Relative Reference Prices and M&A Misvaluations

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Abstract

This paper examines the misvaluation hypothesis using a relative reference point (RRP) in M&A market. Reference point is the deviation of a firm's current stock price from its 52-week high, which reflects investors' perception of the firm's valuation. RRP is the difference between the target reference point (TRP) and the bidder reference point (BRP), indicating the extent to which the bidder is more overvalued relative to the target. We find that bidders prefer stock payments when RRP increases. In addition, RRP is positively related to the offer premium and the target announcement returns, and is negatively related to the bidder announcement returns. Though bidders paying according to RRP is perceived as an overpayment around the announcement date, it is positively related the long-term performance of stock bidders. Our results are consistent with the predictions of the misvaluation hypothesis and reference point theory.

Keywords: Target reference point, bidder reference point, the misvaluation hypothesis, mergers and acquisitions

JEL classification: G34; G14

1. Introduction

The misvaluation hypothesis explains an important motive of merger and acquisition (M&A) activities. The theoretical model of Shleifer and Vishny (2003) predicts that the stock market drives M&As. Overvalued bidders who serve the long-term interests of the shareholders will dilute overvaluation through stock-financed acquisitions, as using stocks would accelerate such a dilution process. The misvaluation hypothesis holds that bidders are rational whereas the market is irrational,[1] which violates the efficiency market hypothesis and differs from what Roll's (1986) hubris management predicts. Following Shleifer and Vishny (2003), Dong *et al*. (2006) provide direct evidence that bidders overpay for targets as long as bidders are overvalued relative to targets. Ang and Cheng (2006), who investigated the long-term performance of stock bidders, found a positive relationship between overvalued stocks and long-term performance. Rhodes-Kropf and Viswanathan (2004) provide a behavioural model suggesting that fully rational individuals make mistakes as they tend to overestimate synergies, especially when market-wide valuation is high (Rhodes-Kropf *et al*., 2005).

Conventional misvaluation measures face three major challenges. First, the measures relating to firms' fundamental value cause estimation biases. Different firms could measure assets in different accounting approaches, such as adopting fair value and historical cost approaches varies across the firms. Firms are also found to manipulate accounting figures to raise the firm's value especially prior to financial crisis periods. Secondly, existent misvaluation measures are mainly based on historical or forward-looking information, such as price-to-book value (P/B), price-to-residual income value (P/V) and earnings per share, which are less likely to reflect a firm's latest status. Thirdly, the frequently used ratio of MTBV is a proxy for both mispricing and investment opportunities of the firm. According to Di Giuli (2013)[2], firms with better investment opportunities should also increase the propensity of using stocks in acquisitions, leading to the same prediction as the misvaluation hypothesis.

This paper constructs new proxy for misvaluation, which is a relative reference point (RRP) derived

[1] Shleifer and Vishny (2003) suggest that bidders are rational as they could time the market and use overvalued stocks as a means of payment for acquisitions rather than holding them until they are corrected in the market. Bidders would pay a price that is lower than the estimated synergy created by the combination of firms. The model assumes a target and a bidder with stock volumes K and K_1 respectively, price per unit Q and Q_1 (where $Q_1>Q$) and price per unit for the combined equity S. As synergies can be achieved when $S(K+K_1)-(KQ+K_1Q_1)>0$ the bidders would pay a price P to gain synergies as long as it lies between Q and S, or $Q<P<S$.

[2] Di Giuli (2013) proposed some post-merger investment related proxies to disentangle the effects of mispricing and investment opportunities.

from the reference point theory[3]. Baker *et al.* (2012) define the target reference point as the deviation of a target's current stock price from its 52-week high.[4] Likewise, we define the bidder reference point as the deviation of a bidder's current stock price from its 52-week high, and RRP is the difference between the target and the bidder reference points, indicating the extent to which the bidder is relatively more overvalued than the target (i.e. the relatively more overvalued bidders).[5]

Baker *et al.* (2012) were the first to put forward the idea of applying reference point theory to M&As. They found a non-linear positive relationship between the offer premium and the target reference point. In particular, the reference point effect on the offer premium is stronger in a lower target reference point level than the higher levels.[6] Targets receive higher offer premiums when their current price is far distant from their 52-week highs in the lowest level of the target reference point, implying that undervalued targets can negotiate for high offer premiums. In a similar vein, Chira and Madura (2015) who focused on the reference point effect on acquisition probability found that bidders are less likely to bid for a target whose current price is heavily discounted from its 52-week high, reasoning that the target would insist on high offer premiums if its reference point indicates an undervaluation, which disappoint the bidder. Baker *et al.* (2012) argued that bidders paying according to the target reference point would believe that they can outperform the target. However, their results show that bidders destroy the wealth of their shareholders, reflected in negative announcement returns. It is suggested that managers influenced by reference-dependent bias tend to overestimate about their profit-generating ability.

Our paper extends the work of Baker *et al.* (2012) for two proposed reasons. First, if negative market reactions are as a result of managerial reference-dependence bias, bidders would perform consistently poor in the long run, as the market will downgrades the firm's price when it fully recognises that M&As are driven by managers' misperception, which is similar to the prediction of Ma *et al.* (2016). By examining this, we assess the reference point effect on the long-run performance

[3] Kahneman and Tversky (1979) develop prospect theory that people gauge gains and losses based on a reference point. The notion of the reference point is rooted in the work of Tversky and Kahneman (1974) that people tend to rely heavily on a single piece of information that shapes their minds while making decisions. Prior research has highlighted the 52-week high as a reference price (Grinblatt and Keloharju, 2001; Huddart *et al.*, 2009; Kliger and Kudryavtsev, 2008).

[4] Their paper uses the target reference point and the target 52-week high interchangeably. However, in our case, the reference point refers to the difference between the firm's highest stock price over the period of 52 weeks prior to the M&A announcement (52-week high) and the firm's current price at the M&A announcement date. Such approach makes this reference point easier to interpret.

[5] We present the construction of RRP in the methodology session of this paper.

[6] They find a nonlinear relation between the offer premium and the target 52-week high. The reference point effect is stronger in the lower segment than the other two higher segments. In each segment, the offer premium increases with the target reference point.

of stock bidders, based on the rationale that bidders using overvalued stocks for finance M&As is with a long-term reason (Shleifer and Vishny, 2003). Secondly, we use the bidder reference point to interpret the reference point theory of M&As, since investigating the target reference point alone does not fully account for the bidder's M&A motive. The market would also look at the bidder reference point since it is relevant price information and readily available for the public, which is similar to that of the target reference point. A bidder with a high price relative to its 52-week high offers market an intuition that the firm performs well, which reinforces its bargaining power in an M&A deal. As a result, they are expected to pay a lower offer premium. Thus, paying high offer premiums may signal to the market that managers are overconfident. Finally, Chira and Madura (2015) suggest that bidders also assess their firm's value according to their reference points. Therefore, we should study the bidder as well as the target reference points so as to fully reveal the reference point effect on the M&A motive.

If RRP is a well representation for the market's perception of the firm's valuation, bidders' decisions that rely on the reference points of the two firms involved are as a result of managers timing the market, consistent with the misvaluation hypothesis. Following this, bidder time the market with overvalued stocks. In the meanwhile, bidders are vulnerable as targets are rational (Rhodes-Kropf and Viswanathan, 2004), and could recognise the sign of bidder overvaluation and thus demand high offer premiums (Vermaelen and Xu, 2014). While focusing on the bidder reference point alone does not reconcile the misvaluation hypothesis. If bidder's current price is high relative to the 52-week high, it might be the case that the bidder is currently undervalued as its strong profit-generating ability can be translated into better performance, leading the market to believe that the firm can hit to another new high 52-week high in a relative short period of time, thus reacting positively to a bid announcement. As such, bidders would avoid paying high offer premiums to meet the market's expectation. Moreover, bidders are more willing to pay with cash instead of stocks if they are undervalued. On the other hand, Chira and Madura (2015) indicate optimistic managers who are more likely to acquire their firms (i.e. a management buyout) than outsider firms do if their firms' price is low relative to the 52-week high. RRP eliminates any of these concerns regarding the true valuation of the bidder as this proxy raises relative valuations to the market level. We should suggest that managers focus on relative misvaluation at the market level, as the market drives the valuations of the two firms away from their fundamentals, leaving bidder managers with mispricing opportunities

as long as their firms are perceived to be relatively more overvalued, which is in line of Dong *et al.*'s thinking (2006) who suggest that misvalaution encourages M&As. Therefore, structuring M&A deals should include both the bidder and target reference points.

RRP is able to accommodate the market's intuition of M&A misvaluation. Unlike Dong *et al.* (2006) and Rhodes-Kropf and Viswanathan (2004) who provided a different view for bidder and target's misvaluation,[7] we find that the reference point should unify the investors' view on the misvaluation of the two firms involved. George and Hwang (2004) find investors' sentiment drives firms' misvaluation. Lacking information and time in which to process the deal, investors should be reluctant to bid up a stock price when it is close to the 52-week high, based on the rationale that it is prior good news that has driven the firm value beyond its fundamental value, leading the market to believe the firm is overvalued. On the contrary, investors should be reluctant to sell stocks whose price deviates greatly from the 52-week high, as this may indicate that the firm is undervalued. We extend these arguments in the context of M&As where managers are theoretically highly committed to create value for the firm instead of exploring short-term profits from possible mispricing phenomena.[8] Rather than Dong *et al.* (2006), who measured relative valuations with the difference of the firm's market price relative to its fundamental value that reflects a managerial perception, we examine the case of possible misvaluation from the perspective of the market.

The role of the bidder reference point in the context of M&A valuation is examined in this paper. Following Baker *et al.* (2012) who proposed the target reference point to explain how much bidders should pay for the acquisition target, we suggest that the bidder reference point would lead bidders to consider how much they could pay for the acquisition target. Bidders who perform poorly may find it difficult to provide any rationale to pay the target with high offer premiums. Whilst those with a stock price that is close to its 52-week high are regarded as rich in financing resources and thus dominating the negotiation table. It is also much easier for a well-performed bidder to persuade their shareholders that the firm is stable and they can manage the deal. Hence, bidders may employ their reference point to rationalise the M&A motive. On the other hand, while the bidder's price that is close to the 52-week high may risk firm's prospects. Barberis and Xiong (2009) suggest that investors

[7] Dong *et al.* (2006) propose price-to-book value and price-to-residual income value for bidder misvaluation whereas Rhodes-Kropf and Viswanathan (2004) propose a misvaluation measure based on an assumption that targets are rational.
[8] Donbalt et al. (2015) also indicate investors' sentiment and the market reaction is positively related in the M&A context.

tend to sell stocks whose price is close to the peak price and Huddart *et al.* (2009) also report large abnormal sales' volumes around the 52-week high. Therefore, given that bidders have full access to the firm's fundamental characteristics, they retain the market's confidence according to their reference points.

