doing so, effectively pays more than the announced premium for the target. This phenomenon is commonly referred to as the 'cost of stock mergers' (Brealey et al., 2011, p.832) and is best explained with a numerical example:

> Assume an acquirer A and a target T with fair stand-alone values of 200 and 100 mil U\$, respectively. Suppose A buys T for a total consideration of 110 mil U\$, payable in A's shares, and that the total synergies of the deal are 50 mil U\$. For simplicity, assume that each U\$ in valuation equals one common share outstanding. Hence, A issues 110 mil new shares, acquires T in a stock swap with an announced premium of 10% and expects to gain 40 mil U\$ (50-10). After the consummation of the deal, the merged entity is worth 350 mil U\$, has 310 mil shares outstanding and a share price 1.129 U\$. Now, the 110 mil shares of T's shareholders are worth 124.2 mil U\$, but the gains for A's shareholders dropped to 25.8 mil U\$ (350-200-124.2), down from announced gains of 40 mil U\$. Thus, the cost of stock mergers for A is 14.2 mil U\$ (40-25.8).

The crucial insight for our purposes is that a cost to the acquirer is a gain for the target. In the example, target shareholders received ownership of 35.5 percent (110/310) of the merged entity and therefore gain, after the merger, an additional 35.5 percent of the acquirer's share of merger synergies, amounting to 14.2 mil U\$ ($.355 \cdot 40$). This results in an post-merger premium of 24.2 percent, while the offer premium is only 10 percent. In the following, we show how the cost of stock mergers can explain negative premiums.

When the bidder pays the target with stock, the merger agreement specifies an exchange ratio X. This ratio is the number of bidder shares to be exchanged for each target share, assuming a fair bid price b, as in (2), for each target's share in relation to the fair stand-alone share price of the bidder, such that

$$X = \frac{\frac{b}{N^T}}{K^B} = \frac{b}{N^T} \cdot \frac{N^B}{v_f^B} \tag{4}$$

with $K^B = v_f^B / N^B$ denoting the bidder's pre-bid share price, N^T and N^B the number of shares outstanding of the target and acquirer, respectively, and v_f^B the stand-alone market value of the bidder.[9] For simplicity, we first assume that both parties have only common stock outstanding and that X refers to payments that only contain stock.[10]

Solving (4) for b defines the total value of the initial public bid at the announcement of a pure stock-for-stock merger

$$b = X \cdot N^T \cdot K^B \tag{5}$$

Substituting (5) in (1), determines the announcement premium

$$p = \frac{X \cdot N^T \cdot K^B}{v_f^T} - 1 = \frac{X \cdot N^T \cdot v_f^B}{N^B \cdot v_f^T} - 1 \tag{6}$$

After the consummation of the merger, the value of the shares that the target's owners received as payment is determined by the share price K^M of the merged entity and not by the pre-bid share price K^B of the bidder. The post-merger share price

$$K^M = \frac{v_f^B + v_f^T + s}{N^B + X \cdot N^T} \tag{7}$$

reflects not only the pre-merger values of the bidder and the target, $v_f^B + v_f^T$, but also the post-merger value of the synergies s, divided by the total number of post-merger stock outstanding. As the share exchange ratio X is fixed, it reflects the number of post-merger shares in the combined firm that the target's owners hold per pre-merger share. Consequently, the post-merger value per original target share is $X \cdot K^M$, and the total post-merger value of the bid is

$$b_m = X \cdot N^T \cdot K^M \tag{8}$$

[9] This is a standard textbook approach. See, e.g., DePamphilis (2008, p.374-377).

[10] For example, if the offer price is \$40 per target share, and the bidder's stand-alone share price is \$80, the share exchange ratio in a pure stock-swap merger is $X = 40/80 = .5$. This implies that the acquirer will give .5 shares of its own stock for each target share. If the stock portion e of the bid is less than 100%, the exchange rate X is multiplied with the stock portion e. If $e = .75$, the target receives \$10 per share as a lump-sum payment plus $X \cdot e = .5 \cdot .75 = .375$ bidder shares per target share.

Analogously to (6), the post-merger premium can be defined using (7) and (8).

$$p_m = \frac{X \cdot N^T \cdot K^M}{v_f^T} - 1 = \frac{X \cdot N^T}{N^B + X \cdot N^T} \cdot \frac{v_f^B + v_f^T + s}{v_f^T} - 1 \tag{9}$$

If the share exchange ratio X is not revised and if the underlying stand-alone values $v_f^B + v_f^T$ are unaffected by the merger, the post-merger premium solely depends on the actual realization of the expected synergies s.[11] Note that the right hand side (RHS) of (9) contains the target's fraction of post-merger equity ownership in the combined firm

$$\xi = \frac{X \cdot N^T}{N^B + X \cdot N^T} \tag{10}$$

Hence, the extent to which the post-merger premium is contingent on the realization of the expected synergies depends on the fraction ξ of total stock that the former owners of the target hold in the merged company. This logic is illustrated in a takeover proposal for the Dutch bank ABN Amro. In a letter to the Chairman of ABN Amro, a bidder consortium of three banks, the Royal Bank of Scotland (RBS), Fortis, and Santander, argued as follows:

> "As our Offer [...] will comprise approximately 70 per cent in cash, the element of potential uncertainty about the value relates only to 30 per cent of our Offer [...]. Furthermore, the shares to be issued by RBS would constitute broadly 20 per cent of RBS's current issued share capital [...]. It can also be assumed that ABN AMRO has an underlying value before synergies [of] [...] approximately 70 per cent of the current value of our price indication. Thus, theoretically at most 30 per cent of the total consideration would be dependent on synergy realization. Therefore it could be argued that from the perspective of an ABN AMRO shareholder, the proportion of the value of our possible offer that relates to the realization of synergies is the product of these three percentages (i.e. 30% x 20% x 30%)."[12]

[11] Although a revision of the exchange ratio before consummation of the deal is possible, it would simply constitute a new bid b.

[12] Letter of Maurice Lippens (Fortis), Sir Fred Goodwin (RBS), Emilio Botin (Santander), and Jean-Paul Votron (Fortis) to Mr Rijkman Groenink (ABN AMRO), dated May 3, 2007 (SEC filing Form 6-K of May 15, 2007, downloadable at http://www.sec.gov/Archives/edgar/data/844150/000119312507114485/d6k.htm)

The letter effectively announces an equity-based earnout. It explains which portion of the offer is contingent on the realization of the target's share of merger synergies. This portion is henceforth referred to as *announced earnout*, defined as $\pi_a = e \cdot \xi \cdot (\lambda s/b)$ with e denoting the equity portion the bid b.[13] The letter implies that, by including the announced earnout π_a, the post-merger premium is equal to the offer premium of 42.9 percent ($\lambda s/v_f^T = .3/.7$). This logic builds on the assumption that ABN Amro receives all synergies from the merger, so that $\lambda = 1$.[14]

RBS, however, intends to gain from the merger, so that $\lambda < 1$. It will therefore expect additional synergies ($(1-\lambda)\, s > 0$), which, if realized as expected, increase the post-merger share price. As ABN Amro's shareholders are paid in stock, they will also benefit from RBS's share of synergies. This effectively raises the post-merger premiums above the offer premium.[15]

Hence, if $\lambda < 1$, the target shareholders receive two types of equity-based earnout: one that is announced and one that is hidden. The latter, henceforth referred to as *hidden earnout* π_h, is not directly included in the offer premium, as the announced earnout π_a, but hidden in the post-merger premium, which includes the bidder's share of synergies.[16] The relationship between the two premiums therefore is

$$p_m = p + \pi_h \tag{11}$$

Note that the amount offered in cash is identical for both premiums. By inserting (6) and (9) in (11) the hidden earnout of the initial bid's equity portion

[13]Note that ξ refers to the target's fraction of *post-merger* equity ownership in a *100 percent* stock merger. The letter erroneously uses the *pre-merger* fraction of equity that RBS would need to finance only *30 percent* of target stock. This neglects (i) the post-merger dilution of the newly issued shares and (ii) and includes the stock portion of the deal twice: once in the 20 percent of issued equity and once as a separately mentioned variable. For a pure stock merger RBS would have to issue $66.\bar{6}$ percent ($1/.3 \cdot .2$) of its equity. This is equivalent to 40 percent ($.\bar{6}/1.\bar{6}$) of post-merger equity ownership without cash portion. Hence, given a 30 percent stock portion, 3.6 percent ($.3 \cdot .4 \cdot .3$) and not 1.8 percent ($.3 \cdot .2 \cdot .3$) of the bid constitute the announced earnout.

[14]To see this, let $p = p_m$ (using (6) and (9)) and solve for X which yields $X = \left(\left(v_f^T + s\right) \cdot N^B\right) / N^T \cdot v_f^B$. If the announced bid is $b = v_f^T + \lambda s$, the negotiated share exchange rate X in (4) only includes the target's share of synergies λs. Substituting $b = v_f^T + \lambda s$ in 4 yields $X = \left(\left(v_f^T + \lambda s\right) \cdot N^B\right) / N^T \cdot v_f^B$. Thus, $p = p_m$ only holds if $\lambda = 1$.

[15]For example, suppose that the total synergies s in the takeover quoted in the letter are equally shared between RBS and ABN Amro ($\lambda = .5$) and that they are expected to be twice as high as ABN Amro's share ($s = 2\lambda s$). Then, ABN Amro's additional gain from RBS's share of synergies ($(1-\lambda)\, s = .5s$) is equal to the announced earnout (3.6 percentage points). Thus, while the offer premium, which includes the announced earnout, remains at 42.9 percent ($.3/.7$), the post-merger premium increases to 48 percent ($(.3 + .036)/.7$).

[16]Hidden earnouts are also the crucial difference between equity-based earnouts and cash earnouts, which are future cash payments that are contingent upon some observable measure of performance. As cash earnouts have no hidden component, they can be fully integrated into the offer premium, either with the maximum amount (e.g., in SDC bid data) or with an expected value.

$e \in [0,1]$ is defined as

$$\pi_h = e \cdot (p_m - p) = e \cdot \frac{\xi \cdot \left(v_f^B + v_f^T + s\right) - b}{v_f^T} \tag{12}$$

Using (1) and (12), (11) can be written as follows.

$$\begin{aligned} p_m &= \frac{b}{v_f^T} - 1 + e \cdot \frac{\xi \cdot \left(v_f^B + v_f^T + s\right) - b}{v_f^T} \\ &= \frac{b}{v_f^T}(1-e) - 1 + e \cdot \frac{\xi \cdot \left(v_f^B + v_f^T + s\right)}{v_f^T} \end{aligned} \tag{13}$$

The first part of the upper RHS in (13), represents the offer premium p, while the second part of the upper RHS represents the additional premium due to the hidden earnout. The first (second) part of the lower RHS in (13), represents the post-merger premium of the cash (stock) portion of the deal. We can now show the following (see appendix for the formal proof):

Lemma 1. *If hidden earnouts are sufficiently high, offer premiums can be negative ($p < 0$), while (i) post-merger premiums are positive ($p_m \geq 0$) and (ii) the acquirer gains control over the target ($\xi < .5$).*

Proposition 4. *Hidden earnouts, and their possibility to compensate for negative premiums, increase in the stock portion e of the payment, and in the target's fraction of post-merger equity ownership ξ.*

Hence, hidden earnouts can explain negative premiums (Lemma), and, as hidden earnouts increase in the target's exposure to the bidder's share of synergies (Proposition 4), so does the likelihood for negative premiums.

The question remains why a target would accept an offer with such a high portion of hidden earnouts that the premium turns negative. We find that the relative size of the target plays a crucial role (see appendix for the formal proof).

Proposition 5. *Bidders can maximize their payment in stock without losing majority control to the target ($\xi < .5$), while keeping the post-merger premium > 0, if the relative size of the target satisfies $v_f^T / v_f^B \leq \left(v_f^B - \lambda s\right) / v_f^B$. If the relative size of the target increases, the offer premium must be smaller or even negative, in order to guarantee majority control.*

The most intuitive explanation of Proposition (5) refers to the extreme case where a target's fair market capitalization exceeds the bidder's value. Here, the only solution to pay with bidder shares without losing majority control ($\xi \geq .5$) is a negative premium. The larger the target, the smaller the (negative) premium that is needed to stay in control, and the higher the hidden earnout that the bidder needs to offer the target as compensation.

To develop a proposition on the market reaction to negative premiums with hidden earnouts, first note that it is impossible to make a bid without a hidden earnout if the bidder wants to gain from a merger ($\lambda \ll 1$) and pay with ownership ($e \gg 0$). Any attempt to engineer a share exchange rate in (4) that fully includes an anticipated hidden earnout would fail, because it could not completely exclude target shareholders from enjoying the joint post-merger synergies, which include the portion $1-\lambda$ that was allocated to the bidder. As the latter enters the bid b in (2), any attempt to fully integrate hidden earnouts *ex ante* into the share exchange rate in (4) does not converge to a solution.

Hence, if hidden earnouts exist, they cannot be explicitly included in the offer premium. This triggers target shareholders to correct offer premiums with positive announcement returns in the magnitude of the hidden earnout.[17] However, the fact that hidden earnouts are present in all stock mergers with $\lambda < 1$ increases the chance that the market reaction to a hidden earnout is confounded with overvaluation.[18] In fact, while overvalued mergers with $e \gg 0$ and $\lambda \ll 1$ always have a hidden earnout (as shown above), it is not a given that mergers with a hidden earnout, $e \gg 0$, and $\lambda \ll 1$ are always overvalued. This suggests that the positive market reaction to hidden earnouts is biased towards the negative market reaction to overvaluation. Thus, although negative announcement returns identify overvaluation in negative premiums, as shown in Proposition (3), they do not reliably identify hidden earnouts.

However, referring back to (1), we can discriminate the effects of hidden earnouts from Proposition (3) by benchmarking the market reaction to the bid $b = v_f^T + \lambda s$ instead of the target's market capitalization v^T. Benchmarking against b discriminates between cases where the post-announcement value of the target $v_{t+1}^T = b + \pi_h \cdot v_f^T$ (i) exceeds bid b, because of expected hidden earnouts ($\pi_h > 0$); or (ii) does not exceed bid b, because of the absence of hidden earnouts ($\pi_h = 0$).[19] We summarize this in the following proposition.

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[17]Suppose a target with a fair value of 100 accepts a stock-for-stock bid of 90 with a hidden earnout of 20. Then, the offer premium is negative ($90/100-1$), but the target's announcement return is positive, as the post-merger premium is positive ($(90+20)/100-1$).

[18]Suppose an overvalued target with a market capitalization of 100 and a fair value of 80 accepts a stock-for-stock bid of 90 with a hidden earnout of 5. Then the offer premium is negative ($90/(80+20)-1$), the post-merger premium is positive ($(90+5)/80-1$), but the target's announcement return is negative, as the market capitalization falls from 100 to 95.

