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Mergers and Beliefs

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ACADEMY of
ECONOMICS
and FINANCE
JOURNAL

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Mergers and Beliefs

Todd A. Brown, Stephen F. Austin State University

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Abstract

We study the combined effects of managerial optimism and market overvaluation on merger premiums and the chosen form of payment. Our empirical results are consistent with market overvaluation and the target manager's optimism as having the most influence on mergers. The observed form of payment corresponds to the acquiring manager's preferences, suggesting that the acquiring manager dictates the method of payment. Lastly, our model demonstrates why cash mergers are more likely to be hostile, and provides an explanation for why a combination of cash plus stock may be optimal.

Introduction

Recent research has examined separately the effects of both managerial and market optimism on mergers. According to this view when the market is overvalued, companies will try to acquire other companies by using their overvalued stock as payment (e.g. Shleifer and Vishny, 2003 and Dong et al., 2006). Conversely, when CEO's are optimistic in relation to their ability to manage, they prefer to use cash to acquire other companies instead of their stock, which they perceive to be undervalued (e.g. Roll, 1986 and Malmendier and Tate, 2008). In this study we allow for both motives for mergers.

Many explanations for mergers and acquisitions have been based on the joint assumption of unbiased managerial behavior and efficient capital markets. In this context, mergers can be explained as a rational attempt to capture synergies or eliminate agency problems. In loosening the assumption about managerial behavior, Roll (1986) suggests that managerial hubris may also help explain observed merger activity. Managerial hubris causes managers overestimate the probability that they will operate the target company better than the current management, therefore causing them to overpay for the target. Shefrin (2001) also notes that psychological biases may prevent decision makers from operating in an unbiased manner.

Malmendier and Tate (2008) test the hubris hypothesis by sorting managers according to their perceived optimism. They define optimistic managers as those who consistently overestimate their ability in acquiring and running potential projects. They conclude that optimistic managers pay too much for target firms while misjudging their potential value-added, thus acquiring companies that could be value-destroying. Furthermore, optimistic CEO's view issuing equity as costly because they frequently believe that their firm is undervalued. This forces optimistic CEO's to use cash in purchasing other firms to avoid issuing new undervalued equity. This need for cash exacerbates the effects of overconfident managers with an abundance of internal resources and also denies the company some otherwise profitable opportunities (where equity could be used). Their empirical tests generally support these predictions.

Shleifer and Vishny (2003) relax the assumption of market efficiency, and suggest that mergers are a rational response by managers trying to time the market or take advantage of private information about the misvaluation of their own firm. The following two sections describe empirical research that relates merger activity to either market mispricing or managerial biases. Dong et al. (2006) find that acquirers that are overvalued pay a higher premium for targets, offer stock payments and experience negative announcement day returns. They also find that overvalued targets are more likely to receive stock payments, accept lower premiums and experience lower announcement day returns.

In this study we begin by developing a model that relates the relative optimism of the both the acquiring and target managers to the market valuation of both firms. The explicit recognition that what matters is the relative optimism of both managers is one of this study's contributions. While acquiring manager optimism has been previously demonstrated as an important factor in mergers, we show that the optimism of the target manager is also important and affects both the target manager's preferred form of payment and required premium.

Our model allows us to pinpoint which beliefs affect the preferred method of payment, the premium, or both. For example, we show that the acquiring manager's belief about the target firm's valuation affects the premium the acquirer is willing to pay, but has no effect on the acquirer's preferred form of payment. The latter is affected only by the acquiring manager's beliefs about her own firm's value.¹ On the other hand, the target manager's belief about his own firm's valuation affects the minimum required premium but not the preferred form of payment: a target manager who believes his firm is undervalued will demand a higher premium, but his optimism will not affect his preferred form of payment. The latter is determined only by the target manager's beliefs about whether or not the acquiring firm is fairly valued.

We test the empirical predictions of the model using a sample of 336 merger transactions. The manager's optimism is estimated by their willingness to accept an increase in the risk of their personal portfolio. Specifically, CEO's are labeled as optimistic if they do not exercise options that are significantly in-the-money or they purchase stock in their own company.

The current market valuation is estimated by the price-to-book ratio and also the price to residual-income ratio to include a proxy for possible future growth of the firm. Future growth is estimated from analyst's expectations of future earnings.

Our model offers several additional insights. First, the model is consistent with an environment in which cash mergers are more frequently hostile than stock mergers. In our model, the beliefs that give rise to a preference for cash among acquiring managers at the same time shrink the range of possible premiums acceptable to both the target and acquiring manager. Assuming the likelihood of a friendly merger is increasing in the range of acceptable premiums (combined with our empirical result that acquiring managers appear to dictate the method of payment), then stock mergers are more likely to be friendly.

Most models predict that either cash or stock is optimal, but rarely predict an optimal combination. Our model offers an explanation for why acquiring managers sometimes choose combinations of cash and stock. Because the acquiring manager's beliefs affect her preferred method of payment, the target manager's beliefs about the acquiring firm's valuation will be a function of the acquirer's chosen method of payment. If the acquiring manager can convince the target that the acquiring firm is fairly priced by substituting cash for some of the stock, this reduces the minimum premium the acquiring firm must pay. We show that when the two managers hold different prior beliefs about the acquiring firm's value, the extra cost to the acquirer of substituting cash for stock (when stock is optimal) can be more than offset by the lower premium that the target manager is willing to accept.

