Stock Market Driven Acquisitions:

Theory and Evidence*

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Abstract

SMDA theories predict that acquirer overvaluation increases buyers' willingness-to-pay in stock mergers, though mispricing has no such effect in cash acquisitions. I exploit this predicted asymmetry by regressing observed merger premia on several proxies for acquirer overvaluation. Though these measures of mispricing may correlate with other drivers of merger premia, they would do so equally in cash and stock deals, and thus any differential effect in equity versus cash mergers should reflect the impact of overvaluation. The data exhibit just this kind of asymmetry. Acquirer overvaluation accounts for 9.2% - a small but economically important fraction - of the total variation in equity merger premia.

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1 Introduction

During the "internet boom," many asset priced soared and then crashed back to earth, and Wall Street witnessed an unprecedented flurry of merger activity. Figure 1 shows the number of mergers in each year since 1973; the abnormal level of activity in the late 1990s is clear.[1] The possibility of a connection between the timing of these two phenomena has not escaped economists. Shleifer and Vishny (2003) propose a theory of "stock market driven acquisitions" (henceforth SMDA) in which a potential acquirer with overvalued equity may use that stock as a cheap currency to purchase hard assets. Though the merger would be followed by negative returns for the joint company, and might even destroy value on net, it would, nevertheless, raise the long run value of the acquiring company's shares. Rhodes-Kropf and Viswanathan (2004) also model this theory, using a standard signal-extraction problem between idiosyncratic misvaluation, market-wide misvaluation, and economic synergies to lead targets to willingly accept overvalued acquirer stock in a merger.

There is much anecdotal evidence to suggest that high valuations drive mergers. One example of a possible SMDA is America Online's purchase of Time Warner (announced on January 10, 2000), using $166 billion in stock. The AOL stock price had doubled in the year before the announcement, climbing to its all-time high just one month before the deal; AOL stock has fallen by more than 80% in the four years since the acquisition, so that the securities with which AOL bought Time Warner are now worth less than $30 billion. Furthermore, AOL offered a $45 billion premium (compared to the market value of Time Warner's stock), but, according to the *Financial Times*, the deal included only $8 billion in economic synergies, so that most of the benefits of the deal must have come from other sources.[2] Of course, it is possible that AOL-TimeWarner fared poorly after the merger for other reasons; but, if the management of AOL had forecasted the subsequent stock price decline, this merger is a prime example of an SMDA.

Other plausible examples of such behavior include Vivendi Universal's purchases of Seagrams and Canal+ in 2000. Vivendi's stock price reached its all-time high just one month before the first of these acquisitions, up more than 50% in the previous year; since that time, it has fallen by more than 75%. Guillaume Hannezo, Vivendi's financial director, subsequently remarked that

[1] This figure does not include mergers trimmed out of my sample. See Section 4.2 for details on the sample.
[2] "All-Share Deals: Paper Money." *FT.com* site, February 11, 2000.

> Depending on where you are in the cycle, the real cost of issuing shares is extremely different: issuing shares at the middle of the internet bubble ... was the right thing to do. Looking back, because of the bubble we had a very low weighted average cost of capital on the equity side. For the same reason today we have a very high cost of capital on the equity side, which explains why we would never envisage a significant acquisition.[3]

In essence, Mr. Hannezo acknowledges that Vivendi engaged in two SMDAs, using overvalued equity to finance the mergers.

Investment bankers also confirm that stock market valuations, alongside economic synergies, often play a key role in the mergers and acquisitions advisory business. One senior vice president in Lehman Brothers' M&A group remarked in an interview that: "There is no question that equity valuation is one of the leading indicators of M&A trends. The common theme among all of these [deals] is a rich earnings multiple which enabled [the bidders] to do stock-based acquisitions with seemingly 'cheap' paper."[4]

The finance literature, in response to these theories and anecdotes, has produced many papers attempting to ground the SMDA theory empirically. For example, Dong, Hirshleifer, Richardson and Teoh (2003) find that different proxies for overvaluation predict the method of payment and premia in mergers; Rhodes-Kropf, Robinson, and Viswanathan (2005) show that mergers are timed to coincide with high levels of firm-specific overvaluation, and that acquirers are often more highly valued than targets; and Ang and Cheng (2003) show that overvaluation correlates with an increased probability of firms choosing to merge and then financing mergers with equity.

But while many of these recent results are consistent with the SMDA theory, they do not rule out alternative explanations of those findings. For example, firms with apparently high market valuations might expect higher future growth, as in the "Q-theory" of mergers of Jovanovic and Rousseau (2002), and thus wish to expand through a merger. Harford (2005) supports the hypothesis that economic, regulatory, and technological shocks are responsible for most merger waves, provided there is sufficient capital market liquidity. Alternatively, managerial hubris, perhaps driven by a high stock valuation, might drive firms to expand in the mistaken belief that merger synergies are larger than in reality (Roll, 1986). Most of the facts in the existing literature are consistent not only with the SMDA theory but also with one or more of these alternative stories, and thus the literature has yet

[3] "Companies & Finance Europe: Vivendi Universal Chief Comes Under Attack," by Jo Johnson. *Financial Times*, March 7, 2002.
[4] Doug Solomon, personal interview, March 5, 2002.

to provide strong empirical support for the SMDA theory.