Prior literature suggests that bidders are likely to pay with stocks for acquisitions when they are overvalued (Ang and Cheng, 2006; Dong *et al.*, 2006). We expect that RRP, the extent to which the market's misperception of the firm's valuation, should also provide similar findings as those in the misvaluation hypothesis. RRP signals to the target firm what a high price they can possibly negotiate for. If targets believe, using the target reference point, that they are overvalued, they would find it even harder to justify this overvaluation since they are generally smaller and lack better investment opportunities than bidders. As a result, they tend to accept more overvalued stocks for liquidity purposes. If this is true, targets have an incentive to sell their firm for a possibly high price through the bidder reference point. In addition, an increase in RRP also leads target shareholders to believe that bidders are attractive as it is more likely for the bidder to rebound to its reference price than the target does. Hence, they might believe that selling their firm to a well-run bidder would more likely to create value. In the light of this, Burch *et al.* (2012) find targets tend to reserve bidders' overvalued stocks, holding a belief that highly-valued bidders are well-performed or have better investment opportunities. Therefore, RRP explains why targets tend to accept overvalued stocks.

Using M&As to investigate the relationship between RRP and M&As is of great interest mainly for two reasons. Firstly, RRP is a direct misvaluation measure that captures the market's perception of the firm's valuation, since it avoids the controversy of using a firm's fundamental characteristics (Lin *et al.*, 2011). M&As serving as a major corporate investment activity draw a great deal of investors' attention. With limited information and limited time in which to process that information, investors are likely to make decisions based on the most current market's perceptions of the firms' valuation, making RRP a suitable valuation proxy for this testing ground. Secondly, RRP will facilitate M&A process. Bidders can identify the relative overvaluation through RRP, as an increase of RRP would potentially drive a relatively more overvalued bidder to dilute overvaluation through acquisitions.

Analysing a sample of 1,878 U.S. domestic public acquisitions announced between 1985 and 2014 and using RRP to test the predictions of the misvaluation hypothesis, we find that the propensity to

use stocks as a means of payment for acquisitions increases with RRP, which is more pronounced when market-wide valuation is high. Our results are robust after applying additional controls. Moreover, the relatively more overvalued bidders tend to pay higher offer premiums. Our results continue to hold after controlling for endogeneity that may arise from omitted variable biases. Finally, multivariate analysis results show that RRP plays a role in bidders' overpayment in the short term. However, higher offer premiums paid by the relatively more overvalued bidders are translated into less negative abnormal returns in the long term, suggesting that bidders who pay for acquisitions according to RRP manage to protect the wealth of shareholders. Overall, the findings are consistent with the predictions of the misvaluation hypothesis and reference point theory.

This paper makes three distinct contributions to the literature. First, this paper explains the misvaluation hypothesis from the reference point perspective. We develop a dynamic valuation framework with RRP that is based on market's perception of the firm's valuation. RRP overcomes the effect of market-wide valuation for an individual firm since both firms experience the same market conditions. A firm's current price that is close to its 52-week highest point is more likely to be driven by the market's sentiment and therefore associated with larger market valuation errors, increasing the probability of the firm been overvalued. Using the RRP, we are able to examine how the valuation difference of the two firms at the market level drives M&As. We lift the bar to the market level, eliminating any estimation biases arising from the use of firm's fundamental value. Furthermore, the RRP is easily observable which makes investors likely to use it for valuation benchmark. Our results suggest that the RRP is able to accommodate the implications of the misvaluation hypothesis.

Secondly, the paper provides direct evidence that more experienced investors behave similarly to less experienced investors in major corporate investment decisions, as they might as well subject to the reference point effect in M&As. However, the market and managers may interpret the reference point differently as the market looks at the offer premium paid according to RRP as a result of overpayment by hubris-infected bidders, while the latter (bidders) pay for acquisitions according to RRP is as a result of market timing. As our results indicated, the less negative long-term abnormal returns for the relatively more overvalued stock bidders compared with the relatively less overvalued (or more undervalued) stock bidders.

Thirdly, the paper offers a new insight into the method of payment hypothesis. We suggest that the sign of relative overvaluation is well identified by RRP, which relaxes the assumptions of irrational

targets (Shleifer and Vishny, 2003) and valuation error misled targets (Rhodes-Kropf and Viswanathan, 2004) in relation to the target's motive of accepting overvalued stocks.[9] As both bidders and targets can identify any relative overvaluation in an M&A deal. Bidders paying stocks instead of cash for a larger RRP acquisition reduce offer premiums while paying cash in a lower RRP acquisition reduce offer premiums compared with the case of the higher RRP acquisitions. Hence, RRP justifies the method of payment choice.

The remainder of the paper is organized as follows: Section 2 designs hypotheses. Section 3 summarizes the data and presents the methodologies. Section 4 analyses the empirical results while section 5 conducts further robustness checks regarding the role of RRP played in the M&A surveyed. Section 6 concludes the paper.

2. Hypothesis development

The misvaluation hypothesis of Shleifer and Vishny (2003) indicates that bidders have a direct incentive to use stocks when they are overvalued. The market has a tendency to assess the firm's reference point during an M&A deal, as predicted by reference point theory (Baker *et al.*, 2012). Managers whose aim is to time the market will also consider to eliminate these overvaluation concerns through M&As. RRP reflects the extent to which the bidder is relatively more overvalued from market perceptions. Bidders will pay with stocks for acquisitions to dilute overvaluation when RRP reveals that they are relatively more overvalued, since holding overvalued stocks in the market will hurt the value of the firm. Therefore, the probability of using stocks for payment purposes increases in line with movements in RRP leading to our first testable hypothesis of

H1: There is a positive correlation between RRP and the likelihood of using stocks as a means of payment in M&As.

Dong *et al.* (2006) propose MTBV as a proxy for misvaluation, indicating that bidders will use both stocks and cash to dilute overvaluation. Their findings imply that diluting overvaluation remains a priority objective for bidder managers. Shleifer and Vishny (2003) predict that bidders'

[9] Common assumptions on whether the target will accept the overvalued stocks suggest that targets either have a cash-out purpose (Shleifer and Vishny, 2003) or misled by the market perception (Rhodes-Kropf and Viswanathan, 2004).

overvaluation will be diluted through acquiring a less overvalued firm. We measure relative bidder-target valuations with RRP. Consistent with the misvaluation hypothesis, we expect that bidders would increase their offer price when they are perceived as relatively more overvalued. Meanwhile, targets can also identify any sign of misvaluation reflected in RRP and ask for higher offer premiums. Based on the above argument we test that

H2: M&A offer premiums are positively correlated with RRP.

Finally, bidders with a relative lower reference point (a high price relative to 52-week high) should have stronger bargaining position, leading shareholders to expect a low offer premium paid to the target. Thus, a high offer premium would offer the market a straightforward intuition that there is an overpayment, thus incurring negative market reactions to the bid announcement. On the other hand, we argue that M&As serve as a value enhancement opportunity for the target firm as shareholders would expect that targets with a relatively higher reference point would have a higher probability of profiting through acquisitions. Therefore, our last testable hypothesis is

H3: Bidder (Target) short-term performance is negatively (positively) correlated with RRP.

3. Data and methodology

3.1. Data

The initial sample covers 36,506 U.S. domestic public acquisitions announced between January 1, 1985, and December 31, 2014, as provided by Thomson One. Stock price was collected from CRSP, and a series of standard accounting variables were collected from COMPUSTAT. We require those accounting variables to be available for the fiscal year end prior to the announcement date. Public acquisitions refer to the two firms involved being publicly traded U.S. firms (listed on NYSE/AMEX/NASDAQ).[10] Once we exclude deals that were classified as recapitalizations, repurchases, self-tender offers and rumors according to Thomson One, we are left with 11,615

[10] We require firms with available stock price to calculate the 52-week high.

observations.[11] We require that the offer premium is not a missing value, which further reduces the number of observations to 5,450. We require the stock price for the calculation of the bidder and the target 3-day CARs to be available, which leaves 4,630 observations. We also require the payment method information to be available in Thomson One, which presents us with 4,290 observations. We are left with 2,156 observations after excluding all bidder variables with a missing value, and have a final sample of 1,878 observations after excluding all target variables with a missing value.[12]

We first study the RRP effect on the probability of using stocks as a means of payment for acquisitions by controlling for a series of deal, bidder and target characteristics highlighted in standard M&A literature. Bidder size is expected to be negatively related to the stock-financed acquisition. Faccio and Masulis (2005) suggest that larger bidders have higher credit facilities, which reduces the probability of using stocks to pay for acquisitions. We measure the firm's growth opportunities with MTBV. Higher MTBV bidders tend to use more stocks in acquisitions, in that they reserve cash to fund new investment projects (Dong *et al.*, 2006; Rhodes-Kropf *et al.*, 2005). We measure firm profitability with the return-on-asset ratio (ROA). We should suggest that firms with higher profitability are more likely to use retained earnings held in cash rather than stocks as it reduces costs of financing. We also account for the target characteristics, since stocks are more likely to be used to mitigate the target risk (Hansen, 1987). In this respect, the propensity to use stocks is greater when targets' risk increases, such as targets are large, with high MTBV and low ROA.

Following Officer (2004), we measure information asymmetry by calculating the standard deviation of returns. Hansen (1987) suggests that stocks are more likely to be used when level of information uncertainty increases. Leverage is defined as debt-to-equity ratio (D/E). Vermaelen and Xu (2014) suggest that over-levered bidders who justify stock financing in terms of moving to an optimal capital structure lead to an increase of overvalued stocks for acquisitions. Whereas targets with high leverage should be reluctant to receive such stocks. Liquidity is defined as cash flow-to-equity ratio (CF/E). Higher liquidity firms are more likely to be less financially constrained firms, which result in the method of payment for acquisitions is cash rather than stocks. Inclusions of capital structure related variables in the regressions would allow us to disentangle the effects of firm's capital

[11] By doing these, we exclude acquisitions in which the bidder and the target is the same firm where the difference between the target and the bidder reference points cannot be observed (e.g. self-tender offers), and acquisitions in which the target actively searches for the bidder, leading the reference point effect to be less relevant.