[19]With hidden earnouts, the target's post-announcement capitalization in Footnote 18 is $v_{t+1}^T = 95$, which exceeds the bid $b = 90$. Without hidden earnouts, the market reaction would reduce the target capitalization to $v_{t+1}^T = b = 90$, and, when including a discount for merger completion risk, to $v_{t+1}^T < b = 90$.

Proposition 6. *If a bid $b = v_f^T + \lambda s$ is announced with hidden earnouts ($\pi_h > 0$), the target's post-announcement value $v_{t+1}^T = b + \pi_h \cdot v_f^T$ exceeds b, such that the post-announcement premium $b/v_{t+1}^T - 1$ is negative. This market reaction also applies to negative offer premiums ($b < v_f^T \Rightarrow p < 0$) with $\pi_h > 0$.*

Our model assumes that the exchange rate between target and bidder shares is fixed. If exchange rates are flexible, the bidder announces an amount per target share, e.g., 10 U$, payable in bidder shares. The exchange ratio in (4) is then an *outcome* of this amount and is specified as close as possible to the effective date of the merger. This insulates target stockholders from volatility in the bidder's stock price. Although the offer premium is not based on the exchange ratio in (4), the form of payment, however, is still in stocks. Hence, target shareholders will still receive hidden earnouts, which, if sufficiently large, enable negative premiums.[20]

2.3 Market liquidity

In a liquid market investors can sell their assets without a significant loss in the value of their investment. If there is limited interest, however, they may find it difficult to sell without offering a *liquidity or marketability discount.* The pertinent literature distinguishes between liquidity in the stock market and in the market for corporate control.

Empirical studies that specifically focus on the relationship between stock liquidity and takeover premiums report mixed results. Massa and Xu (2011) argue that public acquirers prefer a *high* liquidity of target's shares and reflect this in higher premiums. Yet, Chung and Lee (2011) show that *poor* liquidity of target stock is positively related to abnormal returns to the target (which can be interpreted as a proxy for premiums), as post-merger liquidity improvement is priced in.

For the market of corporate control, Schlingemann et al. (2002) show that firms are more likely to divest subsidiaries in industries with a high merger and acquisition activity in the recent past. Although firms prefer to sell the most

[20] The same applies to collar provisions, which are a mixture of fixed and variable exchange rates. Like flexible exchange rates , they also make the bid more cash-like and less contingent for target shareholders (Officer, 2004, 2006). Collars define floors and/or caps for bidder stock prices within which the exchange ratio is fixed. Outside of this range the exchange ratio is adjusted up or down. In the course of such an adjustment, an originally negative premium may become positive. This is consistent with our model, as a collar breach would constitute a completely new bid with, in this case, a positive premium.

liquid corporate assets, liquidity discounts and even negative premiums are possible if shareholders are forced to sell, as in fire-sales (Shleifer and Vishny, 1992). Fire-sale discounts result when the observed selling price of distressed or bankrupt assets is below their fundamental value (the value in best alternative use). Several studies present evidence on fire-sale discounts (e.g., Pulvino, 1998, 1999; Ramey and Shapiro, 2001; Acharya et al., 2007). Their antecedents comprise a number of temporary demand-side conditions that can attenuate industry rivals' willingness or ability to bid for a bankrupt target. These include industry debt overhang (Clayton and Ravid, 2002) and wider financial distress, which tends to be contagious within an industry (Lang and Stulz, 1992).

A central condition in our model is that the post-merger premium has to be positive. In other words, despite being forced to sell below a fair market value, e.g., due to (imminent) bankruptcy or financial distress, the owners of the target still have to gain in comparison with all other options. Here two assumptions come into play. First, if the target, as a going-concern entity, is not taken over within a certain time frame, its ultimate value for the target shareholders is even lower. Eckbo and Thorburn (2008), for example, only find evidence of fire-sale discounts in (Swedish) bankruptcy auctions that lead to piecemeal liquidation, but not in going-concern sales of targets.[21] Second, due to differences between firms or market imperfections, the bidder is able to employ the same corporate assets more efficiently than the (seller of the) target. According to the Q-theory of mergers, corporate assets are re-allocated from low-Q sellers to high-Q buyers (Jovanovic and Rousseau, 2002). Jensen (1991) argues that bankruptcy sales are an important mechanism for the efficient redeployment of assets.

In liquid markets, competition between heterogeneous bidders is likely to bid up the premium into positive territory. Eckbo and Thorburn (2008) report that just five interested bidders and three actual bids in a typical going-concern bankruptcy auction appear to be sufficient to counter potential fire-sale tendencies. In less liquid markets, however, a target may be forced to bargain with only one bidder. Even if this bidder is able to pay more, a negative premium may be the best outcome for a target, particularly if liquidation is its only outside option.[22]

In the framework of our model, a bidder would be able and, in a liquid market, also willing to bid $b = v_f^T + \lambda s$, while the target's shareholders anticipate

[21] Merger talks are therefore often initiated by distressed targets in order to avoid bankruptcy or preempt liquidation. Thorburn (2000) and Eckbo and Thorburn (2008) present evidence that many targets privately work out an acquisition agreement just prior to bankruptcy filings, so-called 'prepacks'.

[22] Boone and Mulherin (2007) show that about half of all targets negotiate with a single bidder. Interestingly, they also find that abnormal returns for target shareholders as well as premiums are comparable with auctions to multiple bidders. However, they do not specifically focus on distressed targets and/or low market liquidity.

a liquidation value of $0 \leq v_l^T < v_f^T$ as the target's ultimate value without takeover.[23] In an illiquid market, a liquidity discount $l \in [0,1]$ can reduce the bid $b = v_f^T + \lambda s$ either (i) by an amount equal or less than the target's share of merger synergies $0 < lb \leq \lambda s$, resulting in a lower, but non-negative offer premium $p = (b - lb)/v_f^T - 1 > 0$, or (ii) by more than the target's gains, $lb > \lambda s$, which results in a negative offer premium, $p = (b - lb)/v_f^T - 1 < 0$. The post-merger premium that refers to the liquidation value v_l^T is $p_m = lb/v_l^T$, which is positive as the target's shareholders relate the bid $lb > v_l^T$ to the liquidation value as the only other possible outcome. We summarize this as follows:

Proposition 7. *If (i) liquidity discounts are sufficiently high ($l > \lambda s/b$), (ii) distressed targets anticipate sufficiently low non-takeover values for the target ($0 \leq v_l^T < v_f^T$), and (iii) bidders assume a target value of v_f^T, then offer premiums $p = (b - lb)/v_f^T - 1$ are negative, while post-merger premiums $p_m = lb/v_l^T$ are positive.*

Although Proposition (7) is framed for the market of corporate control, it applies in extension, but arguably to a lesser extent, to stock market liquidity. The empirical tests therefore include liquidity measures for the stock market and the market of corporate control.

2.4 Agency

If the target's managers privately benefit from selling the target below its fair value, agency theory suggests that they propose or at least support such a deal. At the announcement of such a merger, we would observe a negative offer premium, but, by design, the realized post-merger premium would also have to be negative. Hence, the target shareholders will not support the merger, because their participation constraint as principals is not satisfied. Anticipating this, it makes no sense for target managers to announce a merger below fair market value if the deal is purely motivated by self-interest.

This is different for positive premiums, after correcting for agency costs. Even if positive premiums with agency costs are lower than without, shareholders may participate in the merger as they still expect a gain. The empirical evidence on positive target premiums and agency costs is mixed and type-dependent. While Bargeron et al. (2009) find no relation with target CEO retention, Hartzell et al. (2004) report a negative correlation with cash payments for target CEOs, and Moeller (2005) a negative and a positive relation with target shareholder control in the 1980s and 1990s, respectively.

[23]For simplicity we assume a liquidation value, but, in principle, target shareholders can anticipate any future stand-alone value that is lower than v_f^T.

If the post-merger premium with agency costs is positive, the offer premium is also positive. Thus, agency theory alone cannot explain negative premiums, but it may play a role in explaining non-negative VLPs. Given the mixed effects of agency on negative and non-negative VLPs, we will empirically test for agency costs, but refrain from deriving separate propositions.

2.5 Generalization to VLPs

Negative premiums are the most extreme and distinctive outcome of the much larger phenomenon of VLPs, which also include non-negative premiums. The very same theory that explains negative premiums also applies to VLPs. Accordingly, all of the above propositions generalize to VLPs. Propositions (4) to (6) on hidden earnouts directly apply to VLPs. For the remaining propositions, substitute $\delta > \lambda s$ by $0 < \delta$ in Propositions (1) and (3), $E(\lambda s) > \lambda s$ by $0 < E(\lambda s)$ in Propositions (2) and (3), $l > \lambda s/b$ by $0 < l$ in Proposition (7), and exchange the term 'negative premium' with 'VLP'. Propositions (1) and (2) then predict lower premiums (negative, zero, or positive) and Proposition (3) lower announcement returns than without overvaluation or liquidity discounts.

3 Data and definitions

3.1 Sample design

The sample is constructed from Securities Data Corporation International Merger and Acquisition Database (SDC) and contains offers that are announced in the years from 1995 to 2011. We include both completed and withdrawn offers subject to the following selection criteria.[24] The transaction has an economically significant value of 10 mil U$ or more. Targets and bidders have Standard Industrial Classification (SIC) codes outside the ranges 6000–6999 (financials) and 4900–4999 (regulated utilities) to ensure that regulatory constraints do not affect the occurrence of negative premiums. Bidders seek to acquire full control over the target, both firms are incorporated in the US and have common shares listed for which price and return data are available in Datastream.[25]

There are several technical issues and special cases that can produce negative premiums in the data. Negative premiums can be caused by a reverse stock split or a dividend payout that the target announces together with a negotiated merger bid. Hence, we use stock prices that are adjusted for dividends and stock

[24] For studies with similar criteria see, e.g., Schlingemann (2004); Dong et al. (2006); Helwege et al. (2007).

[25] Acquirers and targets in SDC are matched with Datastream using SEDOLs and CUSIPs. The SDC CUSIPs are recoded into Datastream local codes [LOC] by adding a country prefix.

splits. If a target receives several bids by the same or competing bidders, we exclude all but the very first offer to minimize any confounding events.[26] All acquisitions with the same immediate or ultimate parent are eliminated from the sample to exclude negative premiums that arise through internal reorganization or through financial restructuring with repurchases or self-tenders. We also exclude all partial acquisitions, asset sales or multiple acquisitions on the same day with the same bidder or seller.[27] Negative premiums are also common in reverse mergers that allow privately held companies to obtain a listing on a public exchange without an IPO.[28] For this reason, and for reasons of limited data availability, we exclude private targets from our sample. Another technical reason for negative premiums can be mandatory offers, where a bidder is required by law to make an offer for the remaining shares of the target.[29] To keep our sample as clean as possible we therefore require that bidders have no toeholds and make an offer for 100 percent of target shares. We also focus on deals in the US, where there is no general mandatory bid requirement.[30] Finally, we exclude all spinoffs, recapitalizations, self-tenders, repurchases, deals with a government controlled entity, and deals where the announcement date is estimated. After this selection procedure, we manually checked the stock prices, announcement dates and merger filings (published by the SEC) of all targets with negative premiums, but did not find any other technical, legal or tax related explanations. The final sample consists of 1937 deals with non-missing offer premiums in SDC and, after a match with Datastream, 1776 deals without missing values for empirical analysis.

[26]A comparison of initial and final bids in SDC reveals that roughly half of all follow-up bids are downward adjustments.

[27]For example, parallel asset sales can hollow out a target and result in a low bid for its shares. If several subsidiaries are bought together (e.g., individual hotels from the same seller) tax reasons can make it worthwhile to negotiate negative premiums for some with high premiums for others as a compensation.

[28] The public acquiring vehicle (often shell corporations) is merged into the private target in a share exchange deal that allows the target to gain controlling ownership of the surviving entity (Gleason et al., 2005).

[29] For example, in March 2007, Porsche triggered a mandatory takover bid by raising its stake in Volkswagen (VW) to over 30 percent. As Porsche did not intend to purchase the remaining shares of VW, they offered a price below the current market price of VW. Consequently, in SDC, the deal (#1852060040) is recorded with a negative premium of -14.4 percent.

[30] However, in certain states, if a bidder acquires a certain percentage of the target (20% in Pennsylvania, 25% in Maine, 50% in South Dakota), other shareholders can demand that the bidder purchase their shares at a fair price ('control share cash-out' provision).

3.2 Premium measures

In defining the premium, we take the perspective of the target's shareholder on the open market and use the offer price that the bidder announces to pay per outstanding target common share, as reported in SDC. If there are multiple bids, we use the initial offer. "With offer prices, premium estimation is reduced to finding the best 'base' price with which to scale the known offer price." (Eckbo, 2009, p.154) As the correct base price is principally unknown, we apply two methods to define the base price and, in extension, negative announcement premiums.

First, we use the target's pre-bid secondary market price which the bidder relies on in order to determine the initial offer premiums. To ensure that this base price is largely free of leakage of information and market anticipation of the pending offer, we select a target share price four weeks (20 trading days) prior to the announcement day t, henceforth $t = -20$. Selecting an earlier date has the advantage that it minimizes the inclusion of runups, but it also opens the window for more confounding events between the date of the base price and the offer. For robustness checks, we also use base prices eight weeks ($t = -40$), one week ($t = -5$) and one day ($t = -1$) prior to the announcement.

Second, we adjust the base price (and thus the premium) with the market return between the date of the base price and the announcement of the offer (Krishnan et al., 2007). With this method we control for negative premiums that are due to adverse market movements where the valuation of the whole market and not only of the target drops.[31] Empirically, however, the differences between an unadjusted and market-adjusted premium are negligible (also see Section 4.1). Based on the four week measure ($t = -20$), the number of negative premiums actually increases from 154 to 162 after adjusting for stock market movements. Most of our models refer to the four week premium ($t = -20$), in percent and adjusted for changes in the S&P 500, as the standard measure.[32] If not reported otherwise, we refer to the lowest decile of the standard premium measure as VLPs. The results reported in this paper are robust to the other premium measures and also other cutoff points for VLPs (see Section 6).

The consideration paid by the acquirer often differs from the price received

[31] Suppose, the target's base price is 10 at a market index of 100. A month later the index crashed to 50 and a bid is announced to buy the target for 8. At face value, the announcement premium is negative (8/10-1), but not if we adjust the base price by the -50 percent market return (8/5-1).