In this paper, I first model the incentives facing potential acquirers with overvalued equity and the actions of targets. When I account for mispricing in the stock market, overvaluation increases the premium paid to the target in equity mergers but not in cash mergers. SMDAs create this effect for two reasons: First, the acquiring firm earns additional surplus from selling overpriced stock to the target in an equity deal. Second, the buyer is less patient, since the deal must be completed before the overvaluation collapses. These effects on target premia cannot operate in cash mergers since there is no sale of stock. I then exploit this asymmetry to test the SMDA model by regressing merger premia on proxies for overvaluation. Though my measures of mispricing undoubtedly correlate with neo-classical and psychological drivers of merger premia, they will do so equally in cash and stock acquisitions, and thus any differential effect in stock mergers should reflect the impact of overvaluation. A statistically significant difference between the coefficient in equity deals and that in cash deals provides evidence to reject a null-hypothesis that acquirer overvaluation does not drive equity mergers.

I test these empirical predictions from the SMDA model in the CRSP/Mitchell merger database. I first demonstrate that acquirer overvaluation, as measured by a company's book-to-market ratio, earnings-to-price ratio, or pre-merger abnormal stock return, has a differentially positive effect on target premia in equity mergers. The estimated effects are both economically and statistically significant: a increase in acquirer overvaluation from the 25th to the 75th percentile predicts an increase of 4.3 percentage points, or 25%, in the median equity target premium as compared with an otherwise similar cash deal. These results are robust to controlling for industry differences between acquirers and targets, year fixed effects, and a number of balance sheet variables. Since the interquartile range of equity merger premia is 46.8 percentage points, this analysis suggests that factors relating to acquirer mispricing can explain 9.2% of the variation in equity target premia. This rather low number perhaps accounts for much of the disagreement in the literature over the relevance of SMDA-related factors to mergers. Though differences in acquirer overvaluation create statistically identifiable and economically important effects across the entire sample, and perhaps much larger impacts in extreme individual cases, other factors account most of the cross-sectional differences between mergers.

I also use the post-merger abnormal stock decline to proxy for overvaluation. I first sort acquirers by method of payment and size of premium into eight groups, and then I form portfolios that hold the stock of each buyer for

one year after the close of the merger. As suggested by the model, larger premia predict more negative abnormal returns for equity acquirers, though the opposite relationship prevails among cash bidders. A portfolio holding the quartile of equity buyers who paid the largest premia underperforms by more than 14% per year relative to the portfolio holding the quartile of those who paid the smallest premia. Finally, larger post-merger stock price declines are associated with higher premia in equity deals relative to cash deals even when controlling for other deal characteristics, echoing the findings that use the book-to-market ratio as the proxy for overvaluation. The magnitude of the SMDA effect estimated in these latter specifications is very similar to that produced in the first set of regressions, further supporting the conclusions drawn from them.

On the whole, this paper contributes to the literature on SMDAs in two ways: First, by exploit the asymmetry of SMDA theories between cash and equity mergers, I generate a measure of the impact of overvaluation on mergers that is more free of alternative explanations than those in past examinations. Second, this paper is the first to estimate the relative importance of SMDA-related concerns and other factors in driving merger premia. Though target premia do not, in general, reflect the entire surplus from deals, they make up an important (perhaps the most important) part of it; determining the salience of different drivers of target premia therefore helps to shed light on the more fundamental question of what causes mergers.

The next section briefly reviews the existing literature on the effects of stock market valuation on corporate decision-making. Section 3 provides a theoretical model of SMDAs to formalize the familiar intuition and derives from it identifying empirical predictions of the theory. Section 4 describes the methodology and data sources used to test the basic prediction of the model. Section 5 presents empirical results on the relationship between firm overvaluation and target premia, while Section 6 examines the connection in the data between target premia and acquirer post-merger returns. Section 7 concludes.

2 The Existing Literature

The idea that perceived equity valuations affect managerial decisions is by no means new. The most obvious example of this behavior is an equity issue; firms should find it preferable to issue equity when they can receive a better price for it in the market. Most generally, Stein (1996) shows that managers should change the optimal

hurdle rates for projects in the face of an "irrational" world. Indeed, evidence has shown such behavior, both across time and in a cross-section of the market. Taggart (1977) first shows evidence of the timing of seasoned equity issues, suggesting that U.S. firms postpone equity issues until their market valuation is high. Marsh (1982) finds a similar result for companies in the United Kingdom, demonstrating that firms in need of capital are heavily influenced by market conditions and the past history of security prices in choosing between debt and equity. Choe, Masulis and Nanda (1993) also connect the decision to issue equity with the aggregate economy's position in the business cycle. Jung, Kim and Stultz (1996), though, suggests that agency concerns are an important cause of equity issuance.

There is also evidence that managers time the market in initial public offerings (IPOs). Loughran, Ritter and Rydqvist (1994), using a database including IPOs in 38 countries worldwide, show that companies successfully time these issues to occur in periods of high market valuations, and that these companies' stocks often show low long run returns following the initial release. Lerner (1994) demonstrates a similar result for venture capital firms, while Pagano, Panetta, and Zingales (1998) show that privately held Italian firms are more likely to go public when their industry's book-to-market ratio is low. Most recently, Ritter and Welch (2002) suggest in a survey paper that these patterns in IPO issuance may be changing over time, and that other considerations, including as non-rationality and the principal-agent relationship between managers and shareholders, play a key role as well.