The Model

Our model extends the ideas of Shleifer and Vishny (2003) and Malmendier and Tate (2008) by examining mergers when managers are biased and markets are simultaneously misvalued. It centers on the merger of two firms, the Acquirer (A) and the Target (T), and the future merged combination of these firms (C). The perceived value of each firm is indexed by the subscript i , which denotes the perspective of either the market (m), the acquiring manager (a) or the target manager (t). In the next section, the subscript j is also used to index the relative bias of each manager. If a merger is successful, the value of the combined firm from the viewpoint of i will be:

$$V_i^C = V_i^A + V_i^T + e_i - k \tag{1}$$

where e_i is the synergy gain expected from participant i , and k is the cash paid by the acquirer to the shareholders of the target firm.²

In addition to the cash, the target shareholders can also receive a proportion s_i of the combined firm (acquiring shareholders will receive $(1 - s_i)$ of the new firm). The premium paid by the acquirer, p , is defined as the value of the shares plus cash minus the current market value of the target. Therefore,

$$p = V_i^C - V_i^T - k \tag{2}$$

and the proportion of the new firm given to the target shareholders will be

$$s_i = \frac{p}{V_i^C - V_i^T} \tag{3}$$

It should be noted that the target's share of the combined firm is calculated using the current market values of the acquirer and the target. This assumption is made because share values in merger transactions always use current market values.³

The Acquirer's Decision

We begin the analysis by looking at the decision process of the acquiring manager. The manager will desire a merger if the value of the manager's claim after the merger exceeds the value before the merger. The acquiring manager's problem is: subject to $V_i^A \geq V_i^A$, $V_i^T \geq V_i^T$, and $V_i^C \geq V_i^C$. Constraints (i) – (iii) require that the acquiring manager, target manager and target shareholders, respectively, be at least as well off after the merger as they are before. We assume that beliefs vary among individuals and that these belief differences produce different asset valuations.⁴

To capture the acquiring manager's relative beliefs about valuations, we define the acquiring manager's valuation divided by the market valuation as:

$$\beta_i = \frac{V_i^A}{V_m^A}$$

These ratios represent the bias of the acquiring manager, relative to the market, for the value of her own firm (A), the target firm (T) and the synergies that will be obtained by the merged firm (e). Defining the ratios separately for the acquiring firm, target firm and the synergy gains allows us to separately examine belief differences for each component contributing to the merged firm's value. The maximum premium the acquiring manager can pay while satisfying constraint (i) is:

(4)

Equation (4) establishes an upper bound for the premium the acquiring manager is willing to pay. The first term is standard: the acquiring manager will not pay more for the target firm than the total expected synergy gains. The second term, in square brackets, is affected by the acquiring manager's beliefs about her own firm's value and the synergy gains, while the last term involves her beliefs about the relative valuation of the target. We now consider the implications of specific beliefs.

Case A.1: Unbiased Beliefs (also corresponds to full rationality, efficient markets)

If the acquiring manager and market have identical views on the synergies and the value of each firm, then equation (4) simplifies to . Any decision to merge will be made when the acquiring manager can pay a premium smaller than the synergies that she expects from the merger. This result rests purely on the notion that mergers exist to capture the synergies between two companies. As long as the cost (premium) of the merger is less than the synergies, it is optimal for the acquiring manager to pursue the acquisition. Also in this case, the maximum premium is independent of the method of payment.

Case A.2: Acquiring Manager Believes Own Firm is Overvalued (

If the stock market places a greater value on the acquiring firm than the acquiring manager, this implies that the manager believes her stock is overvalued and will eventually decline towards her perceived value, . The maximum premium the acquiring manager will offer depends on her beliefs about the valuation of the target. First, suppose the acquiring manager believes the target is also overvalued (without loss of generality assume). Then,

(5)

Equation (5) indicates that the method of payment matters, since the premium is maximized by setting k=0. That is, the acquiring manager can afford to pay higher premium by issuing overvalued stock than by offering cash (whether the target manger also prefers stock is addressed in the next section). The second term captures the "penalty" from using cash instead of overvalued stock.

Next, consider the case where the acquiring manager believes the target firm is fairly priced (). In this case,

(6)

The acquiring manager will still prefer stock to cash, but a third force is now at work: the acquiring manager's ability to transfer some of her own firm's overvaluation to target shareholders enables her to pay a premium in excess of the synergy gains when using stock. The stronger the acquiring manager's belief about her own firm's overvaluation, the larger the premium she can afford to pay. This leads to the following three predictions which are consistent with Shleifer and Vishny (2003):

Prediction 1: *The takeover premium is positively related to the acquiring firm's market valuation and negatively related to the target firm's market valuation.*

It is apparent that a stock merger will be preferred by the acquiring manager in order to transfer some of her own firm's overvaluation to the target shareholders.

Prediction 2: *For a given premium, an acquiring manager will prefer to offer a stock payment when she believes her own firm is overvalued*

The analysis also provides a basis for the anticipated stock market returns on the day of the merger announcement. Market optimism about the value of the acquiring firm may lead to a premium in excess of synergy gains.

Prediction 3: *Market optimism about the value of the acquiring firm leads to lower announcement day returns for the acquiring firm.*

Case A.3: Acquiring Manager Believes Own Firm is Undervalued

Roll (1986) argues that managerial hubris may help explain why a manager purchases another firm when it is not a value increasing proposition. A manager who suffers from hubris essentially believes that the more she manages the greater the

value she can create. In this section we consider an acquiring manager who believes his firm is undervalued. This could be due to optimism, overconfidence, hubris, or some other factor. We are not interested in the causes of such a belief, but the consequences on manager behavior.⁵ If the acquiring manager believes the target is fairly valued () then as before

(7)

In this case, the maximum premium the acquirer will pay is () in an all-cash deal. However, if the acquiring manager believes the target is also undervalued, she will be willing to pay more. Again, suppose without loss of generality that (), so that

(8)

The maximum premium is an increasing function of the cash component of the deal and the degree of perceived underpricing. This leads to the following predictions:

Prediction 4: *An acquiring manager who is relatively optimistic about the value of her own firm () will prefer cash as the method of payment in a merger.*

Equation (8) shows that optimism on the part of the acquirer is positively related to premium in cash mergers (since the premium is maximized by setting $s = 0$). However, when stock financing is added to the merger, the positive relationship is weakened.

Prediction 5: *An acquiring manager who is relatively optimistic about the value of her own firm () will offer a higher premium for mergers financed with cash.*

Prediction 5 qualifies the prediction offered by Malmendier and Tate (2008) that optimistic acquiring managers will offer higher premium regardless of the method of payment. Here, the optimistic acquiring manager recognizes that relative to cash, her own stock is ‘undervalued currency’. In fact, holding constant the value of the target firm, the optimistic acquiring manager will offer a *smaller* premium in stock deals than a pessimistic manager who believes her firm is overvalued. Because we expect the acquiring firm’s announcement day return to be lower for optimistic managers, especially when cash is used as the method of payment. This leads to the following prediction.