[32] We compute the premium as follows: (bid per target share / target share at $t = -20$) - (S&P500 at $t = 0$ / S&P500 at $t = -20$), multiplied by 100 for a percentage measure.

by the target shareholders. This may suggest to use the takeover consideration for an alternative premium measurement. There are, however, several data issues with the total consideration reported in SDC. First, next to capital infusions and liabilities assumed, the total consideration also includes the purchase of options, preferred shares, assets, warrants, and common like shares. All these items are not included in the data on the target's market value prior to the announcement, which refers to common shares outstanding. Hence, to align the bid with the target's base price, all the above items have to be subtracted individually from the total consideration. This leads to large outliers and requires quite arbitrary truncation methods (Officer, 2003). Second, any stock portion in the total consideration (incl. common stock) is valued at the last day before the final bid is announced. Thus, if bids are revised or rivaled, any premium that is based on the total consideration is (i) confounded by the whole bidding process; and (ii) does not refer to the offer value at the announcement date, but to an unknown point in time several months or even years later. Third, the consideration paid includes all target stock purchases made within six months of the announcement date. Again, as above, critique (i) and (ii) apply. Moreover, if the takeover process exceeds six months, any purchases of target stock after this period underestimate the premium. In sum, the total consideration is too confounded to reliably identify negative premiums. Moreover, we refrain from using the total consideration to prevent mixed perspectives in our analysis. In this paper we are primarily interested in the target shareholders' perspective and why they accept negative premiums, less so why acquirers may accept a higher consideration than the price received by the target.

3.3 Construction of variables

3.3.1 Overvaluation

There is no generally accepted measure of overvaluation; hence, we use several proxies in line with the literature. The main issue is that a high measure might suggest overvaluation or high expectations concerning future growth and profitability, as suggested by Q-theory (Jovanovic and Rousseau, 2002). Tobin's Q is nevertheless a widely used measure of overvaluation. We compute Tobin's Q for the target (TQ_t) and the bidder (TQ_b) as the ratio of the market value of assets over the book value of assets at $t = -20$. As in Masulis et al. (2007), the market value of assets is defined as the book value of assets minus the book value of common equity plus the market value of common equity. Dong et al. (2006) use the price-to-residual-income-model-value ($PRIMV$) to capture overvaluation. The $PRIMV$ refers to the Ohlson model and is based on earnings forecasts (Ohlson, 1995).[33] Dong et al. (2006) determine the cost of equity using a market model to estimate beta. Yet, they admit substantial variation in their estimates, which they resolve with winsorization. Even after winsorization, the cost of equity estimates lead to extreme fundamental values, as estimates vary between 3% and 30%. To avoid outliers, we follow DMello and Shroff (2000) and use a constant discount rate of 12.5%. Furthermore, in line with Dong et al. (2006), the computation refers to a three year window.

Based on the functional fixation hypothesis, firms with high accruals and net operating assets tend to be overvalued, because investors overstate accounting performance (Hirshleifer et al., 2004; Sloan, 1996). Thus, for robustness, we also compute operating accruals ($ACCR$) and net operating assets (NOA) as discussed in Hirshleifer et al. (2004, p.306-307). Unfortunately, quarterly accounting data do not cover the whole investigation period. Therefore, all accounting-related measures, including $ACCR$ and NOA, use the latest available annual data prior to the bid announcement.

In order to analyze the market response to overvaluation, we follow Brown and Warner's (1985) standard event study methodology to compute cumulative abnormal returns to the bidder (CAR_b) and the target (CAR_t) for the two-day event window (-1, 1) starting with the closing price one day before the announcement. We estimate the market-adjusted model $AR_i = r_i - r_m$, where AR_i is the acquirer i's abnormal return, r_i is the stock return on acquirer i and r_m is the return of the S&P 500 index. Following Fuller et al. (2002) and Dong et al. (2006), we do not estimate market parameters based on a time period before each bid, because there is a high probability that previous takeover attempts would be included in the estimation period. This would make beta estimations less meaningful.

Schwert (1996) and Betton et al. (2009) report that the main abnormal price change preceding a merger occurs about 10 to 15 days prior to the announcement. To measure runups ($RUNUP$) we therefore use a window from $t = -20$ to $t = -1$ for which we compute S&P 500 adjusted buy and hold returns to the target.

3.3.2 Hidden earnout

In line with Section 2.2, hidden earnouts are more likely if the percentage of consideration paid in stock (EQ) is large and if the acquirer has to issue a substantial portion of new equity (NEW_EQ). NEW_EQ is the number of com-

[33] Dong et al. (2006) use I/B/E/S data to obtain analysts' consensus earnings forecasts. Analysts' forecasts are not available for most targets, and the number of forecasts is a crucial factor regarding the precision of the measure. Hence, we use actual earnings and not forecast earnings to construct the price-to-residual-income-model-value.

mon shares issued in the transaction divided by the total number of acquirer's outstanding shares (after issuance). Both variables are from SDC. Moreover, the relative size (*RSIZE*) of the target matters, which we define as the ratio of target over bidder market capitalization at $t = -20$. Our model predicts that hidden earnouts depend on merger gains. Given an acquirer's share of joint synergies $(1 - \lambda)$ the potential for a hidden earnout increases in total merger synergies. In the absence of a precise measure for synergies, we compute the target's operational profitability (*ROIC*), cost-income ratio (*CI*) and capital turnover (*TURNOVER*) as imperfect proxies for synergy potential. *ROIC* is earnings before interest and taxes over fixed assets, *CI* refers to operating costs over revenues, and *TURNOVER* is revenues over fixed assets.

As discussed in section 2.2, the market response to hidden earnouts can be measured with post-announcement premiums, which relate the bid to the target's post-bid stock price. For this, we use the standard premium measure as defined in Section 3.2, but with a base price at $t = 5$.[34] We chose a post-bid window of five trading days so that, on the one hand, the market has time to compound potential hidden earnouts into the target's stock price, while, on the other hand, the chances for confounding events are limited.

3.3.3 Liquidity

Tick data is not available for many targets from 1995 to 2011; hence, we construct measures based on daily closing prices from $t = -250$ to $t = 10$. We estimate the effective bid-ask spread based on the covariance of subsequent changes in closing prices (*SPREAD*) and the proportion of days per month with zero returns (*ZERO*) as defined in Roll (1984) and in Lesmond et al. (1999), respectively.[35] To assess the liquidity of the market for corporate control, we follow Shleifer and Vishny (1992), among others, and determine the monthly M&A volume in an industry (*MKT_ VOL*). Moreover, we compute the number of transactions per month and industry (*MKT_BIDS*). Industries refer to 2-digit SIC codes of target firms, which is in line with Schlingemann et al. (2002).

We also consider a set of variables that capture a target's distress and negotiation power, which is particularly relevant when liquidity is low. In this

[34] Hence, we compute: (bid per target share / target share at $t = 5$) - (S&P500 at $t = 0$ / S&P500 at $t = 5$) $\cdot 100$.

[35] Alternatively, impact measures infer stock liquidity from the price impact of trading volume (Amihud, 2002; Kyle, 1985). The main shortcoming of impact measures is, however, that they are backward looking, which limits their use in assessing liquidity.

line of argument, targets with high leverage, high dependency on short-term finance, low cash holding and high short-term liquidity needs are more likely to accept negative premiums or VLPs. To measure the target's financial health, we compute total debt to equity ($LEVERAGE$), the ratio of short-term debt to long-term debt ($SHORT\_DEBT$), cash holding defined as cash and cash equivalents to total assets ($CASH\_TA$), and working capital relative to total assets (WC_TA). Furthermore, SDC provides us with the target liabilities assumed by the acquirer ($LIAB$) in the transaction, which we normalize with the target's market value at $t = -20$. The variable also indicates a need for cash, arguably due to financial distress.

3.3.4 Agency

Discretionary accruals can be regarded as a proxy for managerial discretion, which is related to agency theory (Sawicki and Shrestha, 2008; Sawicki, 2011). We decompose accruals into non-discretionary accruals (*NDA*) and discretionary accruals (*DA*) by estimating a modified Jones model (Kothari et al., 2005). We run the following fixed-effects model to determine non-discretionary accruals.

$$accruals_{it} = \alpha_i + \beta \frac{1}{TA_{it}} + \gamma \frac{\Delta Rev_{it} - \Delta NR_{it}}{TA_{it}} + \varepsilon_{it} \tag{14}$$

The residuals of regression (14) are discretionary accruals, whereas the fitted values refer to non-discretionary accruals. Furthermore, in line with Jensens's (1986) Free Cash Flow Hypothesis, *CASH_ TA, ROIC,* and *CI* (as defined above) can also be interpreted as indicators for agency costs.

3.3.5 Deal-specific control variables

In line with the literature mentioned in Section 1 we account for several deal-specific control variables from SDC, which may be correlated with takeover premiums. Eckbo (2009) reports that tender offers (*TENDER*) are related with lower premiums. As the first bid may put a target into play, we control for pre-emptive bidding with high initial premiums (Fishman, 1988) by including the total number of bidders (*NUMBID*) in the takeover process. Analogously, and based on the converse argument, we control for withdrawn bids, which may be due to insufficiently high premiums. Intuitively, the theoretical explanations for VLPs work best for friendly bids. Hence, we control for hostile bids (*HOSTILE*). Although we exclude reverse mergers (Section 3.1), some (public) bidders issue more than half of their equity in the process of the takeover. As explained in Section 3.2 the consideration paid by the acquirer is often significantly higher than the price received by target shareholders. The acquirer may issue additional equity for target capital infusions, target liabilities assumed, or investments into the own or joint entity in support of the merger. Hence, even when acquirers issue more than half of their post-issuance equity, it is not a given that they transfer control to the target shareholders. The latter, however, benefit from these cash injections via hidden earnouts. We therefore include a dummy for these mergers (*NEW_EQ50*), as indicated in SDC. Horizontal mergers may differ in terms of potential synergies, but also because both parties may be jointly affected by industry-specific factors, such as industry debt overhang or a low liquidity for corporate assets. If the target and the acquirer are recorded with the same 4-digit SIC code, the merger is classified as horizontal (*HORIZONTAL*).[36]

4 Empirical analysis

4.1 Descriptive findings

Using our standard premium measure (see section 3.2), we confirm that negative premiums exist. Table 1 reports the annual frequencies of all non-missing premiums, VLPs, and negative premiums in our sample.

(Insert Table 1 about here)

Depending on the year, up to 14.1% of all M&As in the sample exhibited a negative offer premium. In the whole sample period from 1995 to 2011, 8.4% of the transactions had a negative premium. Although there is a lot of variation across years (from 1/55=1.8% in 2009 to 11/78=14.1% in 2004) there is not a single year in the sample without a negative premium. Nearly three quarters of all negative premiums (72.8%) are reported before 2002. This pattern extends to VLPs, where 69.6% are observed before 2002, which indicates that the fifth merger wave was generally rich in low premiums, both negative and non-negative. Given the announcement of negative offer premiums, Table 1 also reports how many post-announcement premiums (PAPs, with a base price at $t = 5$) and how many cumulative abnormal returns (CARs) to the target were negative or non-negative. Over the total sample period, negative and non-negative market reactions are rather balanced with 85 (77) non-negative and

[36] In unreported robustness checks we also tested the following control variables from SDC: cash infusion into the target, bankruptcy of the target, cash earnouts in percent of the bid price, a dummy for shareholder litigation, termination fees, lockup options, and for collars. The results reported in this paper remain qualitatively unchanged. As explained in Section 4.1, some of these controls lacked the necessary variation for inclusion in the reference model.

73 (85) negative PAPs (CARs). Across years, however, the balance between non-negative and negative cases within PAPs and for CARs changes frequently and takes on all possible combinations. For example, in 1997 (2000), there are more negative (non-negative) cases both for PAPs and CARs, but in 1998 (2003, 2004), we observe more non-negative (negative) PAPs and more negative (non-negative) CARs. This supports our theoretical argumentation that the two market reaction measurements capture different underlying effects.

Figure 1 shows the median premium for all targets using adjusted and unadjusted premium measures; apparently the differences are negligible. Moreover, Figure1 plots the median premium in the case of negative premiums and of the lowest 10% and 25% of premiums (VLPs) in the respective year. The median premium of the lowest decile (VLP, p10) is mostly negative. The median premium of the lowest quartile (VLP, p25) is mostly non-negative, but often close to zero and in 2002 even negative.

(Insert Figure 1 about here)

Table 2 provides descriptive statistics for all explanatory variables. In line with the literature (e.g., Dong et al., 2006), we winsorized all variables at the 1st and 99th percentile, which are reported as minimum and maximum values.[37] Note that this does not affect the incidence of negative premiums, as the lowest percentile is negative.

(Insert Table2 about here)

Table 3 reports medians of continuous explanatory variables for the whole sample and for the two sub-samples of positive and negative premiums. Column four shows the difference in medians between the two sub-groups, and the last column reports p-values based on a nonparametric K-sample test. For dummy variables, medians are not useful; thus, the table provides means and t-tests for the variables *NUMBID, TENDER*, *HORIZONTAL*, *WITHDRAWN*, *NEW_EQ50* and *HOSTILE.*

[37] The following three variables from SDC are not included in Table 2 (and also not in our econometric specifications). (i) There is no observation in the sample with cash infusions by the acquirer into the target. (ii) There only exist a few outlier cases of cash earnouts that are not zero. As they lie above the 99th percentile they are all set to zero after winsorizing. (iii) The same applies to a dummy variable that indicates whether the target is bankrupt or goes bankrupt during the transaction. When checking the outliers of cash earnouts and of the less than one percent bankruptcy cases we find that they perfectly predict non-negative premiums.

(Insert Table 3 about here)

Although it is too early to draw any conclusions, we find that proxies for the hidden earnout hypothesis exhibit highly significant group-wise differences. In particular, the equity portion (*EQ*) of the bid, the portion of new equity (*NEW_EQ*), and relative size (*RSIZE*) are considerably higher in the case of negative premiums. This is in line with the theoretical considerations. Targets with low asset turnover (*TURNOVER*) seem to accept negative premiums more frequently. Based on a simple two-sample comparison, most proxies for the overvaluation hypothesis lack discriminatory power, although takeovers with negative premiums have a higher *RUNUP* compared to positive premiums, which may point towards excessive runups as a possible reason for (speculative) overvaluation. The price-to-residual-income-model-value is significantly higher for negative premiums, but only for bidders (*PRIMV_b*) and not for targets. Most measures for market liquidity and for financial distress show now significant differences, with the exception of a significantly lower M&A volume (*MKT_VOL)* in the case of negative premiums. In line with expectations, if a bidder issues more than half of its equity in the transaction (*NEW_EQ50*), if a bid is withdrawn (*WITHDRAWN*), and if a bid is not a tender offer (*TENDER*), negative premiums are more prevalent.