Conversely, Ikenberry, Lakonishok and Vermaelen (1995) show that stock repurchases coincide with periods of low equity market valuation. Graham and Harvey (2001) add to the evidence for market timing with survey data documenting what considerations managers focus on when issuing equity. Most notably, they report that two-thirds of CFOs agree that "the amount by which our stock is undervalued or overvalued was an important or very important consideration" in issuing equity, and a similar number agree that "if our stock price has recently risen, the price at which we call sell is 'high'."

Moreover, managers seem to be quite successful in their market timing efforts, at least as judged by post-issue returns. Even net of adverse announcement effects from asymmetric information (Myers and Majluf, 1984), issuers earn negative excess returns following equity sales, suggesting that their stocks were indeed overvalued and later returned to fundamental valuations. Stigler (1964) first suggests this phenomenon, while Ritter (1991),

Loughran and Ritter (1995), and Spiess and Affleck-Graves (1995) convincingly demonstrate this fact in large samples of firms. As before, stock repurchasers show the opposite effects of market timing and earn high subsequent returns (Ikenberry, Lakonishok and Vermaelen, 1995).

Although the fact of negative excess returns following equity issues is not disputed, some economists nonetheless disagree that this evidence suggests overvaluation at the date of issue. Eckbo and Norli (2000) and Eckbo, Masulis and Norli (2000), for instance, suggest that these low excess returns result not from overvaluation at the date of issue but rather the lower risk of issuers. These low returns could also result from managers misvaluing their stocks. If firms choose to issue when they *incorrectly* believe that their stock prices are overvalued, they may be acting inefficiently, thus lowering the expected future cash flow of the firm.

Finally, some further studies document market timing in managerial actions other than equity issues. For instance, Jenter (2003) analyzes insider trading patterns and reports that managers in high book-to-market firms purchase additional equity despite sizable initial exposure to the firm's idiosyncratic risk, while managers in low book-to-market firms sell more stock than predicted on the basis of equity ownership, compensation grants and recent stock price history. In Jenter's data, managers also sell additional stock when the firm issues equity.

There is a small but growing literature on market timing in mergers. Shleifer and Vishny (2003) assume that all capital is identically valued in the long run, but they allow the market to misprice each individual stock, as well as the "synergies" from merging, in the short run. Rhodes-Kropf and Viswanathan (2004) provide more microeconomic foundation to these ideas, suggesting that a signal-extraction problem accounts for target firms' willingness to accept overvalued stock as payment in equity mergers. From these basic assumptions, these papers then derive several predictions, including: 1) acquirers use stock disproportionately when general market or industry valuations are high; 2) acquirers in stock mergers should earn high returns and exhibit other signs of overvaluation prior to the merger; 3) despite negative long run returns, acquisitions for stock serve the interest of long-term shareholders of the bidder. The intuition for the first two predictions is that overvaluation of a company's stock prompts managers to undertake equity mergers, even in the absence of any economic synergies, to capitalize on their stock as a "cheap acquisition currency." The logic behind the final prediction is that, while the stock price of the acquirer may fall after equity mergers, it would have dropped further in the absence of a merger as the stock returned to its efficient level.

These predictions fit well with several stylized facts in the literature. Andrade, Mitchell and Stafford (2001), for instance, report that, in 66% of mergers from 1973 to 1998, the acquirer's price-to-earnings ratio exceeded the target's price-to-earning ratio. Rhodes-Kropf, Robinson, and Viswanathan (2005) show that mergers are timed to coincide with high levels of firm-specific overvaluation, and that acquirers are often more highly valued than targets. Dong, Hirshleifer, Richardson and Teoh (2003) find that different proxies for overvaluation predict the method of payment and premia in mergers. Rau and Vermaelen (1998) find that "glamour" acquirers earn significantly lower stock returns following equity mergers. Agrawal and Jaffe (2000) review this post-merger returns literature more extensively, listing numerous other papers that support the conclusion that equity acquirers earn lower subsequent returns, though these results are subject to the criticisms of the post-issue return literature from above. Teoh, Welch and Wong (1998) report that managers attempt to artificially inflate earnings prior to a stock acquisition by altering discretionary accruals; thus, managers not only exploit misvaluations but also actively create them. These findings are countered by Heron and Lie (2000), though, who find no evidence of managed earnings prior to mergers, but are confirmed by Pshisva and Suarez (2004) using a new and improved dataset. Furthermore, Sudarsanam, Mahate and Freeman (2001) report that "glamour" bidders, as measured by book-to-market ratio, are more likely to use equity than cash in a sample of United Kingdom firms engaging in acquisitions between 1983 and 1995. However, many researchers dispute that overvaluation plays an important role in driving mergers, especially merger waves. Mitchell and Mulherin (1996) and Harford (2005), for instance, argue that neo-classical factors account for most of the variation in merger activity across time.