Prediction 6: *An acquiring manager who is optimistic about the value of her own firm () will experience a lower announcement day return than an unbiased manager, especially for cash-financed mergers.*

Case A.4: The Optimistic Manager in an Overvalued Market

Because we model the beliefs of the acquiring manager relative to the market, the case where the acquiring manager is relatively optimistic applies equally to all cases in which the acquiring manager is relatively more optimistic than the market (e.g. a rational manager in an undervalued market; an optimistic manager in an efficient market; or even an optimistic manager in an overvalued market, provided the manager is relatively more optimistic than the market). Likewise, the case of a relatively pessimistic acquiring manager applies to all situations where the market is relatively more optimistic than the manager herself. Therefore,

Prediction 7: *An acquiring manager will prefer stock mergers when the market is relatively more optimistic than the acquiring manager about the value of the combined firm.*

In the Shleifer and Vishny (2003) model, target firm undervaluation is a necessary, but not a sufficient, condition for cash deals. Here, cash deals can occur if the target is overvalued provided the acquirer is relatively more optimistic than the market about the degree of overvaluation of the combined firms.

The Target Manager’s Decision

We begin the analysis by looking at the decision process of the target manager. We make the simplifying assumption that the target manager negotiates a premium on behalf of the shareholders. We also abstract from the bargaining process and solve for the minimum takeover premium that the target manager will accept. Generally, this is the minimum premium for which there is a perceived increase to the current shareholder wealth, or for which the target shareholders’ share of the combined firm plus any cash they receive in the merger is greater than their value before the merger. This occurs when

Further simplification leads to

(9)

Case B.1: Unbiased Beliefs (also corresponds to full rationality, efficient markets)

If the target manager and market have rational views of the value of each firm then $V_T = V_M$, and the target manager will prefer any positive premium to no merger. This simple result draws from the economic notion of selling an asset whenever one can receive a price above its fundamental value. In this particular specification, the method of payment does not affect this result, and the choice of payment is irrelevant to the post-merger value of the target.

Case B.2: Target Manager Believes Own Firm is Overvalued ($V_T > V_M$)

If the target manager believes that his own firm's stock is overvalued, this presents the target manager with an opportunity to capitalize on the misvaluation.⁶ We assume that the target manager believes that his stock value will eventually decline toward his perceived fundamental value T .

The target manager's beliefs about the valuation of the acquiring firm are important. First, suppose the target manager believes the acquiring firm is overvalued. Then, the minimum premium (assuming without loss of generality $V_A > V_M$) is

$$P_{min} = \frac{V_T - V_M}{k} \quad (10)$$

In an all-stock deal ($k = 0$), $P_{min} = 0$, but for an all-cash deal the minimum premium is actually negative. That is, the target manager is willing to sell his firm for less cash than the current market value, because doing so transfers some of his own firm's overpricing to the acquiring shareholders. More generally, the target manager will accept the merger if the loss that he transfers to the acquiring shareholders, plus the premium, exceeds the loss that is obtained from the acquiring firm (via the acquiring firm's overvalued shares).

Prediction 8: For a given premium, a target manager will prefer a cash payment when he believes that the acquiring firm is overvalued.

This result contrasts with Prediction 2, which states that the acquiring manager prefers to pay in stock when her firm is overvalued. Therefore, our empirical analysis in the next section tests the effect of market optimism on the method of payment to see whether one manager systematically dictates the form of payment in the merger. Furthermore, this prediction also contrasts with the prediction by Dong et al. (2006) in which they hypothesize that target managers will demand stock payments when the acquirer or the target are overvalued.

On the other hand, if the target manager believes the acquiring firm is fairly priced, then the minimum premium is unaffected by the method of payment. However, the target manager is still willing to accept a negative premium satisfying the condition:

$$P_{min} = \frac{V_T - V_M}{k} \quad (11)$$

This analysis also provides a basis for predicting the stock market returns on the day of the merger announcement when the market is optimistic about the value of the target firm. Because the target manager is willing to accept a lower takeover premium when he believes his firm is overvalued, we have:

Prediction 9: The target firm will experience lower announcement day returns when the target manager believes his own firm is overvalued.

Case B.3 Target Manager Believes Own Firm Undervalued

We next analyze the case where the target manager believes his firm's fundamental value exceeds its market value. This could be due to optimism, overconfidence, hubris, or some other factor. Again, we are not interested in the causes of such a belief, but its effects on managerial behavior. If the manager believes the acquirer is also undervalued (assume $V_A < V_M$), then

$$P_{min} = \frac{V_T - V_M}{k} \quad (12)$$

The minimum premium is now positive for cash deals, and all else equal, the target manager demands a higher premium for cash-financed deals than stock deals. This is because (by assumption) he views \$1 of the (undervalued) acquiring firm's stock as worth more than \$1 of cash.

Prediction 10: A target manager who is relatively optimistic about the value of the acquiring firm will demand a higher premium for mergers financed with cash than with stock.

If the target manager believes the acquiring firm is fairly priced, then

While the minimum premium is still positive, the target manager is indifferent between stock and cash as the form of payment. By comparing equations (12) and (13) to (10) and (11), we see that relatively optimistic target managers (who believe their firm is undervalued) will demand a higher premium than relatively pessimistic target managers, regardless of what they believe about the relative pricing of the acquiring firm, and regardless of the method of payment. Therefore, we expect the target announcement day return to be higher for optimistic target managers, especially when cash is used as the method of payment.

Prediction 11: *A target manager who is optimistic about the value of his own firm will demand a higher premium and experience a higher announcement day return than an unbiased target manager.*

Case B.4: The Optimistic Manager in an Overvalued Market

Because we model the beliefs of the target manager relative to the market, the case of target manager optimism applies to all cases in which the target manager is relatively more optimistic than the market (e.g. a rational manager in an undervalued market; an optimistic manager in an efficient market; or even an optimistic manager in an overvalued market, provided the manager is relatively more optimistic than the market). Therefore,

Prediction 12: *A target manager who is optimistic about the value the combined firm will prefer cash mergers when the market is relatively more optimistic than the target manager about the value of the combined firm.*

That is, given an optimistic manager, market optimism must exceed the target manager’s level in order for cash to be the preferred payment.