4.2 Determinants of negative premiums

We use logistic regression models to explain the binary outcome of a negative or positive offer premium.[38] Negative premiums refer to the standard market-adjusted premium measure with a base price at $t = -20$ (see Section 3.2), unless explicitly mentioned otherwise. The specification of the explanatory models requires a trade-off between the importance of the independent variable (its discriminatory power) and the availability of observations. Including all variables would result in such a drop of observations that an in depth analysis becomes impossible. We could select variables that discriminate between negative and positive premiums based on two-sample descriptive statistics (see Table 3). A more precise approach, however, is to estimate logit models using each variable as sole explanatory variable. Based on these logit models, receiver operating characteristic (ROC) curves can be derived. We follow this approach and use the area under the curve and the number of observations together with the descriptive statistics to select the most promising explanatory variables for our reference model. Noteworthy, *RUNUP*, the equity portion of the bid (*EQ*), the issue of new equity (*NEW_EQ*), the relative size of the target (*RSIZE*), and

[38] Probit specifiations provide similar results in terms of the direction of influence and the significance of coefficients.

Tobin's Q of the target (TQ_t) exhibit the largest area under the ROC curve and have at least 1774 observations. Other variables like the price-to-residual-income-model-value of the bidder ($PRIMV\_b$) have a high discriminatory power - but lack the number of observations (941) to justify inclusion into the reference model.[39] All model specifications account for (i) industry-specific effects by including dummies both (a) for the target's and (b) for the bidder's SIC code, and (ii) possible time related effects with year dummies. All reported standard errors are adjusted for heteroskedasticity using the Huber-White sandwich estimator.

4.2.1 Overvaluation

Table 4 focuses on Proposition (1) and (2). Model [A] shows the reference or base model containing explanatory variables with the highest discriminatory power and sufficient observations. The effects of Tobin's Q (TQ_t and TQ_b) are in line with Proposition (1). High-Q targets are more likely to receive offers with negative premiums, which suggests that they are overvalued. Bidders' valuation levels (TQ_b) also support an overvaluation effect as relatively overvalued targets exhibit negative premiums. The reference model [A] contains the portion of equity (EQ) and the target's relative size ($RSIZE$) as additional control variables due to their high explanatory power. As discussed in more detail in the next section, both of them provide support for hidden earnouts as another, mutually not exclusive explanation of negative premiums. All other control variables show no statistically significant effects.

Specifications [B] and [C] introduce alternative overvaluation measurements as discussed in Section 3.3.1. Although the number of observations declines to less than half the sample due to missing data, Model [B] shows that overvalued targets with a high price-to-residual-income-model-value ($PRIMV\_t$) are more likely to exhibit negative premiums. It thus reconfirms the relevance of the overvaluation hypothesis as stated in Proposition (1).

Model [D] and [E] include target runups to test Proposition (2). Here, we use a different measure of premiums, referring to a base price at $t = -1$, and not $t = -20$, as in our standard models. This ensures that the measurement periods for runups ($t = -20$ to $t = -1$) and for premiums do not overlap. In support of Proposition (2), Model [D] shows that runups have a positive partial effect on the likelihood of negative premiums. It is not clear, however, whether runups reflect an overvaluation of the target's fundamental value, or an overestimation of expected merger gains for the target. To analyze this we include the interaction term between target runups and Tobin's Q ($RUNUPxTQ\_t$) in Model [E].[40] If

[39]Of course, we include variables with a low number of observations in alternative model specifications and robustness checks.

[40]Note that, both, fundamental overvaluation as well as excessive runups trigger a market

runups merely reflect an increase in Tobin's Q the interaction term would be positive. However, in support of Proposition (2), which suggests that excessive runups can also serve as a separate reason for negative premiums, the interaction term is negative and significant.

The explanatory power of all specifications [A] to [E] is meaningful and pseudo R-squares range from 0.12 to 0.23. Accordingly, we can summarize that we find empirical support for Proposition (1) and (2).

(Insert Table 4 about here)

4.2.2 Hidden earnout

In the previous section, Table 4 already reported positive effects of the equity portion of the bid (*EQ*) and target's relative size (*RSIZE*), not only in the reference Model [A], but also in all other specifications [B] to [E]. In Table 5, we provide more detailed tests of Proposition (4) and (5). First, Model [F] and [G] corroborate the results in Table 4 by showing that the partial effects of *EQ* and *RSIZE* stay positive and statistically significant in isolation. Despite the positive effects of *RSIZE* the results in [G] could be driven by a group of very small targets, while our model predicts that relatively large targets should be associated with negative premiums. To check this we create a variable *BIG_t* that dummies the upper quintile of *RSIZE*. Model [H] confirms that relatively large targets predict negative premiums, in line with Proposition (5). [41]

Based on our theoretical considerations in Section 2.2, Model [I] introduces the percentage of new equity issues (*NEW_EQ*), which we find to be positively related to negative premiums as predicted by Proposition (4). Note that *NEW_EQ* refers to the number of common shares issued *in the transaction* divided by total number of acquirer's *outstanding* shares. Hence, *NEW_EQ* does not include share repurchases by the bidder or non-floating shares that are authorized before the transaction. Schlingemann (2004) shows that share issues and repurchases in the year prior to the takeover are correlated with bidder announcement returns. This implies that ex ante financing may play an important role that cannot be fully captured with *NEW_EQ*. Therefore, as an alternative proxy for the potential ownership of the target shareholders in the merged entity, we compute the relative size of the target multiplied with the stock portion

correction once a negative premium is announced. Therefore, the target shareholder's market reaction (*CAR_t*) cannot discriminate between the two types of overvaluation as underlying reasons for negative premiums.

[41] This effect is robust when we include *BIG_t* together with *RSIZE* (unreported).

of the consideration. Model [J] includes this variable (*EQ_ RSIZE*), which effectively is the interaction term between *EQ* and *RSIZE*, and confirms the results in [I] as well as Proposition (4).

On a more exploratory note and without an explicit proposition to test, Model [K] introduces proxies for expected synergies the target's profitability (*ROIC* and *CI*) and asset utilization (*TURNOVER*). We readily acknowledge that these proxies are imprecise. Moreover, due to missing values, the number of observations in specification [K] drops to 1117 observations. It is therefore not surprising that we do not find any significant effects.

Overall, based on Table 5, the equity portion of the bid, new equity issues and the target's relative size can explain negative premiums confirming the hidden earnout hypothesis, as stated in Proposition (4) and (5).

(Insert Table 5 about here)

4.2.3 Liquidity and agency

Table 6 reports tests of Proposition (7) on the effects of liquidity and explores the role of agency. As in previous specifications, and in spite of different sample sizes, the equity portion (*EQ*) and relative size (*RSIZE*) are significant in all specifications, reconfirming the hidden earnout hypotheses. In addition, Tobin's Q (*TQ_ t* and *TQ_ b*) has predictive power in models [L] to [P], in support of the overvaluation hypothesis. Model [L] introduces measures for stock liquidity (*SPREAD* and *ZERO*), which do not have any significant effect. Model [M] includes proxies for liquidity in the market of corporate control: the number *(MKT_ BIDS)* and volume (*MKT_ VOL*) of monthly M&A bids. The number of bids do not seem to play a role, but targets in industries with a low M&A volume are more likely to face negative premiums. This provides limited support for Proposition (7), which also states that target shareholders anticipate sufficiently low non-takeover values for the target, as in situations of financial distress. Yet, the empirical models in [N] and [O] do not support this view, for firms with low leverage (*LEVERAGE*), high cash holding (*CASH_ TA*) and, in [N], low net working capital (*WC_ TA*) are more likely to exhibit negative premiums.[42]

[42]SDC also provides a dummy that indicates when the target company is bankrupt or goes bankrupt during the transaction and the amount of capital infusion into the target during the transaction (normalized over the target's market value at $t = -20$). Both variables are dropped from the estimation because they perfectly predict positive premiums, which is in conflict with Proposition (7). We also computed Altman's Z (Altman et al., 1977) and Ohlson's O (Ohlson, 1980) as additional measures for financial distress. Due to the high data requirements both measures reduced the number of observations considerably. As with the all other proxies for distress, we find no statistically significant relation between either Altman's Z or Ohlson's O and negative premiums or VLPs.

Models [P] and [Q] consider agency proxies. As discussed in Section 2.4, managers would violate target shareholders' participation constraint if they support negative premiums purely based on self-serving motives. Accordingly, in [P], we do no find any effect on negative premiums. However, in the domain of positive premiums agency costs may be a motive for VLPs. In Model [Q], we therefore use a dummy for positive VLPs and exclude all negative premiums from the estimation. The agency proxies, however, still lack any predictive power.[43]

Overall, liquidity seems to play a minor role in explaining negative premiums with only market transaction volume showing a significant result. Coupled with the fact that financial distress has no predictive power, Proposition (7) cannot be confirmed. This also applies to agency costs, which find no support as an alternative explanation for negative premiums.

(Insert Table 6 about here)

4.3 Market reaction to negative premiums

If our theoretical considerations are consistent, we should observe certain, discriminating market reactions after a negative premium is announced. The sequence of the initial bid and subsequent market response leads to a sequential logistic analysis. Following the methodology discussed by Amemiya (1985) and Liao (1994), we specify a sequential logistic model that assesses two steps: first, whether a premium is positive or negative; second, given the announcement of negative premiums, how a market incorporates this event in target prices.[44] The logistic models presented thus far addressed the first step, isolating overvaluation and hidden earnouts as the most important explanations for negative premiums. For the second step, we therefore focus on these two explanations as they also provide us with theoretical predictions on discriminating stock market reactions to negative premiums.

The second stage is not only a direct test of Proposition (3) and (6) on market reactions, but also allows us to further discriminate between the two

[43]This also does not change if we dummy the lowest quartile of positive premiums or run OLS regressions (specified as in [Q]) on all positive premiums as a continuous variable (unreported). In the latter case, the discretionary accruals of the *bidder* (DA_b) have a *positive* and significant (β =17.724, p =0.045) effect on premiums. This may point to agency costs for bidder shareholders, but fails to explain negative premiums or VLPs.

[44] Besides a sequential logistic model, one could consider a nested logistic (or multinominal) model (Nagakura and Kobayashi, 2007). A nested model, however, would assume that all choices (positive and negative premiums, as well as positive and negative market reactions) are selected simultaneously. This is not the case. In fact, we need to acknowledge a time gap to capture the market response after the announcement of a negative premium.

theoretical approaches, which is difficult in the first stage of the model, because some variables can be interpreted as proxies for both theories. For example, the valuation level of the acquirer could be used to test the hidden earnout hypothesis, as a high valuation level could signal substantial future growth expectations and thus considerable synergies. The valuation level of the acquirer could, however, also serve as a test for the overvaluation hypothesis, as shareholders of an overvalued target may be more likely to accept negative premiums if they are compensated in value stocks as opposed to even more overvalued bidder stock. The second stage model allows us to differentiate between these two arguments.

4.3.1 Overvaluation

As stated in Proposition (6), we expect negative target abnormal announcement returns to negative premiums if they are due to overvaluation. As only the sign but not the magnitude of this reaction matters to identify overvaluation, we compute a dummy variable that distinguishes between a negative abnormal return (1 if $CAR\_t < 0$) and a non-negative return (0 if $CAR\_t \geq 0$). With this variable as the dependent, we estimate logistic models with the sample of deals that have negative premiums. Hence, a positive coefficient indicates that a negative market reaction on negative premiums is more likely.

Table 7 reports the results of this second step of the sequential logistic model, complementing our estimations of the determinants of negative premiums in the first step. Specification [R] replicates the reference Model [A] in Table 4. As in Model [A], and in line with Proposition (3), TQ_t in [R] positively predicts negative market corrections to negative premiums, which points towards target overvaluation as underlying reason. Also, in correspondence with [A], the sign of TQ_b is as expected in all specifications of Table 7 and significant in [T] and [V].[45] In contrast to Model [A] of the first step, none of the proxies for hidden earnouts (EQ, $RSIZE$) are significant in the second step. As explained in Section 2.2, this is in line with our expectations, because of a bias against positive abnormal returns to hidden earnouts when targets are overvalued. In fact, the insignificance of proxies for hidden earnouts supports our notion that negative premiums with a negative abnormal return are due to overvaluation.

Models [S] and [T] analyze target runups, which clearly confirm Proposition (3), but also the effects found in the corresponding estimations [D] and [E]. Runups not only predict negative premiums (Table 4), but also a downward market correction (Table 7). In combination, we can infer from [D] and [E] in the first step, and from [S] and [T] in the second step, that runups are neither a mere symptom of expected hidden earnouts ([D],[S]) nor of fundamental overvaluation ([E],[T]), but that excessive runups themselves constitute one of the

[45]Due to the low number of observations in the second step, we also report and interpret a statistical significance at $p<.1$.

reasons for negative premiums. Model [U] shows that the effect of runups is also robust to the inclusion of the market reaction to the bidder. A higher likelihood for a negative CAR_t is associated with a lower CAR_b, which shows that bidder shareholders are skeptic about deals where target overvaluation may be the reason for negative premiums. Model [V] tests liquidity as a competing explanation, but without support.

Overall, we can confirm Proposition (3) not only with regard to the overvaluation of the target's fundamental value (TQ_t), but also with regard to excessive runups ($RUNUP$).

(Insert Table 7 about here)

4.3.2 Hidden earnout

As explained in Section 2.2, the market response to negative premiums with hidden earnouts is measured best with post-announcement premiums (PAPs). Negative premiums remain negative after their announcement (with a PAP base price at $t = 5$), if the anticipation of hidden earnouts prevents that target price adjustments hit or undercut the bid price.[46] To analyze the second step of the sequential logistic model for hidden earnouts, and to test Proposition (6), we use a dependent variable that takes the value one for negative PAPs and zero otherwise. The estimation procedure corresponds to the previous section. Model [W] in Table 8 is the reference model. The other model specifications probe into alternative proxies for hidden earnouts ([X] to [Z]) plus runups and market liquidity as competing explanations for negative PAPs ([ZA][ZB]).

With regard to hidden earnouts, we find that relative size ($RSIZE$), big targets in the upper quintile of $RSIZE$ (BIG_t), and the product of EQ and $RSIZE$ (EQ_RSIZE) as a proxy for ownership transfer, are all positively correlated with negative PAPs ([W] to [Y]). Model [Z] provides robustness to the inclusion of abnormal returns (CAR_t, CAR_b) and shows that the shareholders of both target and bidder react positively to the announcement of negative premiums when they expect hidden earnouts. This confirms Proposition (6) and corresponds to our findings in the first stage (Table 5). There is, however, one striking exception. Although the equity portion of the bid (EQ) is a strong and consistent predictor of negative premiums (Tables 4, 5 and 6), it fails to discriminate between hidden earnouts and overvaluation as underlying effects (Tables 7 and 8). Previous studies show that higher target valuations are associated

[46] In fact, as shown further below, the average target return (CAR_t) is positive, when premiums stay negative after their announcement. This indicates that PAPs successfully identify hidden earnouts as discrete effects and separate from overvalution.

with a higher likelihood for all-equity bids and with lower bid premiums (Dong et al., 2006; Betton et al., 2008a). Our results are in line with these findings. If equity bids are more likely for deals with high target (mis)valuations as well as high hidden earnouts, the equity portion cannot distinguish between the two underlying reasons for negative premiums.