3 A Model of Stock Market Driven Acquisitions

Before one can look for the effects of overvaluation in mergers, one must examine carefully what are those effects. Therefore, this section develops a simple model of SMDAs to clarify the intuition and empirical predictions discussed above. The departure point for this model is the idea, due to Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004), that managers may undertake equity mergers, even in the absence of economic synergies, in order to take advantage of a favorably priced stock.

Following this logic, I model both the incentives of the acquirers and the bargaining process. In this model, the target firm is, like the market, totally unaware of any mispricing in the acquirer's stock. The target management

derives private benefits of control from running the company, however, and so the buyer must compensate the exiting executives. The exact value of private benefits is unknown to the acquirer, who optimally bids to balance the probability of success with the cost of the bid. Since the merger opportunity may disappear if the bid fails, a more overvalued acquirer is more impatient to get the deal done. Furthermore, such a buyer pays with a cheaper currency, increasing the willingness-to-pay even more. Thus, the optimal bid is an increasing function of overvaluation.

The model that follows formalizes this logic. There are, of course, other frameworks with different assumptions that produce both the phenomenon of SMDAs and the positive relationship between overvaluation and premia; I discuss some of these alternative models below.

3.1 A Simple Model

Consider an acquirer, denoted as A, bidding to acquire a target T. For firm i, denote with P_i the pre-merger stock price and K_i the number of outstanding shares. The manager of firm A believes the true per share value of her firm to be V_A, however. I assume this difference in perception stems from a market misvaluation of firm A. Furthermore, neither the target company nor the market are aware of this mispricing or able to deduce it from firm A's actions; in this particular way, rational expectations does not hold in this model. Moeller, Schlingemann, and Stulz (2004a) suggest that the market does negatively update on firm value after some large equity mergers, but as long as the correction is not complete, the comparative statics of the model will still hold. I also assume that, in the long run, the value of the stock returns to its proper valuation, and that acquiring management maximizes over this long horizon. This creates the incentive to sell overpriced stock in the short run for assets that will not devalue as much over time.

One way to cash out of the overvalued stock would be to sell it directly to the market in an SEO or other equity placement; in this model, I disallow this possibility. There are a number of reasons why this restriction may be realistic. Baker, Coval and Stein (2004) suggest that some shareholders in a company may be inertial investors and would not resell acquirer stock on the open market were they to receive it after an equity merger. Further, if there is downward-sloping demand for the acquirers stock in the market, (Shleifer, 1986, and Moeller, Schlingemann, and Stulz, 2004b), an equity merger exerts less downward price pressure on the stock than a

similarly sized SEO. Also, the size of equity issues through stock mergers can be larger than through seasoned equity offerings, allowing the acquirer to sell more overpriced stock for a similar discount. For instance, AOL issued $166 billion of stock to Time Warner shareholders in conjunction with their merger, far more than it could have legitimately sold on the open market in a direct stock issue. If there are positive economic synergies between the two firms, the acquirer would be able to reap both the synergistic and misvaluation benefits in one corporate action, thus minimizing any fixed costs of transactions. While this model does not capture any of these nuances, the simple restriction on direct issues is a reasonable reduced form approximation.

Denote with R the total (not per share) present discounted value of firm T to firm A after the merger of the two companies. R should be interpreted broadly, including both the cash flows already generated within firm T and any economic synergies from the merger. I assume that R is publicly observable. Executives of firm T derive private benefits of control B from their management of the company; though the exact value of these perquisites is private information, B is drawn from publicly observable c.d.f. $F(B)$ and p.d.f. $f(b)$.[5] To ensure concavity of the problem, I make the technical assumption that f is everywhere non-increasing on the support of B.

I model the bidding process as a one-shot game, with firm A making a "take-it-or-leave-it offer" for firm T. Denote by Q the total value of the bid. If the bid is greater than the reservation value of firm T management, which equals the sum of the market value of the company and the private benefits of control, the bid is accepted and the game ends. If the bid is rejected, any overvaluation in the acquirer's stock disappears, as does any economic synergy from the deal. One can think of these events as the collapse of a stock market bubble and the elimination of the economic profit opportunity in the target.[6]

In this model, firms can use either cash or stock to finance a merger. I assume that both methods of finance are costlessly executable.[7] If firm A chooses to pay with cash and offers premium Q to the target company, the total value for firm A stockholders is

$$V_{Cash} = R - Q + V_A K_A.$$

[5] Any private benefits of control for the acquiring management would operate as would economic synergies in this model; I exclude them for simplicity.

[6] In a previous draft of this paper, I modeled the bidding game instead as an infinitely repeated game in which, after a failed bid, overvaluation and economic synergies disappear (independently) with probabilities p and q less than one. The primary results of the model are unchanged with this addition.

[7] Since there are no transactions costs, financing the merger with internal cash and externally raised debt are equivalent. I refer to both with the "cash" label in the model.

This value is the sum of the value added from the merger and the long run worth of firm A. In the theoretical appendix, I solve the cash model for the optimal bid and comparative statics summarized in Proposition 1:

Proposition 1 *The optimal bid, Q^*_{Cash}, satisfies the first order condition*

$$f\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right) = F\left(Q^*_{Cash}\right). \tag{1}$$

The optimal bid in a cash merger is increasing in the economic synergy of the merger. Firm A's overvaluation has no impact on the optimal bid.