Data and Methodology

Merger data is from the Security Data Corporation’s (SDC) Global Merger and Acquisition Database. The sample is restricted to US publicly listed firms that have acquired another US publicly listed firm between 1994 and 2004. Both the acquirer and the target must be listed in the ExecuComp database to ensure CEO portfolio data availability. Therefore, the set of mergers is limited to those including firms within the S&P 1500. Firm level data from COMPUSTAT is used to supplement the merger data. The total sample is comprised of 336 mergers with an average deal value of \$3,963.7 million. Of those mergers, 147 are stock mergers and 109 are cash mergers. The remaining 80 mergers are a mixture of stock and cash.

Measure of Market Misvaluation

Following Dong et al. (2006), we use two market misvaluation measures: (1) the standard price-to-book value of equity ratio (*P/B*) and (2) the price to residual-income model ratio (*P/RIM*). Both *P/B* and *P/RIM* have been used in numerous studies as predictors of a firm’s abnormal future returns.⁷ Lee, Myers, and Swaminathan (1999) have shown that *P/RIM* is better at forecasting future stock returns than *P/B*; however, *P/RIM* has the disadvantage of using analyst’s estimates in the calculation which may be inherently biased or may be correlated with current market conditions. Thus we use both ratios.

The *P/B* ratio is calculated by dividing the firm’s current market value by the book value of the firm’s equity at the end of the prior fiscal year. Both values are derived following Fama and French (2002) where market value is calculated by multiplying the stock price one month prior to the merger announcement by the number of common shares outstanding (COMPUSTAT Annual Item 25). Book value of equity is calculated as total assets (Item 6) minus total liabilities (Item 181) and preferred stock (Item 10) plus deferred taxes (Item 35) and convertible debt (Item 79).⁸ Finally, the *P/B* ratio is winsorized at the 1% tails; and following Dong et al. (2006), the negative *P/B* ratios are replaced with the maximum *P/B* ratios in the sample. The mean *P/B* ratio for the acquirer sample is 4.34 and the mean for the target sample is 3.59.

The *P/RIM* ratio is derived from the *P/B* ratio with the addition of analysts’ estimates to proxy for a firm’s future growth potential. Book value follows traditional accounting rules to capture historical cost and does not allow for any measure of future growth. The residual-income model (*RIM*) was created by Ohlson (1995) to combat this problem and capture growth potential. Ohlson begins with book value and adds to it the present value of expected residual income, calculated by first taking the difference between the return on equity and the cost of equity and then multiplying by book value, resulting in:

$$RIM = B_t + \sum_{i=1}^{\infty} \frac{E_t ROE_{t+i} - r_e}{[1 + r_e]^i} B_{t+i-1} , \tag{14}$$

where B is the book value of equity, ROE is the return on equity, and r_e is the firm's cost of equity.

Some assumptions are required to replace the infinite sum and compute equation (14). Lee, Myers, and Swaminathan (1999) find that their estimates of RIM do not change significantly when their forecast horizon is increased beyond three years. Under this assumption that residual income beyond the third year is constant, equation (14) becomes

$$RIM_t = B_t + \frac{f^{ROE}_{t+1} - r_e}{1 + r_e} B_t + \frac{f^{ROE}_{t+2} - r_e}{[1 + r_e]^2} B_{t+1} + TV, \quad (15)$$

where f^{ROE} is the forecasted return on equity and TV is the estimated terminal value beyond year 2 calculated as

$$TV = \frac{f^{ROE}_{t+3} - r_e}{[1 + r_e]^2} B_{t+2}. \quad (16)$$

The forecasted return on equity is derived from analysts' estimates of earnings per share (EPS) taken from the I/B/E/S database and constructed as

$$f^{ROE}_{t+i} = \frac{f^{EPS}_{t+i}}{B_{t+i-1}}, \quad (17)$$

where f^{EPS} is the forecasted EPS. When an EPS forecast is not available, the previous forecast is multiplied by the growth rate of earnings which is also supplied by I/B/E/S. The future book values of equity are computed as

$$B_{t+i} = B_{t+i-1} + f^{EPS}_{t+i} - f^{DPS}_{t+i}, \quad (18)$$

where f^{DPS} is the forecasted dividends per share calculated as

$$f^{DPS}_{t+i} = f^{EPS}_{t+i} \times k, \quad (19)$$

where k is the current dividend payout ratio which is determined by

$$k = \frac{D_t}{EPS_t}, \quad (20)$$

and $D(t)$ and $EPS(t)$ are the current dividend per share and earnings per share, respectively. To compensate for companies with negative EPS, dividends are divided by 6% of total assets to calculate the dividend payout ratio (in accordance with Lee et al., 1999). Finally, the cost of equity is calculated for each firm by the traditional CAPM of:

$$r_e = r_f + \beta_i (r_m - r_f), \quad (21)$$

where r_f is the one-month T-bill rate, r_m is the average annual return on the CRSP value-weighted index over the previous 30 years, and β_i is the firm specific beta calculated using five years of monthly returns.

The mean P/RIM ratio for the acquirer sample is 3.06 and the mean for the target sample is 2.70. The averages of our P/B ratio's and P/RIM ratio's are somewhat larger than those found in Dong et al. (2006), which may be due to different sample periods: our sample is from 1994 – 2004 whereas their sample is from 1978 – 2000. The correlation for the acquirer is 30% and the target is 16%. Dong et al. (2006) report correlations of 33% for acquirers and 20% for targets. These low correlations suggest that both measures may offer orthogonal information about market misvaluation.