With regard to the proxies for overvaluation, neither higher target valuations (*TQ_t*) nor excessive runups (*RUNUP*) predict negative PAPs in Table 8. In fact, a direct comparison with Table 7 shows that all coefficients of *TQ_t*, *TQ_b* and *CAR_b* point into the opposite direction. The positive effects of *TQ_b*, *CAR_b*, *CAR_t*, and *HORIZONTAL* suggest that high-Q bidders and horizontal mergers have a higher synergies potential. Finally, we also probe into market liquidity as a possible reason for negative premiums. We find that stock market liquidity has no effects (unreported), but that targets in industries with high monthly transaction volumes are less likely to experience market reactions that are consistent with hidden earnouts (negative PAPs).

Overall we can confirm Proposition (6) and indirectly reconfirm Proposition (3) if we exclude the equity portion of the bid as a discriminating proxy.

(Insert Table 8 about here)

5 VLPs

As explained in Section 2.5, the mechanisms behind negative premiums explain VLPs in general, including non-negative premiums. To test this, we rerun the estimations in Tables 4, 5, and 6 with dummies for VLPs, defined as the lowest decile of all premiums, as dependent variable (see corresponding Tables 12, 13 and 14 in appendix). Table 9 reports the most important results, which confirm that our previous findings on the determinants of negative premiums also apply to VLPs. In fact, the proxies for hidden earnouts (*RSIZE*, *EQ*, *NEW_EQ*, *EQ_RSIZE*), overvaluation (*TQ_t*, *PRIMV_t*, *RUNUP*, *RUNUPxTQ_t*) and for liquidity in the market for corporate control (*MKT_VOL*) are equally or even more statistically significant for VLPs than for negative premiums. We also find, in line with our previous results, that all proxies for alternative explanations of VLPs are either statistically insignificant or provide conflicting evidence (see appendix).

(Insert Table 9 about here)

Generally, a single cut-off point that defines VLPs is more sensitive to measurement problems than the whole distribution of takeover premiums. We therefore also analyze the whole spectrum of premiums, and of possible VLP definitions, with quantile regressions (least-absolute value models). Compared to standard OLS regressions, quantile regressions are more robust in the presence of outliers. This is an important advantage as takeover premiums exhibit many outliers and are not normally distributed: the lowest quartile is characterized by premiums close to zero (Figure 1), whereas the 90th, 95th and 99th percentiles show premiums of over 93, 118, and 213 percent, respectively.[47] Hence, focusing on different quantiles is more insightful than analyzing the mean.

We run quantile regressions of the models [A],[E],[H],[I],[J], and [M] for every decile of the distribution of premiums and extract the partial effects of selected covariates. Table 10 reports the coefficients and bootstrapped standard errors of the main explanatory variables. All of these variables significantly affect premiums below the 50th percentile, which provides substantial evidence that the determinants of negative premiums (in logistic regressions) translate to a substantial portion of non-negative premiums below the median (in quantile regressions).[48]

(Insert Table 10 about here)

Although some of the variables signaling overvaluation (TQ_t, $RUNUP$) and hidden earnouts ($RSIZE$, BIG_t) predict lower premiums across almost all percentiles, they mainly affect the lower half of premiums. Figure 2 shows the median of TQ_t and $RSIZE$ for different premium deciles. It is apparent that the valuation level and the relative size of the target decline from lower to higher premiums, which suggests that both variables are more relevant for lower premiums. The missing significance of $RUNUPxTQ\_t$ above Q50 in Table 10 indicates that runups coincide with and reflect high target valuations in the upper half or premiums. Hence, excessive runups, as an independent factor, only predict lower values for premiums below the median ($\leq$Q50). Hidden earnouts crucially depend on payment in bidder's stock (EQ) and the partial transfer of ownership to the target (NEW_EQ, EQ_RSIZE). In Table 10, all of these proxies only affect premiums below the median. The latter also applies to MKT_VOL, which is the only (weakly) significant market liquidity variable. Overall, the results emphasize that the proposed mechanisms behind negative premiums not only apply to VLPs, but to most premiums below the median.

[47] All of the following tests reject the Null that premiums are normally distributed (at a 99.999% level of confidence): Kolmogorov-Smirnov for equality to normal distributions, Skewness and kurtosis test for normality, Shapiro-Wilk test for normality, and Shapiro-Francia tests for normality.

[48] Note that the coefficients have the opposite sign to the logistic regressions above, because the dependent does not dummy very low (or negative) premiums, but reflects the (continuous) percentile in the premium distribution. Also note that MKT_VOL is the only variable where we expect a positive relation (more market liquidity, higher premiums).

(Insert Figure 2 about here)

6 Alternative measures of negative premiums

As discussed in Section 3.2, there are different ways to measure premiums depending on the base price and market adjustments. To check whether our main results hold for different premium measures, Table 11 reports the reference model described in Model [A] using six alternative premium measures.[49] Model [R1] refers to our standard measure, but excludes slightly negative premiums, which may be noise, by coding negative premiums that are smaller than -5% with a dummy equal to one, else zero. Model [R2] refers to our standard measure, but without adjusting for changes in the S&P 500 index. Model [R3] and [R4] compute index-adjusted premiums with a base price at $t = -5$ and $t = -1$, respectively.[50] Specification [R5] refers to the average of the index-adjusted target share prices at $t = -20$, $t = -5$, and $t = -1$. Finally, Model [R6] shows the results of the reference model with an index-adjusted base price at $t = -40$. Regardless which premium measure is used the equity portion of the bid (EQ) and Tobin's Q of the target (TQ_t) exhibit consistent results. TQ_b and *RSIZE* are also consistent except in Model [R6], where *RSIZE* just misses the 95% level of confidence ($p < 0.062$).

Hence, overall, and also in the light of the quantile regressions of our standard premium measure (Section 5), the main results of this paper with regard to overvaluation and hidden earnouts are robust to most negative premium measures and cut-off points for VLPs.

(Insert Table 11 about here)

7 Conclusion

Prior empirical research tends to truncate or remove negative premiums and regards them as noise in the data. We show that negative premiums exist in the period from 1995 to 2011, and that they account for 8.4% of all premiums. Our

[49] Our standard premium measure uses a target share price 20 trading days prior to the announcement ($t = -20$), corrected for stock market movements using the S&P 500 index (see Section 3.2).

[50] The measure in [R3] is also applied to test Proposition (2) in Model [D] and [E], as it does not overlap with the runup period ranging from $t = -20$ to $t = -1$.

paper develops three theoretical explanations for negative premiums: overvaluation, hidden earnouts and market liquidity. For each of these approaches, formal propositions are derived and empirically tested. Negative premiums, however, are just the most extreme and salient tip of the iceberg of low premiums. In fact, we show that the explanations for negative premiums also apply to the majority of non-negative premiums below the median.

Proposition (1) focuses on stand-alone overvaluation, and logistic models confirm that targets with a high Tobin's Q and (to a lesser extent) a high price-to-residual-income-model-value explain negative premiums (Table 4) and VLPs (Table 9). Alternative proxies for overvaluation possess less explanatory power, arguably due to the limited number of observations (Table 4). Quantile regressions show that target overvaluation negatively affects premiums across most of the distribution up to the 90th percentile (Table 10). However, the extent of target overvaluation is highest for lower percentiles (Figure 2). Proposition (2) states that excessive runups constitute a form of speculative overvaluation that can lead to negative premiums. The empirical results indeed show that the likelihood of negative premiums (Table 4) and VLPs (Table 9) increases in the runup. Although we find evidence for the substitution hypothesis across all premium percentiles (Table 10), excessive runups, as an independent factor, only predict lower values for premiums below the median. In sequential logistic models, we confirm that the market reacts to negative premiums for overvalued targets with negative abnormal announcement returns (Proposition (3), Table 7).

Proposition (4) and (5) contend that hidden earnouts explain negative premiums. Our empirical tests provide strong evidence in favor of the hidden earnout hypothesis. In particular, relative size, the equity portion of the bid, and proxies for new equity issues predict negative premiums (Table 5) and VLPs (Table 9). Quantile regressions (Table 10 and Figure 2) underline that the hidden earnout hypothesis also applies to lower, non-negative premiums (40th percentile and below). Sequential logistic regressions confirm a positive market reaction to the announcement of negative premiums with hidden earnouts, which results in a negative post-announcement premium (Proposition (6), Table 8).

Proposition (7) explores the role of liquidity in the stock market and the market for corporate control. We find no support for stock market liquidity and only statistically weak support for the relevance of transaction volumes for negative premiums (Table 6), VLPs (Table 9) and higher premium percentiles (Table 10). Related factors pertaining to fire sales and a target's financial health lack explanatory power. We also rule out agency costs as a possible reason for negative premiums.

In conclusion, the paper provides empirical evidence that negative premiums do exist and proposes theoretical explanations, which are tested and largely confirmed. Furthermore, we show that the theoretical explanations are not only relevant for negative premiums, but also apply to the lowest four deciles of all premiums and thus to a significant proportion of the takeover market.

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Tables and Figures

Table 1: Frequency of VLPs and negative premiums

Year	Total	VLP	Negative offer premium				
			NEG	PAP pos	PAP neg	CAR pos	CAR neg
1995	115	10	8	2	6	2	6
1996	143	16	15	10	5	7	8
1997	191	25	22	10	12	7	15
1998	217	24	21	14	7	9	12
1999	224	20	14	8	5	7	7
2000	209	22	21	12	8	14	7
2001	131	18	17	8	8	10	7
2002	64	11	9	7	1	4	5
2003	81	8	5	1	4	3	2
2004	78	12	11	5	6	5	6
2005	83	8	5	2	3	1	4
2006	86	4	2	1	1	2	0
2007	98	5	4	2	2	2	2
2008	73	4	4	2	2	2	2
2009	55	2	1	1	0	0	1
2010	66	2	2	0	2	1	1
2011	23	3	1	0	1	1	0
Total	1937	194	162	85	73	77	85

Note: *Total* contains all non-missing offer premiums in SDC with a base price at $t = -20$. *VLP* refers to the lowest decile of all premiums. *NEG* reports all *Negative offer premiums* according to the standard definition with a base price at $t = -20$. *PAP pos* (*PAP neg*) refers to a non-negative (negative) post-announcement premium with a base price at $t = 5$, given *NEG*. (Four deals have missing base prices at $t = 5$, resulting in 85+73=158 post-announcement premiums.) *CAR pos* (*CAR neg*) refers to a non-negative (negative) cumulative abnormal return to the target from $t = -1$ to $t = 1$, given *NEG*.

Table 2: Descriptive statistics

	N	mean	sd	min	p25	p50	p75	max
PREMIUM	1776	43.229	39.969	-45.529	18.923	36.106	60.943	213.338
RUNUP	1774	0.084	0.200	-0.380	-0.029	0.052	0.167	0.853
CAR_t	1755	0.224	0.252	-0.259	0.060	0.180	0.333	1.245
CAR_b	1768	-0.018	0.083	-0.281	-0.055	-0.010	0.022	0.259
TQ_t	1776	2.469	2.635	0.537	1.217	1.652	2.541	18.457
TQ_b	1776	3.221	3.815	0.740	1.453	2.065	3.199	27.046
PRIMV t	1135	4.999	16.433	-8.818	-0.012	0.241	2.386	108.963
PRIMV b	941	12.823	57.081	-1.700	0.021	0.288	2.094	482.465
ACCR_t	1187	-0.197	0.295	-1.489	-0.286	-0.103	-0.035	0.434
ACCR_b	939	-0.151	0.176	-0.969	-0.206	-0.089	-0.042	0.118
NOA_t	1310	0.632	0.238	-0.475	0.554	0.692	0.788	0.930
NOA_b	955	0.650	0.159	0.023	0.575	0.681	0.760	0.908
NDA_t	1224	-0.350	0.074	-0.620	-0.378	-0.343	-0.324	-0.092
NDA_b	948	-0.351	0.042	-0.543	-0.362	-0.342	-0.328	-0.229
DA_t	1186	0.156	0.295	-1.040	0.047	0.242	0.317	0.747
DA_b	939	0.198	0.186	-0.611	0.137	0.252	0.309	0.557
EQ	1776	54.229	46.895	0.000	0.000	73.607	100.000	100.000
NEW_EQ	1776	14.174	17.978	0.000	0.000	5.259	26.049	70.744
RSIZE	1776	0.295	0.439	0.001	0.036	0.133	0.381	2.990
ZERO	1501	0.136	0.101	0.023	0.062	0.108	0.181	0.612
SPREAD	1501	1.506	1.955	0.000	0.000	0.845	2.390	9.486
MKT_BIDS	1767	32.420	38.031	1.000	8.000	15.000	33.000	156.000
MKT_VOL	1767	3.754	7.184	0.000	0.466	1.343	3.606	44.341
LEVERAGE	1401	0.540	1.167	-1.710	0.058	0.247	0.604	8.662
SHORT_DEBT	1232	0.358	0.347	0.000	0.052	0.227	0.636	1.000
CASH_TA	1755	0.227	0.237	0.001	0.031	0.133	0.372	0.884
WC_TA	1529	0.313	0.272	-0.582	0.113	0.304	0.521	0.869
ROIC	1146	-0.672	6.004	-30.349	-0.509	0.224	0.878	18.673
TURNOVER	1276	1.054	0.733	0.013	0.544	0.928	1.369	4.086
CI	1243	1.119	1.346	0.280	0.719	0.860	1.029	12.550
LIAB	1776	0.139	0.410	0.000	0.000	0.000	0.000	2.475
NUMBID	1776	0.037	0.188	0.000	0.000	0.000	0.000	1.000
TENDER	1776	0.209	0.407	0.000	0.000	0.000	0.000	1.000
HORIZONTAL	1776	0.380	0.485	0.000	0.000	0.000	1.000	1.000
WITHDRAWN	1776	0.128	0.335	0.000	0.000	0.000	0.000	1.000

	N	mean	sd	min	p25	p50	p75	max
NEW_EQ50	1776	0.025	0.157	0.000	0.000	0.000	0.000	1.000
HOSTILE	1776	0.022	0.147	0.000	0.000	0.000	0.000	1.000

Note: The source of the data is SDC and Datastream. Variable names with the ending _ *t* (_ *b)* refer to the target (bidder). The merger announcement date is $t = 0$. *PREMIUM* is (bid per share / target share price at $t = -20$) - (S&P500 at $t = 0$ / S&P500 at $t = -20$) ·100. *RUNUP* is the market adjusted buy and hold return to the target from $t = -20$ to $t = -1$. *CAR_ t* (*CAR_ b*) is the market adjusted cumulative abnormal return from $t = -1$ to $t = 1$. *TQ_ t* (*TQ_ b*) is Tobin's Q defined as market value over book value of assets at $t = -20$ (as in Masulis et al. (2007)). *PRIMV_ t* (*PRIMV_ b*) is the price-to-residual-income-model-value as in Dong et al. (2006) and Ohlson (1995). *ACCR_ t* (*ACCR_ b*) and *NOA_ t* (*NOA_ b*) is operating accruals and net operating assets, respectively, as defined in Hirshleifer et al. (2004, p.306-307). *NDA_ t* (*NDA_ b*) and *DA_ t* (*DA_ b*) is non-discretionary and discretionary accruals, respectively, estimated with the modified Jones model. *EQ* is the percentage of equity in the consideration. *NEW_ EQ* is the number of common shares issued in the transaction divided by the total number of acquirer's outstanding shares (after issuance). *RSIZE* is the ratio of the target over bidder market capitalization at $t = -20$. *ZERO* is the proportion of days with zero returns per month as in Lesmond et al. (1999). *SPREAD* is the estimated bid-ask-spread based on the covariance of subsequent changes in closing prices as in Roll (1984). *MKT_ BIDS* and *MKT_ VOL* is the monthly frequency and US$ volume, respectively, of all domestic US M&As in the 2-digit SIC target industry. *LEVERAGE* is total debt to equity, *SHORT_ DEBT* is short-term over long-term debt, *CASH_ TA* is cash and cash equivalents over total assets, and *WC_ TA* is working capital divided by total assets. *ROIC* is earnings before interest and taxes over fixed assets, *TURNOVER* is revenues over fixed assets, and *CI* is operating costs over revenues. *LIAB* is the amount of target liabilities assumed buy the acquirer in the transaction. *NUMBID* is a dummy for more than one bidder in the takeover. *TENDER* is a dummy for tender offers. *HORIZONTAL* is a dummy for mergers in the same 4-digit SIC industry. *WITHDRAWN* is a dummy for withdrawn offers. *NEW_ EQ50* is a dummy for acquirers that issue more than half of the post-issuance equity. *HOSTILE* is a dummy for mergers that SDC classifies as hostile.