Intuitively, the first order condition weighs the costs and benefits to firm A from increasing the bid. On the left of equation 1 is the benefit of marginally increasing the bid, which the added probability of success times the benefits from the merger. On the right is the marginal cost, which equals the probability that the existing bid was high enough already multiplied by the increase in the bid, which, in this case, would simply transfer surplus. The comparative statics are also straightforward. As the economic synergy increases, firm A gains more from a completed merger and is more anxious to complete the deal; though the private benefits of target management may not be any greater, the bid increases. Since overvaluation plays no role in a cash deal, it is unsurprising that the optimal bid does not depend on the degree of mispricing.

If the firm chooses to pay with stock, overvaluation becomes important. Firm A offers N shares for firm T, which implies a total bid of

$$Q = \frac{N}{N + K_A}\left(R + P_A K_A\right).$$

Note that, since the target is unaware of any mispricing, firm T executives evaluate any bid in terms of the current market price of firm A. Their naïveté also implies that their horizon for maximization is irrelevant; the bid has the same value over both the long and short terms. After such a merger, the total long run value for firm A stockholders is

$$V_{Stock} = \frac{K_A}{N + K_A}\left(R + V_A K_A\right) = V_A K_A + R - Q\left(\frac{V_A K_A + R}{P_A K_A + R}\right).$$

This value equals the long run worth of the combined company, $V_A K_A + R$, minus the price paid for the target discounted by the overvaluation. This discount is the key to a SMDA; if P_A is much larger than V_A, Q can be

much larger than R, and yet the long run value-added remains positive. In the theoretical appendix, I solve this model and derive the comparative statics summarized in Proposition 2:

Proposition 2 *The optimal bid, Q^*_{Stock}, satisfies the first order condition*

$$f\left(Q^*_{Stock}\right)\left[R - Q^*_{Stock}\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right] = F\left(Q^*_{Stock}\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right). \tag{2}$$

The optimal bid in a stock merger is increasing with respect to P_A and R. If there is no mispricing, then $\frac{\partial Q^*_{Stock}}{\partial R} = \frac{\partial Q^*_{Cash}}{\partial R}$. Firms choose to pay with stock if they are overvalued, cash if undervalued, and are indifferent if properly valued.

The intuition for this first order condition is very similar to that in the cash case, setting the marginal benefit of increasing the bid (on the lefthand side) equal to the marginal cost. Increasing the discount from overvaluation affects this trade-off in two ways. First, the firm gets to sell overvalued stock to the market, and so, holding other factors equal, the total benefits to the merger increase. The buyer is thus more anxious to complete the deal before the opportunity disappears since the long run value is higher, raising the marginal benefit to increasing the bid. Second, the marginal cost to increasing the bid is now lower, since fewer long run dollars must be given up for each dollar paid today. These two forces combine to produce the key comparative static from Proposition 2: The optimal bid in a stock merger is increasing in the overvaluation of the acquirer.

An increase in the economic synergy has a more nuanced impact in stock deals. Increasing R raises the total benefit from completing the deal, but it also reduces the effective discount at which firm A can sell stock, since this discount depends on the ratio of the *joint* value of company in the long run to that in the short run. These forces push the premium in opposite directions, but the latter effect is always smaller than the former; the derivative is always positive. If there is no overvaluation, the latter effect does not operate, in which case the effect of an increase in economic synergy is the same across methods of payment.

The final result in Proposition 2 is firm A's optimal choice of cash or stock. If firm A is overvalued, then there is extra surplus to be gained by paying with stock, and thus doing so is optimal. The reverse is true if firm A is undervalued. When there is no overvaluation, the two are equivalent.

3.2 Testable Hypotheses

This model generates a number of empirical predictions.

> HYPOTHESIS 1: A proxy for overvaluation, such a firm's book-to-market value ratio, correlates more positively with merger premia in equity deals than in cash ones.

In the presence of stock market driven acquisitions, overvaluation should positively affect the premia paid in equity deals, but not cash ones. In actual data, though, one is unlikely to be able to measure overvaluation without also capturing some of the economic synergy; for instance, the book-to-market ratio and the earnings-to-price ratio - each measures of Tobin's Q - likely capture a bit of both. This comparative static is robust to this missing data problem, however. The effect of any of these proxies for overvaluation is the same in both cash and equity mergers unless there are SMDAs in the data, in which case the effect in stock mergers should be greater. Section 5 tests this hypothesis.

This model also makes some predictions with respect to longer term post-merger returns to the joint company.

> HYPOTHESIS 2: Larger premia predict more negative post-merger equity returns after equity deals, but not cash ones.

Since more overvalued acquirers pay higher premia, a higher price in an equity deal portends more negative stock price growth after the merger as the overvaluation dissipates. Since this force is not present in cash mergers, the relationship between cash merger premia and post-merger stock movements serves as a convenient control for general post-merger pricing trends.

This post-merger stock price decline can also serve as a noisy proxy for *ex ante* overvaluation itself, as did the book-to-market ratio in Hypothesis 1.

> HYPOTHESIS 3: The post-merger stock price decline has a more positive relationship to merger premia in equity acquisitions than in cash deals.