Measure of Managerial Optimism

Following the approach implemented by Malmendier and Tate (2005), we proxy managerial optimism by observing CEO personal investment in their own company. Data on CEO portfolios is obtained from the ExecuComp database which includes information on option and stock holdings at the fiscal year end for companies in the S&P 1500. CEOs who fail to reduce their exposure to company specific risk are classified as optimistic. This exposure to company risk is then exacerbated by the CEO's large human capital investment in the firm resulting in under-diversified portfolios. Thus, when CEOs fail to take advantage of opportunities to reduce their exposure to firm specific risk or when they increase their exposure, they are classified as optimistic.

The first measure of optimism is proxied by a CEO who holds vested options that are significantly in-the-money. Hall and Murphy (2002) derive the conditions under which it is optimal for unbiased CEOs to exercise their options given their individual wealth and degree of risk-aversion. Malmendier and Tate (2005) utilize this optimality and define as optimistic any CEO who does not exercise stock options that are at least 67% in-the-money in any year after the options have vested. They further control for chance instances of nonexercise by requiring that the CEOs fail to exercise in at least two years in which they had options that were exercisable and significantly in-the-money.

To calculate the percentage that the CEO's vested options are in-the-money we divide the profit from exercising their options (fiscal year-end stock price minus the average exercise price of their options) by the average exercise price of the CEO's in-the-money options. The average exercise price of the options is calculated in accordance with Core and Guay (2002) by taking the value of the CEO's vested options and dividing by the number of vested options and then subtracting this value from the fiscal year-end stock price. They note that their methodology may introduce a downward bias when computing the exercise price when stock prices are decreasing because they assume that out-of-the-money options have exercise prices equal to the current fiscal year-end stock price. To correct for this bias, we modify the methodology of Malmendier and Tate (2005) by classifying CEO's as optimistic when they fail to exercise, at least twice, options that are 100% or more in-the-money. Using this measure we find 61% of the acquirers are classified as optimistic (compared with 51% in the sample of Malmendier and Tate 2005) and 45% of the target managers are classified as optimistic. Each manager's optimism is negatively correlated with their respective market valuations.⁹

The second optimism measure is derived from the Hall and Murphy (2002) framework and follows from their assertion that under-diversified CEOs should not increase their exposure to company risk by purchasing company stock. Therefore, if a CEO bought company stock on net in more years than she/he sold stock on net over her/his tenure, they will be classified as optimistic. The data for CEO stock holdings is obtained from ExecuComp and any shares obtained through stock grants are excluded.

Under the 'Stock Purchaser' measure, we find 56% of the acquirers are classified as optimistic (compared with 61% in the Malmendier and Tate (2005) sample) and 47% of the target managers are classified as optimistic. Optimistic acquiring managers have little correlation with our market measures and the optimism of target managers also exhibit low correlation with the market. The correlation between both managers is 0.088. The 'Option Holder' measure and the 'Stock Purchaser' measure have a correlation for the acquirer and target of 0.159 and 0.241, respectively.

We include several control variables in our regressions to isolate the effects that optimism has on merger characteristics. These control variables are similar to those in Dong et al. (2006) who test investor misvaluation on mergers. Because synergies among related firms can be a major motive in mergers, we include a dummy variable that is equal to one when a merger is conducted among firms in the same industry. We define industry based on 3-digit SIC code. In addition, acquirer industry dummy variables are included to control for differing effects across industries. Year dummy variables are also included to control for changes in merger characteristics across time.

We use the log of both acquirer size and target size, measured as market value, as control variables. The average acquirer market value is \$55,287 million and the average target market value is \$8,782 million. The final control variable is the leverage of the acquirer defined as the total debt of the acquirer divided by the total assets of the acquirer. The leverage variable helps control for the financing constraints that could influence the behavior of the acquirer as explained by the Jensen (1986) free cash flow argument. The mean leverage for our sample is 0.180.

Empirical Results

This section examines the impact of managerial optimism and market misvaluation on (1) the method of payment utilized in mergers; (2) the size of the premium; and (3) the market reaction to the merger announcement.

Method of Payment

According to our model, acquiring managers will prefer to use their stock as payment when they believe their firm is overvalued (Prediction 2). In contrast, target managers will prefer to receive cash when they believe the acquirer is overvalued (Prediction 8). Therefore, tests of the method of payment used in different market conditions will determine whether one manager predominantly decides on the method of payment in mergers.

Table 1 provides the results for logistic regressions of our proxies for market valuation on stock and cash mergers. All of the coefficients of price-to-book (*P/B*) and price to residual-income (*P/RIM*) for the regression on stock mergers are positive. Of the *P/B* coefficients, the acquirer’s stock valuation is significant at the 1% level and the *P/RIM* results are also significant for the acquirer. The cash merger results show negative and significant coefficients. The acquirer’s valuation measures are significant at the 1% and 5% level for *P/B* and *P/RIM*, respectively. These results indicate that stock is used in a relatively optimistic market and cash in a pessimistic one. Because these patterns correspond to the acquiring manager’s preferred method of payment, acquiring managers have primary influence on the method of payment used in mergers.

Table 1. Logistic Regressions of Market Optimism on Cash & Stock Mergers (n = 336)

	(1)	(2)	(1)	(2)
Acquirer <i>P/B</i>	0.150*** (4.830)		-0.133*** (-3.922)	
Target <i>P/B</i>	0.051** (2.326)		-0.038* (-1.698)	
Acquirer <i>P/RIM</i>		0.059*** (2.642)		-0.066** (-2.401)
Target <i>P/RIM</i>		0.037 (1.540)		-0.044* (-1.688)
Non-diversifying	0.300 (1.603)	0.244 (1.332)	-0.332* (-1.713)	-0.298 (-1.560)
Log(Acquirer Size)	-0.270*** (-3.584)	-0.211*** (-2.934)	0.267*** (3.449)	0.238*** (3.127)
Log(Target Size)	0.261*** (3.386)	0.289*** (3.772)	-0.265*** (-3.233)	-0.315*** (-3.736)
Leverage	-0.802 (-1.011)	-0.701 (-0.948)	1.190 (1.469)	0.990 (1.281)
McFadden R2	0.3242	0.2831	0.3281	0.3054

z-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2 tests the prediction that optimistic acquiring managers will be more likely to offer cash in mergers (Prediction 4). The table shows that optimism does increase the acquiring manager’s propensity to use cash. These results indicate that optimism alone does not have a significant influence on the form of payment in a merger.