Table 3: Comparison of sub-groups with positive or negative premiums

	All	Positive	Negative	Difference	P-value
PREMIUM	36.106	39.579	-8.562	48.141	0.000
RUNUP	0.052	0.050	0.080	0.030	0.086
CAR_t	0.180	0.194	-0.009	0.203	0.000
CAR_b	-0.010	-0.010	-0.018	0.008	0.130
TQ_t	1.652	1.648	1.764	-0.116	0.291
TQ_b	2.065	2.077	1.874	0.203	0.159
PRIMV_t	0.241	0.231	0.538	-0.307	0.153
PRIMV_b	0.288	0.233	1.728	-1.494	0.000
ACCR_t	-0.103	-0.104	-0.091	-0.012	0.742
ACCR_b	-0.089	-0.088	-0.101	0.013	0.300
NOA_t	0.692	0.690	0.713	-0.023	0.263
NOA_b	0.681	0.682	0.658	0.024	0.252
NDA_t	-0.343	-0.343	-0.348	0.005	0.341
NDA_b	-0.342	-0.342	-0.341	-0.001	0.355
DA_t	0.242	0.242	0.258	-0.016	0.454
DA_b	0.252	0.253	0.248	0.005	0.735
EQ	73.607	60.670	99.991	-39.322	0.000
NEW_EQ	5.259	4.002	21.450	-17.448	0.000
RSIZE	0.133	0.119	0.355	-0.235	0.000
ZERO	0.108	0.108	0.115	-0.008	0.214
SPREAD	0.845	0.853	0.782	0.072	0.765
MKT_BIDS	15.000	16.000	15.000	1.000	0.300
MKT_VOL	1.343	1.395	0.925	0.470	0.035
LEVERAGE	0.247	0.249	0.209	0.041	0.431
SHORT_DEBT	0.227	0.218	0.349	-0.131	0.053
CASH_TA	0.133	0.133	0.127	0.006	0.730
WC_TA	0.304	0.306	0.251	0.055	0.387
ROIC	0.224	0.230	0.161	0.070	0.205
TURNOVER	0.928	0.946	0.770	0.176	0.024
CI	0.860	0.860	0.859	0.001	0.919
LIAB	0.000	0.000	0.000	0.000	0.112
NUMBID	0.037	0.035	0.050	-0.015	0.379
TENDER	0.209	0.221	0.079	0.142	0.000
HORIZONTAL	0.380	0.377	0.414	-0.038	0.377
WITHDRAWN	0.128	0.122	0.200	-0.078	0.008
NEW_EQ50	0.025	0.020	0.086	-0.066	0.000
HOSTILE	0.022	0.023	0.014	0.008	0.519

Note: The first three columns report medians for continuous variables and means for dummies (*NUMBID, TENDER, HORIZONTAL, WITHDRAWN, NEW_EQ50, HOSTILE*) for the total sample, and for two sub-groups with a non-negative or negative *PREMIUM* ($t = -20$). For RUNUP ($t = -20$ to $t = -1$), *PREMIUM* with a base price at $t = -1$ is used to define the two sub-groups to prevent measurement overlaps. *P-value* refers to the p-value (Pearson's chi-squared) of a two-sided Student's t-test (nonparametric K-sample test) for the equality of means (medians) of dummy (continuous) variables. See notes of Table 2 for the definition of variables.

Table 4: Overvaluation and runups (Propositions 1 and 2)

	[A]	[B]	[C]	[D]	[E]
TQ_t	0.132***			0.113***	0.155***
	(0.030)			(0.032)	(0.035)
TQ_b	-0.122**			-0.075*	-0.068*
	(0.037)			(0.035)	(0.034)
PRIMV_t		0.017*			
		(0.007)			
PRIMV_b		0.000			
		(0.002)			
ACCR_t			0.719		
			(0.627)		
ACCR_b			0.181		
			(1.164)		
NOA_t			-0.464		
			(0.880)		
NOA_b			-0.416		
			(0.950)		
RUNUP				1.691***	2.830***
				(0.476)	(0.593)
RUNUPxTQ_t					-0.333**
					(0.103)
EQ	0.010***	0.013*	0.014**	0.008**	0.008**
	(0.003)	(0.005)	(0.005)	(0.003)	(0.003)
RSIZE	0.629***	1.000**	0.929**	0.589**	0.601**
	(0.170)	(0.376)	(0.323)	(0.187)	(0.192)
NUMBID	0.443	-0.840	-0.832	0.401	0.426
	(0.439)	(0.973)	(1.239)	(0.517)	(0.523)
TENDER	-0.391	-0.863	-0.233	-0.454	-0.506
	(0.363)	(0.771)	(0.611)	(0.323)	(0.324)
HORIZONTAL	0.113	-0.153	-0.102	-0.039	-0.026
	(0.196)	(0.357)	(0.367)	(0.189)	(0.190)
WITHDRAWN	0.275	0.343	0.091	-0.193	-0.217
	(0.258)	(0.453)	(0.416)	(0.304)	(0.309)
NEW_EQ50	0.633	0.545	0.935	0.342	0.346
	(0.454)	(0.757)	(0.708)	(0.489)	(0.500)
HOSTILE	-0.226			-0.789	-0.714
	(0.849)			(1.106)	(1.109)
pseudo R^2	0.13	0.23	0.20	0.12	0.13
ll	-425.881	-138.404	-156.995	-448.942	-443.468
aic	929.762	346.808	387.991	977.884	968.937
bic	1143.565	498.410	550.118	1197.124	1193.657
N	1776	562	591	1774	1774

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All models refer to logistic regressions with a dummy for negative premiums as dependent. The base date for the premiums in [D]-[E] is $t = -1$ to prevent overlap with runups ($t = -20$ to $t = -1$). [A]-[C] test Proposition 1 and [D]-[E] Proposition 2. In [B] and [C] HOSTILE is dropped as it predicts positive premiums perfectly. All models include fixed effects for year, target SIC and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. $RUNUPxTQ\_t$ is the product of $RUNUP$ and TQ_t. See notes of Table 2 for the definition of other variables.

Table 5: Hidden earnouts (Propositions 4 and 5)

	[F]	[G]	[H]	[I]	[J]	[K]
TQ_t	0.135***	0.145***	0.148***	0.146***	0.131***	0.070
	(0.030)	(0.029)	(0.029)	(0.030)	(0.030)	(0.042)
TQ_b	-0.137***	-0.111**	-0.108**	-0.120**	-0.120**	-0.143*
	(0.041)	(0.035)	(0.034)	(0.037)	(0.037)	(0.057)
EQ	0.011***				0.007*	0.008*
	(0.003)				(0.003)	(0.004)
RSIZE		0.662***			-0.131	0.245
		(0.173)			(0.439)	(0.297)
BIG_t			0.820***			
			(0.211)			
NEW_EQ				0.013*		
				(0.005)		
EQ_RSIZE					0.010*	
					(0.005)	
ROIC						-0.017
						(0.021)
TURNOVER						-0.082
						(0.228)
CI						0.028
						(0.088)
NUMBID	0.416	0.491	0.426	0.417	0.420	0.172
	(0.448)	(0.433)	(0.422)	(0.434)	(0.441)	(0.597)
TENDER	-0.430	-1.046**	-0.974**	-0.881**	-0.434	-0.417
	(0.358)	(0.329)	(0.328)	(0.340)	(0.358)	(0.431)
HORIZONTAL	0.090	0.110	0.062	0.074	0.124	0.345
	(0.195)	(0.195)	(0.194)	(0.194)	(0.198)	(0.273)
WITHDRAWN	0.482	0.268	0.325	0.399	0.274	0.394
	(0.246)	(0.262)	(0.245)	(0.249)	(0.263)	(0.354)
NEW_EQ50	1.294***	0.759	0.982*	1.037*	0.472	0.936
	(0.385)	(0.473)	(0.399)	(0.431)	(0.482)	(0.730)
HOSTILE	-0.219	-0.345	-0.494	-0.314	-0.142	0.171
	(0.849)	(0.834)	(0.817)	(0.834)	(0.865)	(0.882)
pseudo R^2	0.12	0.12	0.12	0.11	0.13	0.13
ll	-430.582	-432.608	-431.242	-435.216	-423.929	-251.258
aic	937.164	941.215	938.483	946.433	927.858	542.516
bic	1145.484	1149.536	1146.804	1154.753	1147.142	642.884
N	1776	1776	1776	1776	1776	1117

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All models refer to logistic regressions with a dummy for negative premiums as dependent. [F][I][J] test Proposition 4 and [G]-[H] Proposition 5. [K] explores the role of expected synergies. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. *BIG_t* is a dummy for the upper quintile of *RSIZE*. *EQ_RSIZE* is the interaction of *EQ* and *RSIZE*. See notes of Table 2 for the definition of other variables.

Table 6: Liquidity (Proposition 7) and agency

	[L]	[M]	[N]	[O]	[P]	[Q]
TQ_t	0.124***	0.144***	0.085*	0.083*	0.130*	0.106
	(0.036)	(0.031)	(0.036)	(0.035)	(0.053)	(0.063)
TQ_b	-0.125**	-0.094*	-0.103**	-0.108**	-0.119*	-0.052
	(0.041)	(0.039)	(0.035)	(0.036)	(0.050)	(0.064)
EQ	0.010**	0.010***	0.010*	0.011**	0.014**	0.011*
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)
RSIZE	0.620**	0.772***	0.627*	0.609**	0.848*	0.980*
	(0.233)	(0.178)	(0.251)	(0.235)	(0.331)	(0.422)
ZERO	0.944					
	(1.132)					
SPREAD	0.079					
	(0.057)					
MKT_BIDS		-0.004				
		(0.005)				
MKT_VOL		-0.070*				
		(0.031)				
LEVERAGE			-0.297*	-0.290*		
			(0.146)	(0.137)		
SHORT_DEBT			0.304			
			(0.398)			
CASH_TA			1.526*	1.524*		
			(0.775)	(0.721)		
WC_TA			-1.324*	-1.219		
			(0.672)	(0.658)		
LIAB			-0.002	-0.034		
			(0.412)	(0.371)		
NDA_t					-1.615	1.165
					(2.129)	(1.614)
NDA_b					-1.335	2.573
					(3.857)	(3.829)
DA_t					1.009	-0.230
					(0.618)	(0.438)
DA_b					0.765	0.445
					(1.240)	(0.897)
NUMBID	0.184	0.511	0.473	0.433	-0.834	-0.884
	(0.563)	(0.440)	(0.597)	(0.585)	(1.151)	(0.888)
TENDER	-0.400	-0.426	-0.408	-0.478	-0.248	-0.631
	(0.406)	(0.373)	(0.516)	(0.509)	(0.612)	(0.601)
HORIZONTAL	0.121	0.135	0.171	0.036	-0.212	0.473
	(0.234)	(0.196)	(0.277)	(0.266)	(0.358)	(0.354)

	[L]	[M]	[N]	[O]	[P]	[Q]
WITHDRAWN	0.335	0.230	0.278	0.225	0.125	1.131**
	(0.308)	(0.262)	(0.363)	(0.326)	(0.441)	(0.428)
NEW_EQ50	0.695	0.597	0.178	0.459	1.035	-0.650
	(0.648)	(0.483)	(0.719)	(0.613)	(0.746)	(1.253)
HOSTILE	-0.804	-0.310	-0.395	-0.481		0.171
	(1.125)	(0.870)	(1.160)	(1.123)		(0.728)
pseudo R^2	0.13	0.15	0.14	0.14	0.23	0.18
ll	-326.225	-416.472	-234.742	-269.306	-151.369	-155.406
aic	732.450	914.944	555.485	624.613	380.737	392.812
bic	944.657	1139.503	767.914	842.981	551.628	569.593
N	1488	1767	1033	1186	591	551

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Models [L]-[Q] report logistic regressions with a dummy for negative premiums as dependent. The dependent variable in [Q] is a dummy for positive VLPs (lowest decile). Models [L]-[P] test Proposition 7. [P][Q] explore the role of agency costs. *HOSTILE* is dropped in [P], because it perfectly predicts positive premiums. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. See notes of Table 2 for the definition of variables.