[12] We first exclude all the missing variables that are not used in the regressions, and then report the summary of the acquisition sample and variables.

structure decision and misvaluation on stock-financed acquisitions.

In a further analysis, we study the RRP effect on the offer premium. Different categories of variables were controlled in line with the work of Eckbo (2009). Specifically, we measure firm size with logarithm of market valuation (MV). According to the hubris management hypothesis (Roll, 1986), larger bidders tend to pay generously for smaller targets. We measure the firm's profitability with ROA. Agency theory suggests that poor-performing bidders tend to dissipate firms' resources and overpay for the target, whereas well-performing firms are attractive to bidders (Schwert, 2000). We measure firm growth opportunities with MTBV. Rau and Vermaelen (1998) suggest the extrapolation hypothesis that glamour bidders are less cautionary than value bidders about the target valuation, leading to higher offer premiums. Harford (1999) suggests that the target MTBV links with the managerial takeover motive since bidders are more aggressive in exploring synergies from the lower MTBV target. We measure stock volatility with standard deviation of returns over 335 calendar days ending 30 calendar days prior to the announcement date. All regressions include year and industry effect.

3.2. Summary statistics

Table 1 reports a summary of the acquisition sample. Of 1,878 acquisitions, 608 all stock-financed acquisitions, 726 all cash-financed acquisitions and 539 mixed acquisitions.[13] We have 702 diversifying acquisitions, 1,597 successful acquisitions and a small proportion of tender offers and hostile acquisitions, 380 and 134 respectively.

[Insert Table 1 here]

Table 2 reports summary statistics for variables. Panel A presents the dependent variables used in OLS regressions, including offer premiums, the bidder and the target 3-day CARs (CAR3) calculated using the market model. The mean value for offer premiums is 31%. Panel B presents the main variables of interests. The mean value for the bidder reference point is lower than the target reference point, 29.4% to 41.2%, which suggests that bidders on average are relatively more overvalued. The mean value for RRP is 11.8%. Panel C presents all control variables. Bidders are generally larger, have better performance, and better investment opportunities than their targets, findings which are consistent with prior M&A literature (Fuller *et al.*, 2002; Moeller *et al.*, 2004).

[13] The method of payment information for five acquisitions is defined as "Others" in Thomson One.

[Insert Table 2 here]

3.3. Methodology

3.3.1. Relative reference point (RRP) and offer premiums

Reference point (RP) refers to what extent the current price deviates from its 52-week highest price. The 52-week highest price is a highly relevant piece of price information influencing investors' perception about the firm's future prospects. Given lack of information and time availability to process M&As' information, the market would naturally borrow this to compare with the current price. Hence, the firm's 52-week highest price is the market's reflection of the firm's best performance. According to George and Hwang (2004), the 52-week highest price is an outcome of a series of good news that occurred in the past driving the firm's market value beyond its fundamental value. This is associated with market's misperception of the firm's valuation. A lower reference point would therefore indicate that the firm is still in the momentum of the "good news" effect, leading the firm to be more overvalued. On the contrary, a higher reference point indicates that the good news effect is less relevant, leading the firms to be less overvalued. Therefore, a target reference point (TRP) that is larger to the bidder reference point (BRP) can be a signal of market-wide perception regarding the former firm been less overvalued than the latter. Furthermore, the extent to which the bidder is more overvalued than the target is measured with relative reference point (RRP). Therefore, the market's misperception of firm's valuation tends to reduce when the firm of a lower reference point mergers with a firm of a relative higher reference point. Our data also show that TRP is on average larger than BRP.[14] Formulas for RP, RRP and offer premiums are algebraically illustrated as follows:

$$RP_i = \log(52WeekHigh_{i,t-30}) - \log(StockPrice_{i,t-30}) \quad (1)$$

$$RRP_i = TRP_i - BRP_i \quad (2)$$

[14] We use the difference between the target reference point and the bidder reference in an attempt to obtain a positive value, making our results easier to interpret. According to our prediction, a less overvalued target should have a higher reference point whereas a more overvalued bidder should have a lower reference point. Our descriptive statistics also show that, on average, the target reference point is larger than the bidder reference point with 0.412 and 0.294 respectively.

$$OfferPremiums_{i,t} = \log\left(OfferPrice_{i,t}\right) - \log\left(TStockPrice_{i,t-30}\right) \quad (3)$$

where RP_i denotes the reference point of each firm *i*. The bidder (target) reference point is defined as the logarithmic term difference between the bidder's (target's) highest stock price over 335 calendar days ending 30 days prior to the announcement date and bidder's (target's) stock price 30 days prior to the announcement date.[15] RRP_i denotes relative reference point which is defined as the target reference point (TRP_i) and the bidder reference point (BRP_i). Offer premiums are calculated as the logarithmic term difference between the offer price ($OfferPrice_{i,t}$) and target stock price 30 days prior to the announcement date ($TStockPrice_{i,t-30}$).

As this paper examines the effect of a relative valuation between the two firms involved on an M&As transaction and not the extent to which the firm's market value deviates from its true value, the use of RRP allows us to study this effect within a bilateral valuation framework where the valuation deviation of the two firms influences the market's perception. The market-wide valuation would potentially drive the firm's market value away from its fundamental value (Rhodes-Kropf and Viswanathan, 2004). By doing so, we are able to account for the influence of market swings as RRP is a relative valuation measure allowing us to observe a new equilibrium of the firms' valuation.

3.3.2. Logistic regressions

We use binominal logistic regression to examine the RRP effect on the probability of using stocks.[16] The model is specified as follows:

$$Stock_{i,t} = \alpha + \beta_1 RRP_i + \sum_{i=1}^{N} \beta_i X_{i,t} + \varepsilon_{i,t} \quad (4)$$

where the main variable of interest to be investigated is RRP. X_i denotes control variables in

[15] Using the firm's stock price 30 days prior to the announcement date mitigates the effect of information leakage on firms' stock price.

[16] We transfer logistic coefficients into marginal effect (ME) at sample means, which provide consistent interpretation of OLS estimates. In addition, we use multinomial logistic regression to examine the RRP effect on the probability of using stocks rather than other means of payment as a robustness check.

relation to the method of payment choice.

3.3.3. Classification of high-, neutral- and low-valuation markets

Rhodes-Kropf and Viswanathan (2004) suggest stock-financed acquisitions are positively correlated with market-wide valuation. Following Bouwman *et al.* (2009), we classify market valuation periods using the price-earnings (P/E) ratio of the market index (S&P 500) and monthly data. Firstly, we de-trend the market P/E ratio by removing the best straight line fit (OLS) from the P/E of the month in question and the five preceding years. Secondly, each calendar month was classified into high- (low-) market valuation groups if the de-trended market P/E ratio of that month was above (below) the five-year average. Then, we ranked the months according to the de-trended market P/E ratio. Months in the top 25% of the above average group were classified as high-market valuation months, months in the bottom 25% of the below average group were classified as low-market valuation months, the remaining months being classified as neutral-market valuation months. Thus, half of the months are classified as neutral-market valuation and the other half contains months of both high- and low-market valuation. The idea of de-trending market valuation is to remove the upwards trend because the most recent acquisitions generally have a higher market valuation than the past due to market inflation and other effects.

3.3.4. Short-term method

Following Eckbo *et al.* (2013), we calculate firms' announcement returns with the market model.

$$R_{i,t} = \alpha + \beta_1 R_{m,t} + \varepsilon_{i,t} \tag{5}$$

where $R_{i,t}$ denotes holding period returns (CRSP: RET) for firm *i* in the period *t*, $R_{m,t}$ denotes value-weighted market returns including dividends (CRSP: VWRETD), $\varepsilon_{i,t}$ denotes the error term. We estimate market model parameters over the window from 261 to 28 trading days prior to the announcement date [-261, -28], and use a 3-day event window [-1, 1].

3.3.5. Long-term method

Following Loughran and Vijh (1997), we calculate firm's long-term performance with market-adjusted buy-and-hold abnormal returns (BHARs). This captures investors' long-term holding experience. We calculate 36-month BHARs with the following equation:

$$BHAR_{i,t} = \prod_{t=1}^{T}(1+R_{i,t}) - \prod_{t=1}^{T}(1+R_{index,t}) \quad (6)$$

where, $R_{i,t}$ is the arithmetic returns for firm *i* on day and $R_{index,t}$ is the arithmetic return for the market index on day *t*.

3.3.6. Multivariate analysis

Multivariate analysis is employed to examine the relevant factors explaining the market reaction. According to Draper and Paudyal (2008), multivariate analysis is superior in analyzing the causation relationship between the market reaction and related variables. The multivariate framework is presented as follows:

$$CAR_{(-1,+1)} = \alpha + \sum_{i=1}^{N}\beta_i X_i + \varepsilon_i \quad (7)$$

where X_i denotes variables related to market reactions. The main variable of interest to be investigated is RRP, which is the difference between the target and bidder reference points. The multivariate framework controls for a series of deal and firm characteristics that have significant impacts on market reactions in standard M&A literature (Alexandridis *et al.*, 2010; Asquith *et al.*, 1983).

4. Empirical results

4.1. The RRP effect on the probability of using stocks

[Insert Table 3 here]

Table 3 reports a positive relationship between RRP and the likelihood of using stocks. The inclusions of information asymmetry, and capital structure related variables of both the bidder and the target do

not change the sign and significance level of RRP in specification (4). It shows that stocks are 1.04% more likely to be used when RRP increases 10% (p=0.001), as interpreted by marginal effect. Results for control variables are consistent with the those of Eckbo *et al.* (2013). Our main results suggest that the relatively more overvalued bidders are likely to pay for acquisitions with stocks, which is consistent with the misvaluation hypothesis and also reconciles with the predictions of the reference point theory of M&As.[17] Bidders whose price is close to their 52-week high would give targets a chance of selling out overvalued shares for profits. Our results show that targets tend to accept stocks of firms with high growth opportunities (p=0.000), which is consistent with the view of Burch *et al.* (2012). When the market news has driven a firm's current value away from its fundamentals, bidders have an incentive to exploit such mispricing by focusing on the target reference point, believing that a target whose price is far below its 52-week high would offer them greater potential for overvaluation dilution.[18]

[Insert Table 4 here]

Table 4 reports the RRP effect on the probability of using stocks under different market conditions. Rhodes-Kropf and Viswanathan (2004) indicate that the overestimation of synergies increases with valuation errors. Consistent with this view, we find that the RRP effect is more pronounced when market valuation errors are large. *Table 4* shows that for every 10% increase in RRP would lead to an increase of about 1.53% when the market-wide valuation is high and an increase of about 1.1% when the market-wide valuation is neutral. Whilst the RRP effect on market condition is insignificant in the subsample of low market-wide valuation.