Though the post-merger stock price decline occurs after the determination of the merger premium, the proper functional form must mirror that in Hypothesis 1; somewhat counter-intuitively, the proxy for overvaluation should appear on the right-hand side of the regression. The relationship between the post-merger decline and the merger premium should then be more positive in equity deals than in cash ones. Section 6 tests the latter two hypotheses about post-merger stock price movements.

3.3 Alternative Explanations

Alternative theories of mergers do make predictions about the relationship between Tobin's Q and merger premia, but these effects are constant across methods of payments and so cannot explain the differences predicted by the SMDA model. For instance, a neoclassical "Q-theory" of mergers would predict a positive correlation between Tobin's Q and merger premia, but under that theory the relationship should be the same across cash and equity deals. Similarly, one theory of managerial overconfidence might argue that hubris is greatest when the book-to-market ratio is high, so that merger premia would then correlate positively with Tobin's Q (since an overconfident manager would overpay). But, here too, the effect should be the same in cash and equity mergers.

Post-merger returns are somewhat more difficult to analyze for the other theories. The semi-strong version of the efficient markets hypothesis would predict that the merger premium - and, indeed, any public information - has no predictive power on returns whatsoever. If market efficiency does not hold, misvaluations could go in either direction. If markets underpredict future movements, for instance, then Q-theory would argue that a high target premium indicates future growth, and thus more positive abnormal returns, after mergers with large premia. An overconfidence-based theory would forecast negative abnormal future returns after most mergers but no clear relation to the size of the premium. None of these stories predict a different relationship between the target premium and post-merger returns in cash and equity deals.

3.4 Model Discussion

The model of SMDAs developed in Section 3.1 makes a number of assumptions about the acquirer, target, and bargaining process. First, the acquirer maximizes firm value over the long run, after the stock price returns to proper valuation. It is only necessary that acquiring executives *not* maximize *entirely* in the short run, though, an assumption that is not hard to justify. Managers may be locked into their holdings of company stock by contract or law, in which case they would care about the stock value in the long-term. Also, many investors in the market have long horizons, and so maximizing over the long run may be best for CEOs who are investor-conscious.

In this model, I also assume, for simplicity, that neither the target nor the market is aware of any overvaluation in the acquirer's stock price, nor can either rationally deduce the actual degree of overvaluation from the bid; these assumptions are not necessary for SMDAs. Rhodes-Kropf and Viswanathan (2003) build a model in which both

bidders and targets have private information about their own valuations and the synergy from a potential merger. Though each firm attempts to discern the other's true valuation, a buyer which is more overvalued than expected can still execute a successful SMDA. Since a high bid might result from surprisingly large economic synergies rather than overvaluation, premia per se do not reveal the extent of overpricing. The bargaining process, in the R–KV model, is very similar to that in this paper. For simplicity, I use private benefits rather than uncertainty over the economic synergy to drive the premium, but the main result is the same either way: More overvalued acquirers, all else equal, are more anxious to complete a deal, and thus pay higher premia for targets.

At the other extreme from the assumption made in this paper, one can build a model in which the target, though not the market, is perfectly aware of both the economic synergy and the degree of acquirer overvaluation. The two firms then bargain to split the total surplus, including the benefits both from economic synergies and from the sale of overvalued stock. The economic logic here is the same as above; since there is greater total surplus at stake, the acquirer pays a larger premium to the target to ensure completion of the deal before the overvaluation collapses. In this model, though, the target knowingly accepts overvalued stock as payment and must either maximize over the short run or sell the stock before the collapse; thus, a horizon differential is crucial in this variant. The model presented in this paper shows that, while this horizon differential is a sufficient condition for SMDAs, it is not necessary.

As these several paragraphs demonstrate, a number of combinations of assumptions exist that generate SMDAs. While the particularities of the bargaining process or assumptions about the information available to the target may change, each version of the model produces the same intuitive economic result: A more highly priced acquirer has greater potential surplus from an equity merger and is more anxious to complete the deal. The target of such a merger will therefore receive a higher premium. Each model also predicts the same relationship between premia and future stock price declines. I now turn to testing these general, and yet identifying, testable hypotheses.

4 Methodology and Data Sources

4.1 Empirical Specification

Hypothesis 1 states that proxies for overvaluation should affect the target premium more positively in equity deals than in cash ones. I use a number of proxies for overvaluation, including the book-to-market ratio, the earnings-to-price ratio, and the pre-merger abnormal equity returns for the acquirer. The functional form is

$$AAR_{ijt}^{T} = \alpha + \beta * \rho_{ijt} + \beta_{stock} * \rho_{ijt} + \gamma X_{ijt} + \nu_j + \xi_t + \varepsilon_{ijt} \tag{3}$$

where ρ_{ijt} is the overvaluation proxy and X_{ijt} is a vector of controls for merger i using method of payment j in time period t. I test the null hypothesis that $\beta_{stock} = 0$, which would imply no significant SMDA presence in the data.

One potential confound is that firms that opt to finance mergers using equity may be systematically different than those choosing cash or debt. For instance, firms that are highly levered or possess less cash may be unable to borrow at a low rate and so may issue equity to finance the merger. If these factors systematically correlate with *both* the premia paid, perhaps due to differences in valuation or bargaining power, *and* the overvaluation proxy, then an improperly specified regression would attribute such effects to the SMDA theory through omitted variable bias.