Table 7: Market reaction and overvaluation (Proposition 3)

	[R]	[S]	[T]	[U]	[V]
TQ_t	0.195**	0.168+	0.128+	0.203*	0.169+
	(0.073)	(0.087)	(0.068)	(0.103)	(0.103)
TQ_b	-0.100	-0.144	-0.201+	-0.226	-0.276*
	(0.095)	(0.121)	(0.118)	(0.141)	(0.136)
EQ	-0.001	-0.007	-0.008	-0.008	-0.007
	(0.009)	(0.008)	(0.009)	(0.010)	(0.009)
RSIZE	0.461	0.550	0.511	0.666	0.378
	(0.550)	(0.649)	(0.650)	(0.715)	(0.660)
RUNUP		7.918***	11.166***	10.448***	11.280***
		(1.828)	(2.364)	(2.211)	(2.368)
RUNUPxTQ_t			-1.049**		
			(0.389)		
CAR_b				-7.081*	-7.390*
				(3.080)	(3.230)
MKT_BIDS					0.022
					(0.021)
MKT_VOL					0.053
					(0.059)
NUMBID	2.349+	1.650	2.020	2.259	1.787
	(1.213)	(1.234)	(1.260)	(1.612)	(1.737)
TENDER	1.662	0.682	0.805	0.996	0.910
	(1.413)	(1.002)	(1.012)	(1.081)	(1.065)
HORIZONTAL	-0.671	-0.694	-0.753	-0.631	-0.871
	(0.474)	(0.482)	(0.512)	(0.585)	(0.566)
WITHDRAWN	-0.455	-0.248	0.029	-0.222	-0.107
	(0.797)	(0.885)	(0.866)	(1.105)	(1.449)
NEW_EQ50	-0.458	-0.541	-0.482	-0.967	-1.280
	(0.918)	(1.097)	(1.109)	(1.396)	(1.566)
pseudo R^2	0.20	0.32	0.35	0.38	0.40
ll	-73.744	-62.918	-59.833	-54.334	-52.595
aic	217.487	197.836	193.666	180.669	181.190
bic	318.912	302.159	300.886	283.059	289.269
N	134	134	134	127	127

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table reports the second stage of a sequential model, where the sample consists of negative premiums. [R]-[V] report logistic regressions with a dummy for a negative CAR_t as dependent (1 if CAR_t <0; CAR_t from t=-1 to t=+1). Models [R]-[U] test Proposition 3 directly. [V] tests liquidity as a competing explanation. In all models, *HOSTILE* (dropped) perfectly predicts a positive CAR_t. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. $RUNUPxTQ\_t$ is the interaction between *RUNUP* and TQ_t. See notes of Table 2 for the definition of other variables.

Table 8: Market reaction and hidden earnouts (Proposition 6)

	[W]	[X]	[Y]	[Z]	[ZA]	[ZB]
TQ_t	-0.181*	-0.153*	-0.192*	-0.151	-0.202*	-0.105
	(0.080)	(0.076)	(0.080)	(0.097)	(0.086)	(0.106)
TQ_b	0.261*	0.236*	0.277*	0.307*	0.257+	0.349*
	(0.128)	(0.113)	(0.131)	(0.136)	(0.131)	(0.145)
EQ	0.005	0.006	-0.005	0.008	0.004	0.006
	(0.010)	(0.010)	(0.010)	(0.012)	(0.010)	(0.014)
RSIZE	1.590*		-3.147	2.106*	1.624*	2.797**
	(0.686)		(2.722)	(0.898)	(0.676)	(0.969)
BIG_t		1.729**				
		(0.645)				
EQ_RSIZE			0.050+			
			(0.029)			
CAR_b				10.909*		7.952+
				(4.553)		(4.500)
CAR_t				3.178*		5.307*
				(1.576)		(2.313)
RUNUP					2.491	4.212
					(1.733)	(2.597)
MKT_BIDS						-0.002
						(0.014)
MKT_VOL						-0.294*
						(0.148)
NUMBID	-1.808	-2.177	-1.808	-0.038	-1.876	0.395
	(1.871)	(1.885)	(2.106)	(2.189)	(1.951)	(1.930)
TENDER	0.092	0.348	-0.521	0.606	-0.102	0.972
	(1.182)	(1.169)	(1.151)	(1.224)	(1.196)	(1.462)
HORIZONTAL	1.389**	1.340*	1.513**	1.640*	1.461**	1.276+
	(0.515)	(0.543)	(0.558)	(0.664)	(0.535)	(0.663)
WITHDRAWN	-0.664	-0.514	-0.472	-0.846	-0.702	-1.476+
	(0.648)	(0.679)	(0.689)	(0.789)	(0.672)	(0.863)
NEW_EQ50	-2.104	-1.841	-2.452	-2.378+	-2.153	-2.722+
	(1.484)	(1.181)	(1.633)	(1.365)	(1.348)	(1.394)
HOSTILE	-0.148	-0.500	0.745	-0.277	-0.119	0.992
	(1.491)	(1.577)	(1.594)	(1.718)	(1.514)	(2.200)
pseudo R^2	0.29	0.30	0.30	0.39	0.30	0.43
ll	-65.267	-64.325	-64.194	-54.701	-64.115	-51.064
aic	200.533	198.650	200.388	183.402	200.231	182.128
bic	301.695	299.812	304.441	289.501	304.283	296.829
N	133	133	133	130	133	130

+ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: The table reports the second stage of a sequential model, where the sample consists of negative premiums. [W]-[ZB] report logistic regressions with a dummy (=1) for negative post-announcement premiums (base price at t=5) as dependent. Models [W]-[Z] test Proposition 6 directly. [ZA][ZB] test Proposition 6 indirectly by analyzing competing explanations. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. *BIG_t* is a dummy for the upper quintile of *RSIZE*. *EQ_RSIZE* is the interaction of *EQ* and *RSIZE*. See notes of Table 2 for the definition of other variables.

Table 9: VLPs (lowest decile of all premiums)

	[A1]	[B1]	[E1]	[H1]	[I1]	[J1]	[M1]
TQ_t	0.14***		0.15***	0.15***	0.15***	0.13***	0.14***
TQ_b	-0.13***		-0.08*	-0.11***	-0.13***	-0.13***	-0.11**
PRIMV_t		0.01*					
PRIMV_b		-0.00					
RUNUP			2.71***				
RUNUPxTQ_t			-0.26**				
BIG_t				1.09***			
NEW_EQ					0.02***		
EQ_RSIZE						0.01**	
EQ	0.01***	0.01*	0.01***			0.01*	0.01***
RSIZE	0.74***	1.47***	0.59***			-0.03	0.83***
MKT_BIDS							-0.00
MKT_VOL							-0.05*
NUMBID	-0.03	-1.35	0.25	-0.05	-0.08	-0.07	0.02
TENDER	-0.21	-1.39	-0.48	-0.76**	-0.60*	-0.25	-0.24
HORIZONTAL	-0.03	-0.14	-0.10	-0.08	-0.06	-0.02	-0.01
WITHDRAWN	0.32	0.35	-0.00	0.37	0.45*	0.30	0.32
NEW_EQ50	0.41	0.28	0.08	0.71	0.72	0.14	0.44
HOSTILE	-0.09	0.19	-0.26	-0.43	-0.16	0.01	-0.16
pseudo R^2	0.13	0.23	0.12	0.12	0.11	0.13	0.14
ll	-505.42	-156.72	-508.92	-508.41	-516.40	-501.70	-497.39
aic	1088.83	385.43	1099.85	1092.82	1108.80	1083.40	1076.79
bic	1302.64	542.13	1324.57	1301.14	1317.12	1302.68	1301.35
N	1776	574	1774	1776	1776	1776	1767

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All models refer to logistic regressions with a dummy for VLPs (<p10) as dependent. The base date for the VLPs in [E1] is t-1 to prevent overlap with runups (t-20 to t-1). [A1][B1] test Proposition 1 for VLPs and [E1] Proposition 2 for VLPs. [I1][J1] test Proposition 4 for VLPs and [H1] Proposition 5 for VLPs. Model [M1] tests Proposition 7 for VLPs. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Standard errors (unreported) are corrected for heteroskedasticity. RUNUPxTQ_t is the interaction between RUNUP and TQ_t. See notes of Table 2 for the definition of other variables.

Table 10: Premium percentiles and partial effects

	[Q10]	[Q20]	[Q30]	[Q40]	[Q50]	[Q60]	[Q70]	[Q80]	[Q90]
TQ_t [A]	-1.307**	-1.758***	-2.041***	-1.874***	-2.090***	-2.084***	-1.882**	-1.932*	-2.071
	(0.470)	(0.344)	(0.279)	(0.321)	(0.388)	(0.364)	(0.582)	(0.835)	(1.440)
EQ [A]	-0.090**	-0.074**	-0.063***	-0.067**	-0.037	-0.006	-0.002	-0.034	0.007
	(0.029)	(0.024)	(0.019)	(0.022)	(0.026)	(0.024)	(0.037)	(0.050)	(0.083)
RSIZE [A]	-14.462***	-13.696***	-11.673***	-10.945***	-13.165***	-14.706***	-16.444***	-18.156***	-22.062*
	(2.584)	(2.033)	(1.592)	(1.928)	(2.459)	(2.389)	(3.954)	(5.497)	(9.965)
RUNUP [E]	-30.543***	-36.449***	-33.273***	-35.638***	-37.661***	-37.748***	-42.939***	-46.516***	-60.831***
	(5.163)	(4.094)	(4.762)	(3.741)	(4.079)	(3.302)	(6.959)	(7.764)	(16.422)
RUNUPxTQ_t [E]	3.705**	3.711***	2.822**	2.296**	2.504**	1.364	1.143	1.145	2.451
	(1.317)	(0.808)	(0.944)	(0.787)	(0.842)	(0.719)	(1.618)	(1.770)	(3.205)
BIG_t [H]	-10.125***	-13.193***	-11.743***	-12.372***	-14.350***	-16.744***	-17.030***	-20.165***	-27.937***
	(2.375)	(2.346)	(1.955)	(2.529)	(2.327)	(2.054)	(2.805)	(3.777)	(6.842)
NEW_EQ [I]	-0.174*	-0.219***	-0.146***	-0.148**	-0.143	-0.126*	-0.075	-0.137	-0.210
	(0.077)	(0.056)	(0.040)	(0.053)	(0.085)	(0.054)	(0.084)	(0.098)	(0.194)
EQ_RSIZE [J]	-0.189***	-0.189***	-0.174***	-0.114**	-0.049	-0.043	-0.072	-0.047	-0.116
	(0.037)	(0.041)	(0.035)	(0.039)	(0.058)	(0.055)	(0.072)	(0.079)	(0.167)
MKT_VOL [M]	0.412*	0.291*	0.296*	0.355*	0.229	0.229	0.190	0.426	0.678
	(0.177)	(0.121)	(0.148)	(0.143)	(0.166)	(0.117)	(0.192)	(0.256)	(0.459)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Table reports coefficients and standard errors (in parentheses) of selected covariates, estimated with separate quantile regressions (least-absolute value models) for the percentiles Q10,Q20,...,Q90 of *PREMIUM* (base date t=-20) as dependent variable. In models with *RUNUP* (t=-20 to t=-1) we use the standard premium measure with a base date at t=-1 as dependent to prevent overlaps. The specification of the quantile regression corresponds to the model indicated in brackets behind the variable name. *BIG_t* is a dummy for the upper quintile of *RSIZE*. *EQ_RSIZE* (*RUNUPxTQ_t*) is the product of *EQ* and *RSIZE* (*RUNUP* and *TQ_t*). All models include fixed effects for year, target SIC, and bidder SIC (unreported). Variance-covariance matrix of the estimators is obtained via bootstrapping. See notes of Table 2 for the definition of other variables.

Table 11: Robustness checks based on different definition of premiums

	[R1]	[R2]	[R3]	[R4]	[R5]	[R6]
TQ_t	0.134***	0.128***	0.098***	0.116***	0.133***	0.063*
	(0.031)	(0.030)	(0.030)	(0.030)	(0.032)	(0.030)
TQ_b	-0.142**	-0.082**	-0.065*	-0.065*	-0.095*	-0.019
	(0.051)	(0.031)	(0.032)	(0.033)	(0.040)	(0.027)
EQ	0.011**	0.013***	0.011***	0.008**	0.010***	0.011***
	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
RSIZE	0.687***	0.659***	0.593**	0.471*	0.672***	0.369
	(0.204)	(0.181)	(0.191)	(0.183)	(0.190)	(0.198)
NUMBID	0.617	0.162	0.282	0.430	-0.057	-0.421
	(0.471)	(0.456)	(0.532)	(0.520)	(0.544)	(0.561)
TENDER	-0.274	-0.377	-0.357	-0.405	-0.221	-0.110
	(0.411)	(0.368)	(0.376)	(0.332)	(0.372)	(0.349)
HORIZONTAL	0.052	0.164	0.054	-0.060	-0.085	-0.090
	(0.234)	(0.196)	(0.212)	(0.189)	(0.224)	(0.207)
WITHDRAWN	0.381	0.438	0.163	-0.226	0.055	0.445
	(0.286)	(0.260)	(0.293)	(0.301)	(0.311)	(0.272)
NEW_EQ50	0.325	0.331	0.433	0.356	0.510	-0.060
	(0.484)	(0.479)	(0.471)	(0.470)	(0.496)	(0.563)
HOSTILE	-0.571	-0.000	-0.709	-0.945	-0.596	0.985
	(1.168)	(0.867)	(1.129)	(1.099)	(1.146)	(0.603)
pseudo R^2	0.14	0.15	0.10	0.10	0.12	0.09
ll	-321.258	-409.555	-379.704	-456.372	-359.881	-406.304
aic	720.515	897.109	835.409	990.744	795.762	888.608
bic	934.318	1110.912	1041.865	1204.503	1002.174	1096.455
N	1776	1776	1691	1774	1689	1754

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: [R1]-[R6] report logistic regressions with a various definitions of negative premiums as dependent. [R1] refers to negative premiums smaller -5 percent (using the standard measure). [R2] refers to the standard measure (t=-20) but without stock index adjustment. [R3] refers to an index adjusted base price at t=-5 and [R4] at t=-1. [R5] refers to the average premium based on t=-20, t=-5 and t=-1. [R6] refers to an index adjusted base price at t=-40 (8 weeks). All models include fixed effects for year, target SIC, and bidder SIC (unreported). Reported standard errors (in parentheses) are corrected for heteroskedasticity. See notes of Table 2 for the definition of variables.