4.2. The RRP effect on the offer premium

Thus far, we have examined the reference point effect on stock-financed acquisitions, suggesting that managers time the market with stocks perceived overvalued. It remains interesting to explore the reference point effect on target pricing decision. Baker *et al.* (2012) show that the market, given limited information and limited time to process the deal, would look at the firm's reference point and regard an offer price based on the reference point as managerial overconfidence. It is less likely the

[17] Our results are robust when we use a ratio of the target reference point over the bidder reference point to replace RRP, a variable indicating the extent to which the target is less overvalued relative to the bidder.

[18] It can be argued that when the target current price is significantly lower than its 52-week high, the target may experience risks of bankruptcy. In that case, we believe that bidders would be cautious about these targets and may not focus on their 52-week high. However, we focus on the whole M&A sample rather than the individual case.

case that the reference point effect plays a similar role for bidders as well as the market.

[Insert Table 5 here]

The first four specifications of *Table 5* use different categories of control variables.[19] The sign and significance level of RRP do not change significantly compared with that reported in specification (5). It reports that RRP is positive and significant at the 1% level (coefficient 0.089, t=4.501), showing that a 10% increase in RRP is associated with an approximately 0.9% increase in offer premiums. The signs and significance levels of our control variables are generally consistent with prior M&A studies (Alexandridis *et al.*, 2013; Moeller *et al.*, 2004). Our results suggest that the relatively more overvalued bidders overpay for the target according to RRP, which are consistent with the reference point theory of M&A. It can be interpreted as follows: bidders perceived as overvalued will pay a price according to the target reference point to obtain the deal and thus diluting overvaluation (Baker *et al.*, 2012). More, when bidders' price is close to the 52-week high, they may find it hard to justify it, and will suffer significant losses in the long run either because of initial overvaluation to be corrected (Jensen, 2005) or their stocks to be aggressively sold around the peak price (Barberis and Xiong, 2009). Hence, bidders would pay heavily for a less overvalued target to revise the market's perception. On the other hand, targets would also demand high offer premiums, as a lower bidder reference point leads targets to believe that the bidder is able to afford a higher offer premium.

[Insert Table 6 here]

Given that acquisitions were largely driven by operating synergies and agency problems before 1990, and by misvaluation after 1990 (Dong *et al.*, 2006; Shleifer and Vishny, 2003), we conduct time-distribution tests whose results are reported in *Table 6*. Our sample period covers the high valuation trends when investors' perception to firms' misvaluation is high, such as the stock market bubble between 2000 and 2002, and the housing bubble and credit crisis between 2007 and 2009. Our results show that the misvaluation hypothesis is more likely to explain acquisitions after 1990 than before 1990 when the primary M&A motive is synergies. By extending the sample period of Dong *et al.* (2006), we find that RRP plays an important role during large valuation trends. We split the sample period into two: from 2001 to 2007 and 2008 to 2014, reported in specifications (4) and (5). The idea of doing so is to investigate how RRP explains the offer premium before and after 2008 financial

[19] Before running the regressions, we performed a correlation matrix of our independent variables. Results are reported in Appendix A. Our results show little evidence of econometric problems, such as multicollinearity issues.

crisis. Our results show that for every 10% increase in RRP would lead to an increase of 0.94% in the period of 2001 and 2007 and this figure is more than double in the period of 2008 and 2014 (1.92%). The misvaluation tends to be larger after financial crisis. Once again, our results show that the relative overvaluation drives M&A's overpayment. Rhodes-Kropf and Viswanathan (2004) find a positive correlation between stock-financed acquisitions and merger waves, arguing that rational targets make mistakes by accepting overvalued stocks during high valuation periods. Based on their argument, we provide up-to-date evidence suggesting that M&A offer premiums increase with valuation errors, which rationalizes bidder' motive for overpayment. The high offer premiums area form of compensation for the targets' willingness of accepting overvalued stocks.

[Insert Table 7 here]

However, we are aware of the fact that not all acquisitions involve a relatively more overvalued bidder, as reflected in RRP. Bidders are relatively more overvalued if their current price has a smaller change relative to the reference point price as opposed to those of targets (i.e. RRP>0), while they are relatively undervalued if their current price shows a larger change relative to the reference point price compared with those of targets (i.e. RRP<0). In line with Dong et al. (2006), overvaluation motivates the firm to engage in M&As, if RRP is a suitable proxy for misvaluation we should expect that firms of these two groups perform significantly different.

We therefore split our M&A sample into two subsamples by RRP and conduct univariate analyses regarding to the offer premium, bidder and target announcement returns, as reported in *Table 7*. Our results show a majority of deals are RRP driven, 1,155 as opposed to 723, which is consistent with the findings of Fu *et al.* (2013) while it is against the view of Savor and Lu (2009). Panel A of this table reports that acquisitions are carried with significantly larger offer premiums when bidders are relatively more overvalued than the opposite case, the mean difference for the offer premium is 5% and at the 1% significance level. Our results suggest overvalued bidders are likely to pay with high offer premiums for the undervalued or less overvalued targets, suggesting that managerial primary M&A motive is to dilute overvaluation. Due to this, they believe the deal may not be accepted until high offer premiums paid to targets who can also identify bidders' motive through RRP. In Panel B, both the two subsamples show significantly negative bidder announcement returns. The relatively more overvalued bidders perform significantly worse than the relatively more undervalued bidders, with a negative mean difference of 0.8% and at the 5% significance level. These results are also

consistent with those Ma *et al.* (2016) who find bidders with a lower price relative to their 52-week high outperform those with a higher price relative to the reference point price. Panel C reports target announcement returns by RRP. Both relatively more undervalued and more overvalued targets receive high market reactions which is significantly different from 0. In particular, the mean difference for target announcement returns is about 5% (t=4.33), suggesting that targets involved in high RRP acquisitions can demand high offer premiums based on RRP, which is translated into higher announcement returns.

Panel D of this table reports univariate analysis results for the offer premium by the method of payment in the two RRP subgroups. Our results are consistent with the prediction of the misvaluation hypothesis that overvalued stocks are used as cheap currency. Specifically, all cash-financed acquisitions carry higher offer premiums when bidders are relatively more overvalued than relatively more undervalued bidders. As the result shows a mean difference of 8.5%, which is at 1% significance level. Moreover, the mean difference of cash and stock payments for acquisitions in the case that bidders are relatively more overvalued is 3.92%, suggesting that all stock-financed acquisitions carry lower offer premiums than all cash-financed acquisitions when bidders are relatively more overvalued. Combined, relatively more overvalued bidders tend to avoid using cash, as it will increase the offer premium. Our results note the reason of overvalued bidders using stocks for acquisitions in terms of takeover costs, indicating that RRP indicates managerial method of payment choices.

4.3. Do bidders who focus on RRP overpay for the target?

We use RRP as an instrument variable of the offer premium when examining the role of overpayment. Baker *et al.* (2012) suggest the offer premium is not a clean measure since it can represent both overpayment and synergies. Using 2SLS, we are able to investigate the chain responses of the RRP effect on the offer premium, and the offer premium effect on firm's announcement returns. If RRP plays a role in overpayment, we should expect that the offer premium with 2SLS estimates should yield more negative bidder announcement returns compared with those with OLS estimates.

[Insert Table 8 here]

In *Table 8*, the offer premium with 2SLS estimates generates more negative (positive) bidder (target) CARs compared with that with OLS estimates, shown in specifications (1) and (2), and (3) and (4)

respectively.[20] Our results are consistent with Baker *et al.* (2012) who studied the reference point effect on M&A outcomes in a sample of M&As between 1984 and 2007. Our results are also in line with the reference point theory of M&As. The market would presumably believe that the chance of price rebounding tends to increase when the bidder's current stock price is close to the 52-week high. However, engaging in takeovers tends to be value destroying. During the time when a bid is announced, the market reacts negatively to it as this indicates that bidders are unable to deliver real support to the firm's performance and they are likely to undertake bad acquisitions to maintain overvaluation (Jensen, 2005).

4.4. Do all stock-financed acquisitions driven by RRP protect the wealth of long-term shareholders?

We now turn to investigate whether bidders focusing on RRP protect the interest of their long-term shareholders. According to the misvaluation hypothesis, bidders who dilute overvaluation with stocks in an attempt to protect the wealth of long-term shareholders. It was expected that bidders making an offer price based on RRP would have a similar rationale. In *Table 9*, we limit our sample to acquisitions that are 100% financed by stocks only and ranked the sample into four quartiles according to RRP, each presenting 152 observations, as reported in Panel A.[21] We examine whether overpayment leads underperformance. By doing so, we estimate the relation between the offer premium and long-term performance under market-adjusted model for each correspondent quartile. The fourth quartile (i.e. the highest RRP rank) includes acquisitions involving relatively more overvalued bidders whereas the first quartile (i.e. the lowest RRP rank) includes acquisitions involving relatively less overvalued or more undervalued bidders.

[Insert Table 9 here]

Results of Panel A suggest that stock-financed acquisitions generate negative long-term returns, which are consistent with the M&A literature (Loughran and Vijh, 1997; Rau and Vermaelen, 1998). Bidders in the highest quartile pay the highest offer premiums compared with those of other quartiles. In spite of this, the mean difference of offer premiums between the groups of the relative more overvalued bidders and undervalued bidders is 9.9% at 1% significance level and the mean difference

[20] The Hausman test and *F*-test results show that coefficients generated by 2SLS regression are more consistent to those generated by OLS regression, as reported at the end of *Table 8*. Our results are robust when CARs are calculated using the market-adjusted model. We do not report these results for the sake of brevity, but these are available upon request.

[21] Of the 608 all stock-financed acquisitions, 402 fall into the group in which bidders are relatively more overvalued.

for long-term abnormal returns of stock bidders is 18.7% and at 10% significance level, indicating that relatively more overvalued bidders, though overpay for acquisitions, outperform those undervalued counterparts. Similarly, we estimate the long-term performance of bidders with the size-adjusted model. Results are consistent with those under the market-adjusted model, as reported in Panel B of this table.