In order to limit such possibilities, I include a number of control variables in the X_{ijt} vector, including fixed effects interacting 2-digit SIC code and method of payment, 1-. 2-, and 3-digit SIC industry difference fixed effects, and year fixed effects. I also use a number of balance sheet variables as controls: The cash-to-assets ratio, the leverage ratio, a fixed effect for dividend-payment, the dividend-to-assets ratio, and log(assets) for the acquiring company, as well as log(assets) for the target company. I also allow method-of-payment-specific coefficients for these variables. Note that, conditional on this vector of control variables, the choice of method of payment need not be independent of the proxy for overvaluation; indeed, the simplified model in Section 3 predicts that firms choose the medium of transaction solely from the extent of overpricing. Rather, the choice of equity or cash must be uncorrelated with unobservables which, themselves, correlate with merger premia. The robustness of the results below to the rather lengthy control vector suggests that this identification assumption is appropriate.

4.2 Data

The primary source of data for this paper is the CRSP/Mitchell Merger Database.[8] This dataset contains information on 12,578 merger bids from January, 1962 through December, 2000. These bids include unsuccessful bids, earlier bids of eventually successful acquirers, and announced mergers that subsequently failed, as well as successful acquisitions. Cleaning the dataset of all uncompleted mergers leaves 5,387 completed bids. The relevant variables included in this dataset are: the identities of the acquiring and target companies, the form of transaction (cash, mixed, or stock), whether the deal was friendly, neutral, or hostile, and the merger announcement date in the *Wall Street Journal*.[9]

The other datasets used are the Center for Research in Securities Prices (CRSP) database and Standard & Poor's COMPUSTAT database, both of which are available though Wharton Research Data Services (WRDS). The CRSP database contains a history of security prices and earnings, while the COMPUSTAT database provides detailed balance and income sheet information. Stocks traded on the NASDAQ were not fully integrated into CRSP until 1973, though, an event that drastically changed the size and composition of the sample (Andrade, Mitchell, and Stafford, 2001). Thus, I focus on mergers in my sample that occur only from 1973-2000. Merging the Mitchell merger database with CRSP yields a sample of 3,827 mergers.

I further trim the sample in a number of ways. First, I use only mergers in which the method of payment was all-equity or all-cash. The model in Section 3 is not rich enough to deal with "hybrid" cases, though the estimates, in practice, often behave as averages of the coefficients for equity and cash deals. Second, I remove acquisitions of extremely small companies from the data by removing any merger in which the market capitalization of the target did not exceed \$1 million or 5% of the acquiring company. This practice, by now standard in the literature, weeds out the very smallest takeovers as potentially unrepresentative. Depending on the precise specification, I am left with a dataset of 1500-1800 total mergers and 1300-1400 when I include the balance sheet controls. Finally, to reduce the sensitivity to outliers, I windsorize the dependent variable and primary independent variable of interest for each regression at the 5th and 95th percentile.

[8] I thank Kenneth Froot, Geoff Verter and Sarah Eriksen at Harvard Business School for helping me to gain access to this dataset.

[9] Since the *WSJ* will most likely run the merger announcement the day after the initial press release, the announcement date may be one day before the reported announcement date in the Mitchell Dataset. The dataset manual is unclear on this point. For the empirical analysis below, I assume that the reported date in the Mitchell database is the actual date on which the news of the mergers became public, although the results are substantively unchanged if the alternate assumption is made.

I calculate the abnormal returns to the target stock during the announcement period using a standard three-factor market model calibrated during the six-month period immediate preceding the beginning of the announcement period window. I use two different windows for the announcement period. The "long" window begins twenty trading days before the announcement of the merger and extends until the close date. The average close date is approximately six months after the announcement date; more than 95% of mergers have closed within one year. This window should be long enough to capture the "run-up" in the target stock price before the announcement (Schwert 1996) as well as to allow the uncertainty following the announcement to subside.[10] I also present some results using the "short" window that includes only one trading day before and after the announcement date as a robustness check. I also multiply the dependent variable by 100 (so that if a target stock displayed an abnormal return of 20% within the announcement-period window, $AAR^T = 20$).

The main proxy for overvaluation is the acquirer book-to-market ratio, calculated as the ratio of the book value of assets to the market value. Market value is defined as total assets plus market equity minus book equity. Market equity is the number of common shares outstanding times the closing price of the stock, each calculated on the twenty-first trading day before the announcement date. Book equity is total assets minus total liabilities minus preferred stock plus deferred taxes plus convertible debt, each as measured in the annual report released most recently before the beginning of the announcement period.

The second proxy for perceived overvaluation is the acquirer earnings-to-price ratio. It is calculated as the ratio of the average of per quarter earnings per share during the preceding year to the price of the acquiring firm's stock on the twenty-first trading day before the announcement date. This moving average of earnings helps to remove any seasonality as well as to reduce the impact of artificial earnings management through discretionary accruals leading up to the merger announcement (Pshisva and Suarez, 2004).