Figure 1: Premiums (median) over time

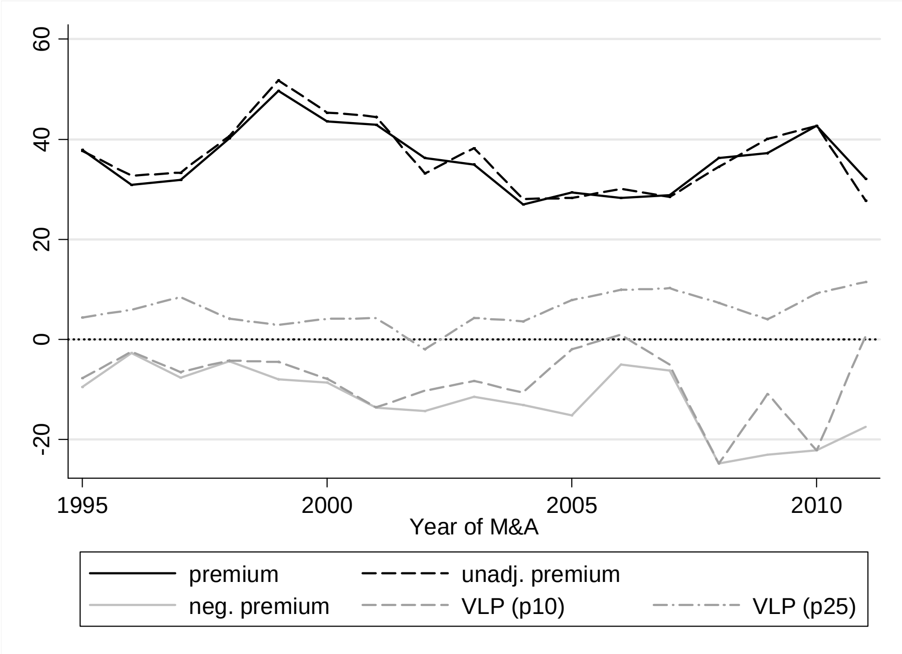
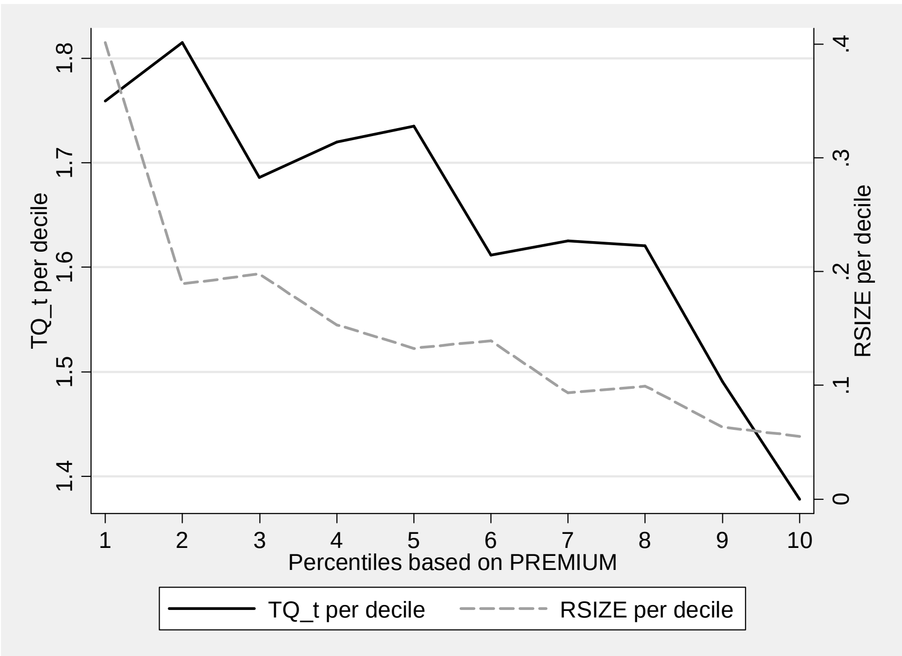


Figure 2: Target valuation and relative size (median) per decile of premiums



Appendix A (Proofs)

Lemma 1

Proof. From (13) follows that the post-merger premium p_m is positive whenever $p - e\frac{\xi(v_f^B+v_f^T+s)-b}{v_f^T} > 0$. Substituting (4) into (10) leads to $\xi = \frac{v_f^T+\lambda s}{v_f^B+v_f^T+\lambda s}$. Substituting ξ, the offer premium $p = \frac{b}{v_f^T} - 1$, as well as the bid $b = v_f^T + \lambda s$ into (13) leads to the following sufficient condition on the hidden earnout π_h that guarantees a positive post-merger premium

$$\pi_h = e\frac{\frac{v_f^T+\lambda s}{v_f^B+v_f^T+\lambda s}(v_f^B + v_f^T + s) - (v_f^T + \lambda s)}{v_f^T} > \left|\frac{v_f^T + \lambda s}{v_f^T} - 1\right|,$$

which can be simplified to

$$\frac{e\,(\lambda-1)\left(v_f^T + s\lambda\right)s}{-\left(v_f^B + v_f^T + \lambda s\right)} > |\lambda s|$$

Given that all other variables are assumed to have positive values, the offer premium $p = \frac{b}{v_f^T} - 1$ can only be negative if $\lambda < 0$. That is, the bid in the offer premium contains no merger synergies and is lower than the target's fair value. In this case, the above inequality simplifies to:

$$\frac{e\,(\lambda-1)\left(v_f^T + s\lambda\right)}{-\left(v_f^B + v_f^T + \lambda s\right)} > -\lambda \Leftrightarrow e > \frac{\left(v_f^B + v_f^T + \lambda s\right)}{\left(v_f^T + s\lambda\right)}\frac{-(-\lambda)}{(\lambda-1)}.$$

To ensure negative premiums due to hidden earnouts, the equity portion has to exceed e^* defined as $e^* \equiv \frac{-\lambda}{1-\lambda}\frac{v_f^B+v_f^T+\lambda s}{v_f^T+\lambda s}$. We have to ensure that $e^* \in [0, 1]$; thus, we derive conditions such that $0 \le e^* \le 1$. It is obvious that $e^* \ge 0$, as $p < 0 \Leftrightarrow \lambda < 0$, which also implies $1-\lambda > 0$. To ensure that $e^* \le 1$, the target's size has to be below the following threshold:

$$\frac{-\lambda}{1-\lambda}\frac{v_f^B + v_f^T + \lambda s}{v_f^T + \lambda s} \le 1$$

$$\Leftrightarrow v_f^T \le -\lambda\left(v_f^B + s\right) \tag{15}$$

The acquirer's shareholders gain control of the merged entity if ξ is below .5. This implies for the target's size:

$$\frac{v_f^T + \lambda s}{v_f^B + v_f^T + \lambda s} \leq \frac{1}{2}$$

$$\Leftrightarrow v_f^T \leq v_f^B - \lambda s \tag{16}$$

Whether (15) or (16) are binding depends on the value of λ. If $\lambda \in [-1, 0)$ inequality (15) is binding; hence, if hidden earnouts exist under the conditions derived ($e > e^*$ and v_f^T fulfills inequality (15)), the acquirer does not lose control over the merged entity. Yet, if $\lambda < -1$, inequality (16) ensures that the acquirer does not lose control. Hence, for sufficiently low v_f^T , $e > e^*$ and $\lambda < 0$, we observe a positive p_m in combination with a negative p. □

Proposition 4

The proposition follows directly from the first derivatives of (12) with respect to e and ξ.

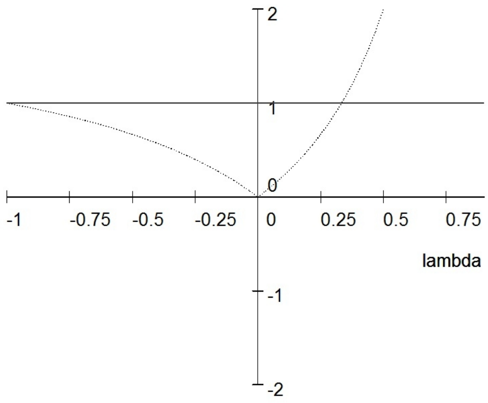
Proposition 5

Consider $\xi = \frac{v_f^T + \lambda s}{v_f^B + v_f^T + \lambda s}$. If $\xi \leq \frac{1}{2} \Rightarrow v_f^B \geq v_f^T + \lambda s$ or $1 - \frac{\lambda s}{v_f^B} \geq \frac{v_f^T}{v_f^B}$. Note that if the acquirer does not want to lose control to the target, only a negative λ allows him to acquire a larger target, while a positive λ is only feasible for smaller targets.

At the same time e and λ need to be chosen such that $p_m \geq 0$. This leads to the following condition (where the second inequality follows from substituting $v_f^B = v_f^T + \lambda s$, i.e. the lower bound for v_f^B):

$$\frac{e\,(\lambda - 1)\left(v_f^T + s\lambda\right) s}{-\left(v_f^B + v_f^T + s\lambda\right)} > |\lambda s| \Longrightarrow \frac{2\,|\lambda|}{(1-\lambda)} < e.$$

The graph below shows the threshold (which is a function of λ and represented by the dotted line) which e needs to exceed in order to guarantee $p_m \geq 0$. Obviously, high values of $e \to 1$ are only feasible in combination with $\lambda \in [-1, 1/3]$.



Assuming $e = 1$, substituting these feasible values of λ into $1 - \frac{\lambda s}{v_f^B} \geq \frac{v_f^T}{v_f^B}$ shows that if $\lambda = -1 \Rightarrow 1 + \frac{s}{v_f^B} \geq \frac{v_f^T}{v_f^B}$, and hence the relative target size $\frac{v_f^T}{v_f^B}$ can be larger than 1, while for $\lambda = 1/3 \Rightarrow 1 - \frac{1}{3}\frac{s}{v_f^B} \geq \frac{v_f^T}{v_f^B}$, the ratio should be smaller than 1.

Appendix B (VLPs)

Table 12: VLP (lowest decile) - Overvaluation and runups

	[A1]	[B1]	[C1]	[D1]	[E1]
TQ_t	0.14***			0.12***	0.15***
TQ_b	-0.13***			-0.08*	-0.08*
PRIMV_t		0.01*			
PRIMV_b		-0.00			
ACCR_t			0.27		
ACCR_b			-0.29		
NOA_t			0.00		
NOA_b			-0.09		
RUNUP				1.83***	2.71***
RUNUPxTQ_t					-0.26**
EQ	0.01***	0.01*	0.01*	0.01***	0.01***
RSIZE	0.74***	1.47***	1.33***	0.58***	0.59***
NUMBID	-0.03	-1.35	-1.29	0.22	0.25
TENDER	-0.21	-1.39	-0.88	-0.44	-0.48
HORIZONTAL	-0.03	-0.14	-0.09	-0.12	-0.10
WITHDRAWN	0.32	0.35	0.19	0.01	-0.00
NEW_EQ50	0.41	0.28	0.69	0.08	0.08
HOSTILE	-0.09	0.19	-0.17	-0.32	-0.26
pseudo R^2	0.13	0.23	0.20	0.11	0.12
ll	-505.42	-156.72	-177.01	-512.83	-508.92
aic	1088.83	385.43	430.01	1105.66	1099.85
bic	1302.64	542.13	597.22	1324.90	1324.57
N	1776	574	602	1774	1774

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All models refer to logistic regressions with a dummy for VLPs (<p10) as dependent. The base date for the VLPs in [D1]-[E1] is t-1 to prevent overlap with runups (t-20 to t-1). [A1]-[C1] test Proposition 1 for VLPs and [D1]-[E1] Proposition 2 for VLPs. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Standard errors are corrected for heteroskedasticity. *RUNUPxTQ_t* is the interaction between *RUNUP* and *TQ_t*. See notes of Table 2 for the definition of other variables.

Table 13: VLP (lowest decile) - Hidden earnouts

	[F1]	[G1]	[H1]	[I1]	[J1]	[K1]
TQ_t	0.14***	0.15***	0.15***	0.15***	0.13***	0.11**
TQ_b	-0.15***	-0.12***	-0.11***	-0.13***	-0.13***	-0.16**
EQ	0.01***				0.01*	0.01
RSIZE		0.77***			-0.03	0.60*
BIG_t			1.09***			
NEW_EQ				0.02***		
EQ_RSIZE					0.01**	
ROIC						-0.00
TURNOVER						-0.10
CI						-0.01
NUMBID	-0.06	0.02	-0.05	-0.08	-0.07	-0.21
TENDER	-0.25	-0.86**	-0.76**	-0.60*	-0.25	-0.31
HORIZONTAL	-0.04	-0.02	-0.08	-0.06	-0.02	0.22
WITHDRAWN	0.57*	0.33	0.37	0.45*	0.30	0.43
NEW_EQ50	1.16**	0.54	0.71	0.72	0.14	0.30
HOSTILE	-0.09	-0.20	-0.43	-0.16	0.01	0.10
pseudo R^2	0.11	0.11	0.12	0.11	0.13	0.10
ll	-513.97	-514.19	-508.41	-516.40	-501.70	-302.75
aic	1103.93	1104.37	1092.82	1108.80	1083.40	659.50
bic	1312.25	1312.69	1301.14	1317.12	1302.68	795.00
N	1776	1776	1776	1776	1776	1117

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: All models refer to logistic regressions with a dummy for VLPs (<p10) as dependent. [F1][I1][J1] test Proposition 4 for VLPs and [G1]-[H1] Proposition 5 for VLPs. [K1] explores the role of expected synergies. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Standard errors are corrected for heteroskedasticity. *BIG_t* is a dummy for the upper quintile of *RSIZE*. E*Q_RSIZE* is the interaction of *EQ* and *RSIZE*. See notes of Table 2 for the definition of other variables.

Table 14: VLP (lowest decile) - Liquidity and agency

	[L1]	[M1]	[N1]	[O1]	[P1]	[Q1]
TQ_t	0.13***	0.14***	0.12***	0.11***	0.14**	0.11
TQ_b	-0.14***	-0.11**	-0.11***	-0.12***	-0.14**	-0.05
EQ	0.01***	0.01***	0.01**	0.01**	0.01	0.01*
RSIZE	0.87***	0.83***	0.79***	0.82***	1.24***	0.98*
ZERO	1.36					
SPREAD	0.06					
MKT_BIDS		-0.00				
MKT_VOL		-0.05*				
LEVERAGE			-0.25*	-0.23*		
SHORT_DEBT			0.41			
CASH_TA			0.95	1.00		
WC_TA			-1.04	-1.03		
LIAB			-0.17	-0.17		
NDA_t					-1.20	1.16
NDA_b					-1.94	2.57
DA_t					0.69	-0.23
DA_b					0.26	0.45
NUMBID	-0.34	0.02	0.04	-0.11	-1.32	-0.88
TENDER	-0.26	-0.24	-0.20	-0.27	-0.90	-0.63
HORIZONTAL	0.05	-0.01	-0.00	-0.03	-0.17	0.47
WITHDRAWN	0.32	0.32	0.22	0.23	0.26	1.13**
NEW_EQ50	0.07	0.44	0.15	0.13	0.74	-0.65
HOSTILE	-0.46	-0.16	-0.07	-0.20	-0.05	0.17
pseudo R^2	0.12	0.14	0.13	0.13	0.23	0.18
ll	-391.16	-497.39	-283.02	-327.18	-170.25	-155.41
aic	864.32	1076.79	654.04	740.37	420.50	392.81
bic	1082.19	1301.35	871.96	958.74	596.51	569.59
N	1501	1767	1046	1186	602	551

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Models [L1]-[Q1] report logistic regressions with a dummy for VLPs (<p10) as dependent. The dependent variable in [Q1] is a dummy for positive VLPs (lowest decile). Models [L1]-[P1] test Proposition 7 for VLPs. [P1][Q1] explore the role of agency costs. All models include fixed effects for year, target SIC, and bidder SIC (unreported). Standard errors are corrected for heteroskedasticity. See notes of Table 2 for the definition of variables.