Our results suggest that stock bidders paying high offer premiums according to RRP are able to protect the wealth of long-term shareholders. These results are consistent with Ang and Cheng (2006) who found long-term performance of stock bidders and overvaluation been positively related. However, they contradict the findings of Lin *et al.* (2011) who conducted similar tests as ours for the long-term performance of the overvalued bidders. Their paper classifies bidder valuation by the ratio of price-to-fundamental value (P/V) with higher P/V indicating a more overvalued bidder, indicating that bidders who have the highest P/V generate a significant negative market performance for both short term and long terms within three years after M&As as compared with those bidders in the other P/V quartiles.

5. Robustness checks

5.1. Endogeneity issues

OLS can be subject to endogeneity issues arising from omitted variable biases in this paper, as RRP maybe correlated with firms' mismanagement or mispricing which cannot be observed or the possibility that the market perception is likely the be an accurate reflection of the firm's valuation. If the market could accurately estimate the value of the firm, the managers should have no chance of timing the market through RRP. However, this tends to be unrealistic as the misvaluation hypothesis proposes. In this case, we suggest that the market's 52-week high and the bidder's and target's 65-week high can be used as instrumental variables given that they are indirectly related to offer premiums but can affect offer premiums through the RRP. The market's 52-week high is an ideal instrumental variable as it is uncorrelated with the firm's mismanagement. Baker *et al.* (2012) indicate that market-wide valuation should be highly correlated with the firm's 52-week high leaving it for future research. Hence, we suggest that the bidder's and the target's 65-week highs are used as instrumental variables in line with the extrapolation hypothesis that indicates that market perception is influenced by firms' past performance. Using a longer horizon is of less relevance in terms of

market's perception of the firm's valuation. We therefore perform a 2SLS estimator with the market 52-week high, the bidder and the target 65-week high as instrumental variables.

[Insert Table 10 here]

According to our results presented in *Table 10,* the OLS is preferred over the 2SLS.[22] This is because the market 52-week high reflects the market-wide valuation instead of the firm-specific valuation which is believed to be an important source of valuation error (Rhodes-Kropf *et al.*, 2005). We also believe that a longer horizon of investors should be less relevant to firms' valuation than a shorter horizon, as events occurred more recently would potentially have a more substantial impact on the investors' mind than those occurred in the past (Bhootra and Hur, 2013).[23] Overall, the OLS is likely to dominate the 2SLS.

5.2. The effect of RRP on the probability of using stocks

Results of a series of robustness checks examining the RRP effect on the probability of using stocks are reported in Appendix B. Shleifer and Vishny (2003) predict that bidders use stocks when they are relatively more overvalued. We divide our M&A sample into two subgroups: the relatively more overvalued bidders (i.e. RRP>0), and the relatively more undervalued bidders (i.e. RRP<0), as presented in Panel A.[24] Our results suggest that the RRP effect on the probability of using stocks is solely driven by the relatively more overvalued bidders. We find that, when the bidders are relatively more overvalued, for every 10% increase in RRP leads to an increase of propensity of using stocks for acquisitions by 8.31% whereas there is little evidence that the relative more undervalued bidders use stocks for acquisitions. Panel B reports the probability of using stocks rather than other means of payment is also large when RRP increases. Specifically, an additional 10% increase in RRP would lead to stocks are 7.28% and 4.25% more likely to be used as a means of payment for acquisitions

[22] Specifically, the Hausman test shows a *p*-value of 0.6414, indicating there is no endogeneity issues in the regression. Moreover, the test of over-identifying restrictions further rejects the null hypothesis that there is no relation between the instruments and the error term (p=0.0000).

[23] In this line of thinking, we employ the timing of the 52-week high as instrument variables of the reference point for endogeneity test, which is the interval of days between the announcement date and the date when the 52-week highest stock price arrives and reflect the investors' horizon of the firm's valuation. We also employ the interaction term of the timing of the 52-week high and the reference point of the firms as instrumental variables, which capture the investors' reaction to the distances of both the time and value from the 52-week highest price to the current price. Our results continue to support that the OLS is more consistent than the 2SLS.

[24] We have 1,742 observations in regressions. Of the 1,742 observations, 1,103 fall into the group in which bidders are relatively more overvalued and 639 are fall into the group in which bidders are relative more undervalued. 50 observations are dropped due to multicollinearity problems of the year and industry dummies.

compared with the method of payment is cash and a mixture of stocks and cash respectively.

5.3. The effect of RRP on the offer premium

The RRP effect on offer premiums across different subsamples, as reported in Appendix C. We divide our samples into subsamples according to the method of payment, deal type, deal choice and deal status. Our control variables are as the same as those presented in the specification (5) of *Table 5*. Specifications (1) and (2) report a positive relation between RRP and the offer premiums by different method of payment subsamples. The offer premium is larger when paying with cash than stocks, which is consistent with our univariate analysis results of Panel D of *Table 7*. It is worth noting that the RRP effect is strong for both successful and unsuccessful M&A subsamples, which is against the view of Chira and Madura (2015) who suggest that the two firms involved with a higher price relative to their reference points are likely to complete the deal, while those with a lower price relative to their reference points are less willing to complete the deal, in that the firms see large disadvantages in the negotiation position.[25] Therefore, it became evident that the RRP effect on offer premiums is strong regardless of the method of payment, deal types and deal status.

6. Conclusions

This paper investigates the misvaluation hypothesis using the reference point theory of M&As. We develop a bilateral valuation framework with RRP, and with which we find results that are consistent with the misvaluation hypothesis.

We put the target and the bidder reference points into the M&A platform, affirming that the propensity for paying for acquisitions with stocks is greater when RRP increases, this trend being more pronounced when the market misperception of the firm's valuation is high. Moreover, the offer premium increases with RRP, leading to more negative bidder (positive target) announcement returns, indicating that RRP plays a role of overpayment, suggesting that managers time the market. This is the same as what the misvaluation hypothesis predicts. While in a quartile analysis for a sample of all stock-financed acquisitions, we find that the relatively more overvalued bidders who pay highest offer premiums compared with those in other quartiles generate less negative long-term abnormal returns,

[25] They examine the reference point effect on the probability of deal completion. The significance level of the reference point is significantly weakened after different controls included in the logistic regression model.

suggesting that bidders time the market while focusing on RRP. Our results show that RRP is indicator for the value of the firms engaged in M&As.

We make several contributions to the behavioral finance and M&A literature. First, we provide a simply way of structuring M&A through RRP which reflects the most current market reactions to the firm's valuations. This valuation measure is straightforward in terms of observing the difference in bidder and target overvaluation. The market tends to react to bidders' announcements negatively due to a high offer premium paid according to RRP. This is different from the reason of bidders looking at the reference points. Our findings reveal that higher offer premiums according to RRP would reduce negative market reactions in the long term, suggesting that focusing on RRP is also a bidder's thinking weighed for the value of the firm. Therefore, bidders are rational by employing a RRP for M&A pricing decision. Secondly, we find that RRP directs the method of payment choices, as a relatively more overvalued bidder tends to reduce offer premiums when financing an acquisition with stocks rather than by cash. Thirdly, we also find that managers who have more information about the firm are also subject to the reference point effect. Overall, our results suggest that managers use a RRP to time the market and thus formulate M&A strategies, which are consistent with the misvaluation hypothesis.

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Table 1. Summary statistics for acquisition sample.

This table reports summary statistics for 1,878 U.S. domestic public deals announced between 1985 and 2014. The number *N* denotes the number of deals per year. The third and fourth columns present the mean and median of deal value. The fifth to seventh columns present the method of payment. Here "Stock" refers to all-stock acquisitions. "Cash" refers to all-cash acquisitions. "Mix" refers to acquisitions that are neither all stock-financed nor all cash-financed acquisitions. "Completed" refers to completed deals (i.e. successful deals), of which there are 1,874 with information relating to deal status. "Tender" refers to tender offers. "Hostile" refers to hostile bids. "Diversification" refers to diversified deals in which the primary two Standard Industry Classification codes are different between bidders and targets.

Year	N	Deal Value ($mils)		Payment Method			Completed		Tender		Hostile		Diversification	
		Mean	Median	Cash	Stock	Mix	Yes	No	Yes	No	Yes	No	Yes	No
1985	5	243.86	53.00	3	1	1	3	2	-	5	1	4	2	3
1986	21	129.04	41.70	18	1	2	18	3	7	14	1	20	15	6
1987	34	254.60	47.25	18	6	8	30	3	6	28	5	29	17	17
1988	30	381.53	68.92	15	8	7	24	6	11	19	6	24	16	14
1989	24	114.04	30.49	11	10	3	17	6	4	20	1	23	18	6
1990	23	579.03	29.38	12	7	4	18	5	5	18	3	20	10	13
1991	23	172.38	26.82	7	14	1	19	3	3	20	-	23	14	9
1992	21	155.46	51.44	6	13	2	17	4	1	20	2	19	12	9
1993	45	519.07	114.00	14	18	12	33	12	7	38	5	40	20	25
1994	61	222.95	74.12	23	30	8	46	14	9	52	7	54	18	43
1995	98	538.98	74.91	27	53	18	84	14	14	84	6	92	38	60
1996	95	684.53	138.25	31	40	24	80	15	18	77	9	86	36	59
1997	130	645.10	232.11	19	62	49	113	17	19	111	3	127	46	84
1998	138	1208.89	140.12	36	54	47	126	12	27	111	3	135	47	91
1999	164	1513.65	305.42	61	58	45	134	30	41	123	14	150	68	96
2000	136	2286.88	378.34	35	68	33	119	17	32	104	8	128	49	87
2001	109	1115.01	146.89	33	40	36	94	15	27	82	4	105	38	71
2002	49	1784.72	268.90	20	14	15	44	5	16	33	4	45	18	31
2003	71	807.01	130.82	27	18	26	65	6	19	52	5	66	19	52
2004	66	2859.54	479.02	25	16	25	60	6	6	60	3	63	22	44
2005	66	2874.25	500.75	29	13	24	60	6	7	59	5	61	24	42
2006	75	1838.00	563.07	40	12	23	65	10	6	69	4	71	29	46
2007	60	1478.29	792.51	39	6	15	53	7	12	48	2	58	18	42
2008	57	2208.95	234.26	35	6	16	40	17	14	43	10	47	17	40
2009	44	3498.35	496.88	17	8	19	41	3	16	28	-	44	18	26
2010	56	1884.97	572.72	33	9	14	47	9	16	40	5	51	15	41
2011	41	2691.37	611.62	16	8	17	28	13	8	33	9	32	13	28
2012	38	1385.71	622.51	26	1	11	37	1	10	28	-	38	17	21
2013	44	1997.05	1139.09	28	5	11	39	5	9	35	3	41	12	32
2014	54	6908.66	1662.39	22	9	23	43	11	10	44	6	48	16	38
Total	1878	1540.29	227.49	726	608	539	1597	277	380	1498	134	1744	702	1176

Table 2. Summary statistics for variables.