While market valuation affects the choice of payment more than relative managerial optimism, our model also predicts that there will be an interaction between managerial optimism and market valuation. Because managerial optimism is measured on a binary scale, we cannot test Predictions 7 and 12 by calculating the difference between managerial and market optimism to determine which is relatively more optimistic. However, relative optimism does suggest that market valuation will be positively related to optimism of the acquirer manager in stock mergers and positively related to optimism of the target manager in cash mergers. To perform a test of this relation we use the following logistic regression:

$$\Pr Y = 1 | O, M, X = G \beta_1 + \beta_2 O + \beta_3 M + \beta_4 O \cdot M + X' B \quad (22)$$

where *O* is the optimism measure of either the acquirer or the target (Option Holder or Stock Purchaser), *M* is the combined market valuation measures (*P/B* or *P/RIM*), and *X* is the set of control variables. *Y* is a binary variable equal to 1 if the merger

was completed with either all cash or all stock where noted. We assume that G follows the logistic distribution. The null hypothesis is that β_4 , the coefficient on the interaction of market valuation and CEO optimism, is equal to zero.

Table 2. Logistic Regressions of Acquirer Optimism on Method of Payment (n = 336)

	(1)	(2)
Option Holder	0.127 (0.665)	
Stock Purchaser		0.097 (0.508)
Non-diversifying	-0.334* (-1.783)	-0.336* (-1.790)
Log(Acquirer Size)	0.171** (2.409)	0.153** (2.084)
Log(Target Size)	-0.259*** (-3.308)	-0.244*** (-3.123)
Leverage	0.978 (1.294)	1.003 (1.335)
McFadden R2	0.2770	0.2766

z-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

To compute the regression given in Equation (22) we need a measure for the combined market value of the acquirer and the target. We, instead, form a modified P/B and P/RIM for the combination of the acquirer and target. Therefore, the combined market value M will be calculated as

$$M = \frac{P_a + P_t}{B_a + B_t} \text{ or } \frac{P_a + P_t}{RIM_a + RIM_t}, \quad (23)$$

where P_i is market value, B_i is book value, RIM_i is the residual income model calculation given in Equation 14, and i represents the acquirer (a) or the target (t).

The results for the effects on a stock merger for acquiring managers are shown in Table 3. The coefficients on the level of managerial optimism are negative and insignificant. The coefficients on market valuation are positive and significant (with the exception of regression (4) which has a significance level of 12%). The interaction term between market valuation and managerial optimism is significant in three of the four models. This is consistent with the conjecture that optimistic acquiring managers will prefer stock mergers when the market is sufficiently overvalued (i.e. when the market is relatively more optimistic than the acquiring manager about the value of the combined firm).

Table 4 tests whether target manager optimism influences the likelihood of a cash merger. The coefficients of the level of optimism of the target manager are negative and insignificant (with the exception of the second regression where it is positive and insignificant) implying a weak penchant for stock mergers. The coefficients on market valuation are negative and significant. The interaction term between the market and managerial optimism is significant in two of the four models at the 10% level providing some support for a positive relationship between optimistic target managers and market valuation in cash mergers.

The relationship between managerial optimism and market valuation could give credence to the theory that optimistic manager's view of the market is skewed by their own perceptions. Acquiring managers prefer offering stock when the market is overvalued; however, the degree of overvaluation that they perceive in the marketplace is affected by their level of optimism. In other words, we conclude that optimistic acquiring managers require a higher level of relative market valuation before offering stock in mergers. Conversely, optimistic target managers gain by accepting cash in an overvalued market. It also appears target managerial optimism alone does not influence the method of payment in mergers, however, it does seem to influence the level at which the manager views stock market misvaluation.

Table 3. Logistic Regressions of Acquirer & Market Optimism on Stock Mergers (n = 336)

	(1)	(2)	(3)	(4)
Option Holder	-0.219 (-0.631)	-0.440 (-1.447)		
Stock Purchaser			-0.330 (-0.950)	-0.418 (-1.473)
Combined (Acquirer & Target) <i>P/B</i>	0.194*** (3.845)		0.188*** (2.899)	
Combined (Acquirer & Target) <i>P/RIM</i>		0.086** (2.474)		0.061 (1.626)
(CEO Measure) x (Market Valuation)	0.133* (1.719)	0.193*** (2.766)	0.055 (0.702)	0.110** (1.985)
Non-diversifying	0.305 (1.609)	0.241 (1.293)	0.278 (1.488)	0.247 (1.341)
Log(Acquirer Size)	-0.334*** (-4.181)	-0.302*** (-3.816)	-0.292*** (-3.609)	-0.287*** (-3.483)
Log(Target Size)	0.309*** (3.868)	0.317*** (3.933)	0.272*** (3.433)	0.315*** (3.915)
Leverage	-0.825 (-1.042)	-0.911 (-1.199)	-0.709 (-0.912)	-0.529 (-0.708)
McFadden R2	0.3335	0.3025	0.3151	0.2910

z-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 4. Logistic Regressions of Target & Market Optimism on Cash Mergers (n = 336)

	(1)	(2)	(3)	(4)
Option Holder	-0.487 (1.443)	0.012 (0.045)		
Stock Purchaser			-0.505 (-1.595)	-0.104 (-0.388)
Combined (Acquirer & Target) <i>P/B</i>	-0.246*** (-4.178)		-0.275*** (-4.237)	
Combined (Acquirer & Target) <i>P/RIM</i>		-0.087** (-2.288)		-0.085** (-2.138)
(CEO Measure) x (Market Valuation)	0.153* (1.850)	0.028 (0.500)	0.136* (1.875)	0.012 (0.234)
Non-diversifying	-0.267 (-1.366)	-0.298 (-1.570)	-0.270 (-1.392)	-0.302 (-1.579)
Log(Acquirer Size)	0.273*** (3.208)	0.233*** (2.878)	0.325*** (3.938)	0.247*** (3.136)
Log(Target Size)	-0.301*** (-3.627)	-0.301*** (-3.569)	-0.315*** (-3.769)	-0.304*** (-3.622)
Leverage	0.976 (1.214)	0.926 (1.212)	0.879 (1.098)	0.963 (1.256)
McFadden R2	0.3377	0.2941	0.3377	0.2929

z-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Premium

We now consider factors that influence the size of the premium paid to target shareholders. We measure premium as the price per share offered by the acquirer divided by the target's stock price five days prior to the announcement date of the merger. The average premium for our sample is 29.063% which is consistent with other studies (e.g. Dong et al. 2006).