This table reports the number, mean, median and standard deviation of variables used in the regressions. Panel A presents the main dependent variables. Firms' 3-day CARs are calculated with the market model, with parameters estimated between 261 and 28 trading days prior to the announcement date. Offer premiums are defined as the logarithmic term difference between offer price and target stock price 30 calendar days prior to the announcement date. Panel B presents the main variables of interest. The reference point is defined as the logarithmic term difference between a firm's highest stock price over 335 calendar days ending 30 days prior to the announcement date and the price ending 30 days prior to the announcement date. RRP is defined as the difference between the target and the bidder reference point. Panel C presents control variables. Deal characteristics are noted as Table 1. "Relative Size" is defined as the deal value divided by bidder MV, where bidder MV is defined as the product of market price and outstanding shares (CRSP: SHROUT*PRC). ROA is return-on-asset ratio, defined as net income (Compustat: NI) divided by total asset (Compustat:AT). MTBV is market-to-book value, defined as the market value of equity to the book value of equity, where book value of equity is total shareholders' equity (Compustat: SEQ) plus deferred taxes and investment tax credit (Compustat: TXDITC) minus the preferred stock redemption value (Compustat: PSTKRV). Volatility is the standard deviation of daily returns over the 335 calendar days ending 30 days prior to the announcement date. CF/E is cash flow-to-equity ratio, defined as income before extraordinary items (Compustat: IBC) plus depreciation and amortization (Compustat: DPC) minus cash dividends (Compustat: DV), and leverage is measured by debt-to-equity ratio, defined as total long-term debt (Compustat: DITT) divided by the book value of equity. All accounting variables were in the fiscal year end before the announcement date, and continuous variables are winsorised at the 1% and 99% levels.

Variables	N	Mean	Median	Std. Dev.
Panel A: Main Dependent Variables				
Offer Premiums	1878	0.310	0.292	0.282
Bidder 3-day CARs	1878	-0.011	-0.007	0.073
Target 3-day CARs	1878	0.222	0.176	0.240
Panel B: Main Variables of Interest				
Bidder Reference Point	1878	0.294	0.157	0.351
Target Reference Point	1878	0.412	0.255	0.455
RRP	1878	0.118	0.055	0.420
Panel C: Other Variables: deal, bidder, and target characteristics				
Cash	1878	0.387	-	0.487
Stock	1878	0.324	-	0.468
Hostile	1878	0.071	-	0.257
Tender	1878	0.202	-	0.402
Diversification	1878	0.374	-	0.484
Relative Size	1878	0.401	0.191	0.555
Bidder lnMV	1878	7.500	7.443	2.159
Bidder MTBV	1878	3.991	2.632	6.269
Bidder ROA	1878	0.026	0.047	0.138
Bidder Volatility	1878	0.029	0.025	0.017
Bidder Leverage	1872	0.661	0.330	1.194
Bidder CF/E	1804	0.161	0.180	0.316
Target lnMV	1878	5.212	5.133	1.839
Target MTBV	1878	2.691	1.797	4.300
Target ROA	1878	-0.049	0.024	0.241
Target Volatility	1878	0.041	0.035	0.022
Target Leverage	1870	0.619	0.140	1.621

Table 3. The effect of RRP on the probability of using stocks.

This table reports binomial logistic regression for all-stock acquisitions on RRP. Dependent variable is "Stock", which is a dummy variable, taking a value of 1 if acquisitions are 100% financed with stocks, 0 otherwise. Variable definitions are as in the notes to Table 2. *P*-value is reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively, is reported alongside marginal effects. We transfer coefficients into marginal effect (ME), evaluated at the sample means of the independent variables.

	(1)			(2)			(3)			(4)		
Stock	Coef.	*p*-value	ME	Coef.	*p*-value	ME	Coef.	*p*-value	ME	Coef.	*p*-value	ME
RRP	0.567***	(0.000)	0.103	0.605***	(0.000)	0.110	0.531***	(0.001)	0.097	0.570***	(0.001)	0.104
Hostile	-0.777**	(0.014)	-0.141	-0.742**	(0.019)	-0.135	-0.721**	(0.022)	-0.132	-0.670**	(0.033)	-0.123
Tender	-2.441***	(0.000)	-0.443	-2.402***	(0.000)	-0.436	-2.563***	(0.000)	-0.468	-2.502***	(0.000)	-0.458
Diversification	0.146	(0.266)	0.027	0.124	(0.349)	0.023	0.146	(0.280)	0.027	0.120	(0.378)	0.022
RelativeSize	-0.611***	(0.000)	-0.111	-0.662***	(0.000)	-0.120	-0.561***	(0.000)	-0.102	-0.606***	(0.000)	-0.111
Bidder lnMV	-0.379***	(0.000)	-0.069	-0.290***	(0.000)	-0.053	-0.402***	(0.000)	-0.073	-0.314***	(0.000)	-0.057
Bidder MTBV	0.048***	(0.000)	0.009	0.036***	(0.001)	0.007	0.060***	(0.000)	0.011	0.048***	(0.000)	0.009
Bidder ROA	-2.063***	(0.000)	-0.375	-0.914*	(0.088)	-0.166	-2.464***	(0.000)	-0.450	-1.407**	(0.030)	-0.257
Target lnMV	0.315***	(0.000)	0.057	0.350***	(0.000)	0.063	0.348***	(0.000)	0.064	0.375***	(0.000)	0.069
Target MTBV	0.051***	(0.001)	0.009	0.041***	(0.006)	0.008	0.063***	(0.000)	0.012	0.055***	(0.001)	0.010
Target ROA	0.087	(0.762)	0.016	0.371	(0.231)	0.067	0.009	(0.977)	0.002	0.218	(0.492)	0.040
Target Volatility				5.118	(0.253)	0.928				3.773	(0.423)	0.690
Bidder Volatility				32.029***	(0.000)	5.809				30.994***	(0.000)	5.670
Bidder Leverage							-0.232***	(0.001)	-0.042	-0.211***	(0.002)	-0.039
Target Leverage							-0.126***	(0.003)	-0.023	-0.121***	(0.005)	-0.022
Bidder CF/E							0.213	(0.403)	0.039	0.233	(0.386)	0.043
Year	Yes			Yes			Yes			Yes		
Industry	Yes			Yes			Yes			Yes		
Constant	0.324	(0.577)		-1.480**	(0.032)		0.592	(0.360)		-1.130	(0.132)	
N	1878			1878			1792			1792		
Pseudo R^2	0.272			0.287			0.291			0.303		

Table 4. Testing the effect of RRP on the probability of using stocks under different market-wide valuations.

This table reports binomial logistic regression for all-stock acquisitions on RRP by different market conditions. Dependent variable is "Stock", which is a dummy variable, taking value of 1 if acquisitions are financed with 100% stocks, 0 otherwise. High Market is a dummy variable, taking a value of 1 if takeover months in the top 25% above past 5-year average de-trended P/E of the market index (S&P 500) or market valuation is high, 0 otherwise. Specifications (1)-(3) report the results when market-wide valuation is high, low and neutral respectively. We were able to determine 1733 observations with valid market-wide valuation data, 666 for high valuation periods, 434 for low valuation periods, and 633 for neutral valuation periods. Variable definitions are as in the notes to Table 2. *P*-value is reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively, is reported alongside marginal effects. We transfer coefficients into marginal effect (ME), evaluated at the sample means of the independent variables.

Stock	(1) High			(2) Low			(3) Neutral		
	Coef.	*p*-value	ME	Coef.	*p*-value	ME	Coef.	*p*-value	ME
RRP	0.758***	(0.002)	0.153	1.021	(0.113)	0.059	0.510*	(0.057)	0.109
Hostile	-0.317	(0.462)	-0.064	-1.043	(0.199)	-0.060	-0.723	(0.332)	-0.155
Tender	-2.339***	(0.000)	-0.473	-1.195**	(0.042)	-0.069	-4.251***	(0.000)	-0.910
Diversification	0.797***	(0.001)	0.161	-0.165	(0.676)	-0.010	-0.060	(0.792)	-0.013
RelativeSize	-0.968***	(0.000)	-0.196	-0.847	(0.121)	-0.049	-0.307	(0.238)	-0.066
Bidder lnMV	-0.377***	(0.000)	-0.076	-0.809***	(0.000)	-0.047	-0.141	(0.162)	-0.030
Bidder MTBV	0.052***	(0.002)	0.011	0.060	(0.181)	0.003	0.038	(0.109)	0.008
Bidder ROA	-2.376***	(0.009)	-0.481	-1.664	(0.453)	-0.096	-2.797*	(0.071)	-0.599
Target lnMV	0.600***	(0.000)	0.121	0.696**	(0.014)	0.040	0.170	(0.161)	0.036
Target MTBV	0.062**	(0.016)	0.013	-0.004	(0.936)	0.000	0.063**	(0.049)	0.014
Target ROA	-0.154	(0.764)	-0.031	0.069	(0.938)	0.004	0.699	(0.219)	0.150
Target Volatility	8.929	(0.254)	1.808	-1.335	(0.952)	-0.077	-1.354	(0.866)	-0.290
Bidder Volatility	15.449	(0.144)	3.127	35.750	(0.140)	2.068	51.081***	(0.000)	10.936
Bidder Leverage	-0.306***	(0.002)	-0.062	-0.219	(0.304)	-0.013	-0.169	(0.150)	-0.036
Target Leverage	-0.129*	(0.090)	-0.026	-0.089	(0.350)	-0.005	-0.203**	(0.013)	-0.043
Bidder CF/E	0.096	(0.791)	0.019	-0.634	(0.359)	-0.037	2.044***	(0.001)	0.438
Year	Yes			Yes			Yes		
Industry	Yes			Yes			Yes		
Constant	-2.916**	(0.033)		-0.057	(0.974)		0.044	(0.976)	
N	666			434			633		
Pseudo R2	0.345			0.268			0.333		

Table 5. The effect of RRP on the offer premium.

This table reports the ordinary least square (OLS) regression results for offer premiums on RRP, controlling for a series of deal and firm characteristics. Specification (1) reports the relationship between offer premiums and the reference point effect, specification (2) controls for deal characteristics, specification (3) controls for deal and bidder characteristics, specification (4) controls for deal and target characteristics, specification (5) controls for all variables. Variable definitions are as in the notes to Table 2. Robustness *t*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, **and * respectively, is reported alongside coefficients.

	(1)		(2)		(3)		(4)		(5)	
Offer Premiums	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
RRP	0.101***	(5.099)	0.105***	(5.311)	0.110***	(5.575)	0.098***	(4.846)	0.089***	(4.501)
Hostile			0.008	(0.367)	0.002	(0.105)	0.015	(0.698)	0.032	(1.563)
Tender			0.075***	(4.744)	0.074***	(4.695)	0.080***	(5.098)	0.075***	(5.006)
Diversification			0.006	(0.433)	0.004	(0.284)	0.005	(0.369)	-0.017	(-1.256)
Stock			-0.024	(-1.336)	-0.019	(-0.991)	-0.026	(-1.392)	-0.003	(-0.184)
Cash			-0.009	(-0.565)	-0.004	(-0.227)	-0.019	(-1.123)	-0.031*	(-1.917)
RelativeSize					0.020	(1.537)	0.021*	(1.744)	0.116***	(7.263)
Bidder ROA					0.090	(1.262)			0.019	(0.269)
Bidder MTBV					-0.000	(-0.222)			-0.000	(-0.010)
Bidder lnMV					0.006	(1.506)			0.056***	(9.627)
Bidder Volatility					0.570	(0.819)			0.768	(1.047)
Target ROA							0.119***	(2.810)	0.141***	(3.347)
Target MTBV							-0.001	(-0.806)	-0.001	(-0.878)
Target lnMV							-0.030***	(-6.512)	-0.078***	(-11.703)
Target Volatility							-0.035	(-0.065)	-0.315	(-0.537)
Constant	0.212***	(3.291)	0.182***	(2.744)	0.116	(1.535)	0.334***	(4.388)	0.150*	(1.896)
Year	Yes		Yes		Yes		Yes		Yes	
Industry	Yes		Yes		Yes		Yes		Yes	
N	1878		1878		1878		1878		1878	
adj. R^2	0.077		0.088		0.089		0.116		0.169	

Table 6. Testing the effect of RRP on the offer premium over time.

This table reports the OLS regression results for offer premiums on RRP by time periods. We divide our sample into different time periods. Specifications (1)-(3) report results before 1990, 1990 to 2000, and after 2000 respectively. Specifications (4) and (5) further divide the sample after 2000 into two time periods before and after the 2008 financial crisis. Variable definitions are as in the notes to Table 2. Robustness *t*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, **and * respectively, is reported alongside coefficients.

Offer Premiums	(1)		(2)		(3)		(4)		(5)	
	1985-1989		1990-2000		2001-2014		2001-2007		2008-2014	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
RRP	-0.058	(-0.773)	0.062**	(2.392)	0.125***	(3.858)	0.094**	(2.293)	0.192***	(3.655)
Hostile	-0.049	(-0.463)	0.044	(1.476)	0.031	(1.038)	0.089**	(2.245)	-0.003	(-0.073)
Tender	0.191***	(2.750)	0.109***	(4.668)	0.048**	(2.152)	0.017	(0.539)	0.080**	(2.514)
Diversification	-0.021	(-0.395)	-0.003	(-0.149)	-0.024	(-1.255)	-0.046*	(-1.772)	0.010	(0.306)
Stock	0.078	(0.931)	-0.002	(-0.076)	-0.039	(-1.353)	-0.005	(-0.142)	-0.081*	(-1.854)
Cash	0.037	(0.564)	-0.084***	(-3.258)	0.006	(0.268)	0.023	(0.784)	0.004	(0.138)
RelativeSize	0.064	(1.413)	0.133***	(5.774)	0.092***	(3.355)	0.069*	(1.892)	0.121***	(2.981)
Bidder ROA	0.623**	(2.306)	-0.010	(-0.104)	-0.005	(-0.044)	-0.083	(-0.694)	0.300	(1.273)
Bidder MTBV	0.001	(0.273)	-0.001	(-0.432)	0.001	(0.848)	0.001	(0.462)	0.003	(1.059)
Bidder lnMV	0.028	(1.544)	0.058***	(6.615)	0.049***	(5.472)	0.037***	(3.633)	0.059***	(3.631)
Bidder Volatility	-4.431	(-1.110)	0.534	(0.535)	0.733	(0.611)	0.424	(0.279)	0.799	(0.375)
Target ROA	0.157	(0.911)	0.188***	(2.996)	0.121**	(1.979)	0.151**	(2.176)	0.011	(0.097)
Target MTBV	-0.004	(-0.378)	-0.000	(-0.040)	-0.003	(-1.577)	0.001	(0.238)	-0.006**	(-2.322)
Target lnMV	-0.032	(-1.508)	-0.079***	(-7.832)	-0.074***	(-7.090)	-0.067***	(-5.149)	-0.076***	(-4.427)
Target Volatility	1.856	(0.774)	-0.330	(-0.415)	0.093	(0.098)	-0.192	(-0.140)	-0.026	(-0.024)
Constant	-0.413**	(-2.600)	0.087	(0.860)	0.301***	(3.104)	0.285**	(2.369)	0.102	(0.685)
Year	Yes		Yes		Yes		Yes		Yes	
Industry	Yes		Yes		Yes		Yes		Yes	
N	114		934		830		496		334	
adj. R^2	0.190		0.176		0.184		0.190		0.375	

Table 7. Univariate analysis by different RRP groups

This table reports univariate analysis results for the offer premium, the bidder and the target's cumulative abnormal returns (CAR3) in a 3-day window around the announcement date, where CAR3 is calculated with market model. We divide our sample into those RRP less than 0 (i.e. RRP<0 group), which represents the bidder is relatively more undervalued than the target and those RRP larger than 0 (i.e. RRP>0 group), which represents the bidder is relatively more overvalued than the target. Panel A reports the univariate analysis results for the offer premium. Panel B reports the univariate analysis results for the bidder CAR3. Panel C reports the univariate analysis results for the target CAR3. Panel D reports univariate analysis for the offer premium by the method of payment. Here "Cash" represents that acquisitions are 100% financed with cash. "Stock" represents acquisitions that are 100% financed by stocks. Specifications (1) and (2) of Panel D report offer premiums of 100% cash-financed acquisitions at RRP>0 and RRP<0 groups. Specifications (3) and (4) of Panel D report offer premiums of 100% stock-financed acquisitions at RRP>0 and RRP<0 groups. The mean value, *t*-statistics, and the number of observations for the offer premium, the bidder and the target 3-day abnormal returns around the announcement date are reported in each Panel. The mean difference of *t*-tests is reported at the end of each Panel. *T*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively.

Panel A: Univariate analysis for the offer premium

	Offer Premiums	*t*-stat.	N
(1) RRP<0	0.279***	(30.20)	723
(2) RRP>0	0.329***	(37.26)	1,155
Mean difference (2)-(1)	0.050***	(-3.79)	

Panel B: Univariate analysis for the bidder CAR3

	Bidder CAR3mm	*t*-stat.	N
(1) RRP<0	-0.006**	(-2.27)	723
(2) RRP>0	-0.014***	(-6.37)	1,155
Mean difference (2)-(1)	-0.008**	(-2.28)	

Panel C: Univariate analysis for the target CAR3

	Target CAR3mm	*t*-stat.	N
(1) RRP<0	0.191***	(23.81)	723
(2) RRP>0	0.240***	(32.34)	1,155
Mean difference (2)-(1)	0.049***	(4.33)	

Panel D: Univariate analysis for the offer premium by the method of payment at different RRP subgroups

	(1)	(2)	(3)	(4)	Mean difference			
	RRP>0	RRP<0	RRP>0	RRP<0	(1)-(2)	(3)-(4)	(1)-(3)	(2)-(4)
	Cash		Stock					
Offer Premiums (%)	35.25***	26.75***	31.33***	29.22***	8.50***	2.11	3.92*	-2.47
t-stat	(25.18)	(20.90)	(19.07)	(14.51)	(4.24)	(0.80)	(1.88)	(-1.08)
N	435	291	402	206	724	608	837	497

Table 8. Do bidders focusing on RRP overpay for the target?

This table reports the OLS regression and 2SLS regression results for both bidder and target 3-day CARs on offer premiums. The dependent variable for specifications (1) and (2) is the bidder CAR3 and for specifications (3) and (4) is the target CAR3, where CAR3 is calculated with the market model. The parameters are estimated in the window [-261,-28]. Specifications (2) and (4) reports the results of 2SLS regression using RRP as an instrument variable of offer premiums. Variable definitions are as in the notes to Table 2. Robustness *t*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, **and * respectively. We report the results of the Hausman test and *F*-test at the lower part of the table.

	(1)	(2)	(3)	(4)
	Bidder CAR3		Target CAR3	
	OLS	IV	OLS	IV
Offer Premiums	-0.018***	-0.090***	0.469***	0.765***
	(-2.807)	(-2.626)	(20.499)	(6.597)
Hostile	-0.002	-0.002	-0.000	-0.003
	(-0.324)	(-0.317)	(-0.028)	(-0.153)
Tender	0.009**	0.017***	0.041***	0.010
	(2.376)	(2.888)	(3.102)	(0.533)
Diversification	0.003	0.003	0.004	0.004
	(0.805)	(0.867)	(0.375)	(0.373)
Stock	-0.011**	-0.010**	-0.045***	-0.045***
	(-2.326)	(-2.155)	(-3.952)	(-3.512)
Cash	0.021***	0.021***	0.031***	0.037***
	(5.245)	(4.555)	(2.615)	(2.857)
RelativeSize	-0.005	-0.005	-0.050***	-0.052***
	(-1.116)	(-1.311)	(-6.136)	(-5.505)
Bidder lnMV	-0.003***	-0.003***		
	(-3.916)	(-3.230)		
Bidder MTBV	-0.000	-0.000		
	(-0.972)	(-0.901)		
Bidder ROA	0.041**	0.040***		
	(2.186)	(2.998)		
Target lnMV			-0.002	0.006
			(-0.866)	(1.447)
Target MTBV			-0.002**	-0.002
			(-2.228)	(-1.640)
Target ROA			-0.012	-0.017
			(-0.469)	(-0.800)
Constant	0.015*	0.032***	0.106***	-0.027
	(1.843)	(2.706)	(5.578)	(-0.483)
N	1878	1878	1878	1878
adj. R^2	0.060	.	0.374	.
Hausman test	4.8934	(*p*=0.0271)	7.9056	(*p*=0.0050)
F-test	60.2985	(*p*=0.0000)	42.9958	(*p*=0.0000)

Table 9. Do all stock-financed acquisitions driven by RRP protect the wealth of long-term shareholders?