Our model suggests that the premium is affected by the degree of misvaluation in the market. Table 5 tests the prediction that overvaluation of the acquiring (target) firm leads to a higher (lower) premium as stated in Prediction 1. The coefficients on the market valuation of the acquirer are 0.332 for P/B and 0.265 for P/RIM . While they are both positive, they are insignificant. Target market valuation coefficients of -1.165 for P/B and -1.108 for P/RIM are both significant at the 1% level. These results are similar to those found by Dong et al. (2006) and consistent with Prediction 1.

Table 5. Least Squares Regression of Market Optimism on Premium (n = 336)

	(1)	(2)
Acquirer P/B	0.332 (0.861)	
Target P/B	-1.165*** (-3.735)	
Acquirer P/RIM		0.265 (1.392)
Target P/RIM		-1.108*** (-3.220)
Non-diversifying	1.603 (0.600)	1.493 (0.555)
Log(Acquirer Size)	-0.290 (-0.272)	-0.003 (-0.003)
Log(Target Size)	1.046 (0.946)	0.455 (0.410)
Leverage	-25.007** (-2.331)	-22.330** (-2.079)
Adjusted R2	0.1478	0.1392

t-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 tests whether the premium is affected by managerial optimism. Prediction 5 states that an optimistic acquiring manager will pay a larger premium when paying cash and Prediction 10 states that a target manager who is optimistic about the value of the acquiring firm will demand a larger premium in cash mergers. To test these predictions we use the following general regression:

$$\text{Premium} = G \beta_1 + \beta_2 O + \beta_3 \text{Cash} + \beta_4 O \cdot \text{Cash} + X' B \quad (24)$$

where O is the optimism measure of either the acquirer or the target (Option Holder and Stock Purchaser), Cash indicates that cash was used to finance the merger, and X is the set of control variables. The null hypothesis is that β_4 , the coefficient on the interaction of cash and CEO optimism is equal to zero.

The coefficients on managerial optimism are positive but insignificant. The coefficients on cash are also both insignificantly different from zero. The interaction coefficients are 13.683 and 9.935 with significance at the 5% level and 10% level, respectively. The significance of the interaction term indicates that optimistic acquiring managers offer larger premiums in cash mergers than stock mergers. These results are noteworthy because they qualify the evidence in Malmendier and Tate (2008) that acquiring manager optimism leads to higher premiums. While managerial optimism is significant when tested alone, it becomes insignificant when the interaction with cash is included.

Table 6. Least Squares Regressions of Premium on Managerial Optimism & Cash Merger (n = 336)

	Acquirer		Target	
	(1)	(2)	(3)	(4)
Option Holder	0.587 (0.182)		2.467 (0.789)	
Stock Purchaser		0.834 (0.265)		3.252 (1.041)
Cash Merger	-2.268 (-0.510)	0.330 (0.076)	0.055 (0.015)	3.138 (0.862)
(CEO Measure) x (Cash Merger)	13.683** (2.438)	9.935* (1.775)	12.489** (2.265)	7.480 (1.380)
Non-diversifying	0.935 (0.346)	1.459 (0.537)	2.140 (0.795)	1.709 (0.629)
Log(Acquirer Size)	0.044 (0.041)	-0.798 (-0.730)	-0.626 (-0.601)	-0.498 (-0.474)
Log(Target Size)	0.718 (0.636)	1.379 (1.212)	0.910 (0.817)	1.049 (0.930)
Leverage	-23.303** (-2.164)	-22.996** (-2.136)	-23.964** (-2.239)	-21.996** (-2.057)
Adjusted R2	0.1392	0.1270	0.1481	0.1320

t-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 6 also provides the results for the effects of target manager optimism and a cash payment on the amount of premium paid. The coefficients on target managerial optimism are positive but are insignificant.¹⁰ The variables on cash are both positive and insignificant from zero. The interaction coefficients are 12.489 and 7.480 with the first one significant at the 5% level. These results suggest that optimistic target managers seek larger premiums in cash mergers.

Market Reaction

The reaction of the market to merger announcements can be used as a gauge to measure the market's perception of the merger. We estimate the market's reaction to the merger by calculating the cumulative abnormal return (CAR) around the announcement date of the merger. The CAR is computed using standard event study methodology of Brown and Warner (1985). We employ a three-day event window around the announcement date (day 0). Expected returns are computed assuming that $\alpha = 0$ and $\beta = 1$ in the standard CAPM framework following Fuller et al. (2002). Therefore, we proxy expected returns by the CRSP value-weighted market return. Finally, abnormal returns are calculated to be

$$AR_{it} = r_{it} - r_{mt} \quad (25)$$

where r_{it} is the return for firm i on date t , and r_{mt} is the market return. Then the cumulative abnormal return is computed as

$$CAR_i = \sum_{t=-1}^1 AR_{it} . \quad (26)$$

The acquirer has an average CAR of -2.187% and the target's CAR is 19.105%. These returns are similar to those found in other studies (e.g. Kaplan and Weisbach, 1992) and consistent with the acquirer losing value or breaking even and the target gaining value in mergers.

Table 7 provides the results for regressions of the acquiring firm's CAR on its market value and manager's optimism. The coefficients for the CEO optimism measure are positive but statistically insignificant. This result differs from Malmendier and Tate (2008) who report a significantly negative coefficient. Market optimism exhibits a statistically significant negative

relationship with the acquirer CAR having coefficients of -0.235 for *P/B* and -0.118 for *P/RIM*; both are significant at the 5% level. As might be expected, market misvaluation leads to lower announcement day returns providing evidence that the announcement may signal the acquiring manager's belief that her own firm is overvalued. It does not appear, however, that the market is able to perceive the relative optimism of the acquirer. This could be due to the lack of transparency in the marketplace with respect to the manager's optimism level. Alternatively, the market may "buy into" arguments by the acquiring manager that synergy gains are substantial.