Panel A of this table reports the univariate analysis results of both the offer premium and the firms' 36-month market-adjusted buy-and-hold abnormal returns (BHAR36ma) by RRP quartiles. The sample only consists of 100% stock-financed acquisitions. Each quartile is assigned a rank from 1 to 4. Rank 1 represents bidders that are relatively more undervalued than their targets (i.e. RRP<0), and rank 4 represents bidders that are relatively more overvalued than their targets (i.e. RRP>0). Panel B of this table serves as a robustness check of the results of Panel A. It reports the univariate analysis results of both the offer premium and the firms' 36-month size-adjusted buy-and-hold abnormal returns (BHAR36sa) by RRP. We divide RRP into three levels, the bottom one third or rank 1 refers to bidders are relatively more undervalued, while the top one third or rank 3 refers to bidders are relatively more overvalued, the middle rank accounts for the remaining observations. We report mean value, *t*-statistics and the number of the offer premium at each rank. BHAR36ma and BHAR36sa are winsorised at the 1% and 99% levels. We perform bootstrap estimation of sampling distribution of BHAR36ma and BHAR36sa at 1000 replications, and report mean value, *p*-value and the number of BHAR36ma and BHAR36sa of each rank. The mean difference of *t*-tests is reported at the end of the table. *T*-statistics (or *p*-value) are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively.

Panel A: Market-adjusted BHARs by RRP quartiles						
All stock-financed acquisitions	Offer Premiums	*t*-stat.	N	BHAR36ma	*p*-value	N
1 (RRP<0)	0.296***	(12.12)	152	-0.348***	(0.000)	137
2	0.251***	(11.74)	152	-0.221**	(0.017)	144
3	0.283***	(12.02)	152	-0.198**	(0.025)	145
4 (RRP>0)	0.395***	(13.86)	152	-0.161*	(0.093)	147
Mean difference 4-1	0.099***	(2.63)		0.187*	(0.079)	
Panel B: Size-adjusted BHARs by RRP (Robustness check)						
All stock-financed acquisitions	Offer Premiums	*t*-stat.	N	BHAR36sa	*p*-value	N
1	0.294***	(14.53)	201	-0.400***	(0.003)	158
2	0.262***	(13.04)	201	-0.206**	(0.040)	180
3 (RRP>0)	0.360***	(15.29)	206	-0.253***	(0.001)	174
Mean difference 3-1	0.066**	(2.11)		0.147*	(0.073)	

Table 10. Endogeneity issues.

This table reports the RRP effect on the offer premium by controlling for endogeneity issues. Results from an OLS regression and a 2SLS regression are presented in this table. The RRP is treated as an endogenous variable, and the market 52 week high, with the bidder and the target 65 week-high treated as instrumental variables. We first obtain the fitted value from the regression of the RRP on the instrument variables and then replace the RRP with the fitted value. Results are reported in the "IV" Column. The market 52-week high is defined as the logarithmic term difference between the highest total market value (CRSP: TOTVAL) over the 335 calendar days ending 30 days prior to the announcement date and the total market value 30 days prior to the announcement date. The bidder (the target) 65 week-high is 427 calendar days ending 30 days prior to the announcement date and the stock price 30 days prior to the announcement date. Variable definitions are as in the notes to Table 2. Robustness *t*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively, is reported alongside coefficients. The results of the Hausman test and the Sargan test are reported in the lower part of the table.

Offer Premiums	OLS		IV	
	Coef.	*t*-stat.	Coef.	*t*-stat.
RRP	0.089***	(4.501)	0.085***	(4.853)
Hostile	0.032	(1.563)	0.032	(1.312)
Tender	0.075***	(5.006)	0.075***	(4.518)
Diversification	-0.017	(-1.256)	-0.017	(-1.280)
Stock	-0.003	(-0.184)	-0.003	(-0.179)
Cash	-0.031*	(-1.917)	-0.031*	(-1.856)
RelativeSize	0.116***	(7.263)	0.116***	(7.719)
Bidder ROA	0.019	(0.269)	0.018	(0.337)
Bidder MTBV	-0.000	(-0.010)	-0.000	(-0.005)
Bidder lnMV	0.056***	(9.627)	0.056***	(10.282)
Bidder Volatility	0.768	(1.047)	0.744	(1.110)
Target ROA	0.141***	(3.347)	0.140***	(4.545)
Target MTBV	-0.001	(-0.878)	-0.001	(-0.883)
Target lnMV	-0.078***	(-11.703)	-0.078***	(-12.472)
Target Volatility	-0.315	(-0.537)	-0.291	(-0.624)
N	1878		1878	
adj. R^2	0.169		0.169	
Hausman test	0.2170	(*p*=0.6414)		
Over-identifying restrictions (Sargan test)	26.8164	(*p*=0.0000)		

Appendix A. Variables correlation matrix.

This table reports pairwise Pearson correlation of the variables used in the regression of offer premiums on RRP.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. RRP	1.0000														
2. Hostile	-0.0450	1.0000													
3. Tender	-0.0199	0.1333	1.0000												
4. Diversification	-0.0072	-0.0175	0.0245	1.0000											
5. Stock	0.0957	-0.1122	-0.2918	-0.0289	1.0000										
6. Cash	-0.0355	0.0518	0.3323	0.1144	-0.5493	1.0000									
7. RelativeSize	-0.0939	0.2082	-0.0710	-0.1175	0.0101	-0.2716	1.0000								
8. Bidder ROA	-0.0898	0.0096	0.0884	0.0969	-0.1875	0.1732	-0.1187	1.0000							
9. Bidder MTBV	0.0092	-0.0661	-0.0459	-0.0099	0.1511	-0.0770	-0.0789	0.1448	1.0000						
10. Bidder lnMV	-0.0465	-0.0500	0.0938	0.0764	-0.1840	0.1811	-0.3759	0.3133	0.2044	1.0000					
11. Bidder Volatility	0.0667	-0.0353	-0.0688	-0.0681	0.3333	-0.2574	0.1446	-0.4836	0.1110	-0.4176	1.0000				
12. Target ROA	-0.2785	0.0618	0.0088	0.0286	-0.0651	0.0106	0.1003	0.2997	-0.0042	0.0912	-0.2870	1.0000			
13. Target MTBV	-0.1282	-0.0369	-0.0187	0.0093	0.1246	-0.0714	-0.0517	0.0379	0.1840	0.1591	0.0662	0.0426	1.0000		
14. Target lnMV	-0.2091	0.1085	-0.0051	-0.0844	-0.0961	-0.0757	0.1873	0.1755	0.1153	0.6213	-0.3167	0.3045	0.1913	1.0000	
15. Target Volatility	0.3084	-0.1088	-0.0072	0.0382	0.2321	-0.0760	-0.1515	-0.2704	0.0929	-0.2373	0.6290	-0.4696	0.0385	-0.5106	1.0000

Appendix B. The effect of RRP on the probability of using stocks (Robustness checks).

Panel A of the table reports binomial logistic regression for 100% stock-financed acquisitions on RRP by different RRP groups. Specifically, RRP>0 represents bidders that are relatively more overvalued than their targets, and RRP<0 represents bidders that are relatively more undervalued than their targets. There are 50 observations missing due to multicollinearity problem of the year and industry dummies, so that we are left with 1,742 observations, 1,103 for RRP>0 group, and 639 for RRP<0 group. Panel B reports multinomial logistic regression results for Stock versus Cash and Stock versus Mixed. "Stock" refers to acquisitions that are 100% financed by stocks. "Cash" refers to acquisitions that are 100% financed with cash. "Mixed" refers to acquisitions that are neither 100% cash financed nor 100% stocks financed. There are 5 missing observations that are defined as "Other" in terms of the method of payment in Thomson One. For both panels, we control 15 variables as shown in the specification (4) of Table 3. Variable definitions are as in the notes to Table 2. *P*-value is reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, **, and * respectively.

Panel A: Binomial logistic regressions. By RRP		
	RRP>0	RRP<0
RRP	0.831***	-0.232
p-value	(0.003)	(0.611)
15 variables	Controlled	Controlled
Year &Industry	Yes	Yes
N	1103	639
Pseudo R^2	0.316	0.350
Panel B: Multinomial logistic regressions. By the method of payment		
	Stock Vs Cash	Stock Vs Mix
RRP	0.728***	0.425**
p-value	(0.000)	(0.017)
15 variables	Controlled	Controlled
Year & Industry	Yes	Yes
N	1787	1787
Pseudo R^2	0.288	0.288

Appendix C. The effect of RRP on the offer premium (Robustness checks).

This table reports the OLS results for offer premiums on RRP by different subsamples. We divide the sample by the method of payment, as reported in specifications (1) and (2), by whether a deal is diversified or not, as reported in specifications (3) and (4), by whether a deal is a tender offer or not, as reported in specifications (5) and (6), and by whether a deal is successfully or not within the sample period, as reported in specifications (7) and (8). Our regressions control all variables as reported in specification (5) of Table 6. All year and industry dummies are included in the regressions. Robustness *t*-statistics are reported in parentheses. Statistical significance at the 1%, 5% and 10% levels is denoted ***, ** and * respectively.

OLS regressions. The RRP effect on offer premiums by different subsamples								
Offer Premiums	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Method of Payment		Diversification		Tender		Successful	
	Stock	Cash	Yes	No	Yes	No	Yes	No
RRP	0.071**	0.113***	0.127***	0.067**	0.148***	0.078***	0.081***	0.119**
t-stat	(2.239)	(3.674)	(4.066)	(2.566)	(4.107)	(3.464)	(3.921)	(2.347)
Variables	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Year & Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	608	726	702	1176	380	1498	1597	277
adj. R^2	0.146	0.223	0.159	0.173	0.224	0.144	0.164	0.238