Table 7. Least Squares Regressions of Acquirer CAR on Acquirer & Market Optimism (n = 336)

	(1)	(2)	(3)	(4)
Option Holder	0.549 (0.552)			
Stock Purchaser		0.299 (0.312)		
Cash Merger	1.638 (1.197)	0.888 (0.677)		
(CEO Measure) x (Cash Merger)	-0.660 (-0.383)	0.591 (0.347)		
Acquirer <i>P/B</i>			-0.235** (-1.998)	
Acquirer <i>P/RIM</i>				-0.118** (-2.070)
Non-diversifying	0.213 (0.257)	0.178 (0.216)	-0.048 (-0.060)	0.112 (0.138)
Log(Acquirer Size)	-0.044 (-0.134)	-0.078 (-0.232)	0.171 (0.523)	0.092 (0.285)
Log(Target Size)	-0.527 (-1.523)	-0.484 (-1.397)	-0.609* (-1.826)	-0.641* (-1.921)
Leverage	-2.503 (-0.756)	-2.546 (-0.774)	-1.019 (-0.314)	-2.103 (-0.649)
Adjusted R2	0.0964	0.0970	0.1073	0.1082

t-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 8 estimates the same basic equation for the target firm. Just as with the acquirer, the overvaluation of the target's stock leads to lower announcement day returns. The coefficient of *P/B* in the regression on Target CAR is -0.921 and is significant at the 1% level; *P/RIM* has a coefficient of -0.644 which is significant at the 10% level. The reaction of the market to both measures of target manager optimism is significant at the 10% level with Option Holder having a coefficient of 4.444 and Stock Purchaser's coefficient equal to 4.687. These results indicate that target shareholders get rewarded in a merger if their CEO is relatively optimistic, and that this reward comes in the form of the increased premium that the optimistic target manager demands (see Table 6).

Conclusion

The empirical results suggest that market valuation of the acquiring firm has a strong influence on the form of payment. The more overvalued the acquiring firm, the more likely that the merger will be financed with cash. The form of payment is not directly affected by the optimism of either manager. However, an optimistic acquiring manager will offer stock if her firm is sufficiently overvalued. The size of the premium is affected by the valuation of the target firm and the optimism of the target manager. Overvalued targets receive lower premiums, while but the premium is increasing with the optimism of the target manager. For cash deals, the premium is also higher when an optimistic acquiring manager is involved. In addition, the observed form of payment corresponds to the acquiring manager's preferences, suggesting that the acquiring manager may dictate the method of payment.

Table 8. Least Squares Regressions of Target CAR on Target & Market Optimism (n = 336)

	(1)	(2)	(3)	(4)
Option Holder	4.444* (1.856)			
Stock Purchaser		4.687* (1.938)		
Target <i>P/B</i>			-0.921*** (-3.170)	
Target <i>P/RIM</i>				-0.644* (-1.781)
Non-diversifying	-1.482 (-0.583)	-1.718 (-0.675)	-1.624 (-0.646)	-1.097 (-0.430)
Log(Acquirer Size)	1.676* (1.701)	1.787* (1.816)	1.842* (1.892)	1.897* (1.919)
Log(Target Size)	-1.115 (-1.058)	-1.176 (-1.114)	-0.687 (-0.658)	-1.205 (-1.137)
Leverage	-10.825 (-1.078)	-11.403 (-1.137)	-14.763 (-1.478)	-12.730 (-1.262)
Adjusted R2	0.0778	0.0789	0.0992	0.0769

t-statistics are in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Notes

1. Hereafter we use the pronoun ‘she’ to refer to the acquiring firm manager and ‘he’ to refer to the target firm manager.
2. Cash is subtracted from the value of the combined firm because the cash departs the firm after the merger. Therefore, in an all cash merger, the combined firm will be equal to the value of the acquirer plus the accompanied synergies (cash would be equal to the target firm). If the acquirer pays a premium equal to the synergies, the value of the combined firm will not have changed from the pre-merger value (i.e. no value is added).
3. Cai and Vijh (2007) have shown that merger premiums are affected by the liquidity of managerial stock and option holdings. While acknowledging the link between managerial compensation and merger premiums, our model abstracts from this effect to focus exclusively on managerial beliefs and market misvaluation.
4. Our model does not attempt to identify the cause of the heterogeneous beliefs or misvaluation. We instead refer to prior literature of how stock market prices may deviate from fundamental values (e.g. Shleifer, 2000) or the tendency of CEOs to overestimate their own skill level and consequently, the value of their company (e.g. Larwood and Whittaker, 1977 and Camerer and Lovo, 1999).
5. The results of this scenario are the same for an unbiased manager in a pessimistic market.
6. This scenario applies equally to a rational manager in an overvalued market, or a pessimistic manager in a fairly valued market. The key feature is that the manager believes his firm is worth *less* than the market value.
7. See for example, Daniel, Hirshleifer, and Teoh (2003) and Barberis and Huang (2001) for P/B studies and Ali, Hwang, and Trombley (2003) and Frankel and Lee (1998) for P/RIM studies.
8. Redemption value of preferred stock (Item 56) is substituted when preferred stock is missing.
9. The negative correlation of the ‘Option Holder’ measure may imply that managers may utilize some inside information when deciding to exercise their options. However, Malmendier and Tate (2005b) state that this optimism variable is “a reflection of the CEO’s attitude” and not an indicator of her/his belief in the future direction of the stock. They support this assertion by showing that CEOs would have improved their economic position by exercising their options early and investing the proceeds in the S&P 500. Therefore, this measure of CEO optimism is designed to capture the attitude of the CEO and not be associated with market movements.
10. As with the acquiring manager, optimism of the target manager does lead to higher premiums when tested alone but not with the inclusion of the interaction with cash payments.

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