I also use the abnormal return to the acquiring company's stock to measure overvaluation. Theoretically, firms with large past abnormal returns could either be normally valued companies becoming overvalued or undervalued companies returning to proper valuation. Polk and Sapienza (2002) use this measure and cite a number of studies suggesting that this measure does proxy for overvaluation. Marsh (1982) also suggests that managers

[10] Schwert (1996) calculates the pre-announcement "run-up" in the target stock from 127 trading days before the merger, but the vast majority of the action occurs in the final 20 days of trading. I experimented with several extended announcement period windows and the results were substantively unchanged.

respond to their equity valuations relative to recent history. I calculate these abnormal returns in a one-year or six-month window ending twenty trading days before the announcement date. I use a three-factor market model to calculate the expected return.

Before continuing to the analysis, it is worth noting two proxies for overvaluation mentioned in the literature that I do not use here: Insider trading and earnings manipulation. Jenter (2003) shows that insiders hold contrarian views on the market and successfully time the market in both personal trades and firm-wide decisions. Mergers are not a good application of this measure, however. Insiders are likely to be very careful in their trades immediately before the announcement of the merger, a period that the SEC may examine closely in retrospect. Furthermore, managers of both the acquiring and target firms are often subject to lock-in provisions explicitly preventing the sale of company stock for some time after the merger.

Earnings manipulation is another popular measure of overvaluation in the literature. A number a papers (i.e., Sloan, 1996, and Hribar and Collins, 2001) suggest that investors fail to correct for the difference between earnings from cash flows and earnings by accrual. Earnings accruals thus predict future returns. Mergers are a poor application of this proxy as well, though. Since managers determine the level of earnings manipulation endogenously in the run up to a merger, the most overvalued companies may not be those with the greatest accruals. In fact, Pshisva and Suarez (2004) suggest that it is the companies least overvalued one year before a merger that manipulate earnings the most. Thus, I do not use either insider trading or earnings manipulation as proxies for overvaluation.

5 Empirical Results: Overvaluation and Target Premia

5.1 Summary Statistics

Figure 1 shows the number of mergers in each year in my sample and the breakdown between methods of payment. The number of mergers per year increased dramatically in the 1990s, and this increase is largely due to the explosion of equity mergers. Cash mergers increased in the late 1990s after a lull around 1991, but the frequency of cash mergers was roughly the same in the late 1990s as in the mid-1980s. The 1970s was a decade

of very few mergers.[11]

Summary statistics for target premia, the main dependent variable, appear in Table 1. Because of the non-normal distribution of the variables, I give various quantiles instead of a standard deviation. The mean premium paid to the target in my sample, as measured over the "short" announcement period window, is 12.14%. This figure increases if the premium is measured over the "long" window, as one might expect. The distribution of returns in the "long" window is much wider as well, with an IQR of 46 percentage points, as compared to 21 percentage points in the shorter window.

Table 1 also breaks down these distributions by method of payment and period. More than two-thirds of mergers are equity financed, a proportion that is roughly constant throughout the sample. Average premia are greater in cash deals than in equity mergers, and the distribution is somewhat more diffuse. This fact might initially seem inconsistent with the SMDA theory of mergers; after all, in any given merger, any gains from selling overpriced acquirer stock come in addition to economic gains and should thus raise the premium paid. This logic is not correct, though, since it holds all other aspects of the merger equal. For instance, equity mergers with substantial gains from the sale of stock might have fewer economic gains than cash mergers. Also, firms that undertake equity mergers are different along a number of dimensions that might influence the average premium size. Since I control for these differences in the regressions, though, they should not bias the results. The distributions of merger premia in the two sub-periods are very similar.

Table 2 displays summary statistics for the key independent variables in this paper. Stock acquirers are more overvalued than cash acquirers as measured by all four proxies, and especially so for those firms in the extremely overvalued tail of the distribution. The number of mergers in the sample differs slightly across the four proxies; past abnormal returns are available for slightly more mergers than the balance sheet variables. The sample in which I could find all of the proxies is given as the "Total Sample Overlap" at the bottom of the table. The results below are not substantially affected if I use only these core data in the regressions. Table 2 also summarizes two other aspects of the mergers in my sample. First, there are virtually no hostile mergers, and those present are usually financed with cash. Second, equity mergers are less likely to occur between firms in different industries,

[11] The paucity of mergers in the 1970s is somewhat accentuated by my exclusion of targets with a market capitalization less than $5 million, but the effect is small. The substantive impact both of Figure 1 and of the remaining analysis is unchanged by adjusting the cutoff for inflation across decades.

as measured by 1-, 2-, or 3-digit SIC codes.[12]

Table 3 summarizes the balance sheet control variables. There are small but intuitive differences across stock and cash mergers. 72% of cash acquirers pay dividends, in comparison with only 63% of stock acquirers. Those firms that do pay dividends tend to pay more dividends, as measured by the dividends-to-assets ratio, if they are involved in a cash merger. Cash and equity acquirers appear quite similar in terms of leverage and cash reserves except for a few rather cash-laden stock bidders. Mergers financed through equity are likely to involve larger firms, though this effect seems mostly present above the median of each distribution. The relative size of the target is roughly the same across methods of payment.

5.2 Results

Table 4 displays the results from the basic specification using the target premia as measured over the "long" window and the acquirer book-to-market ratio (B/M) as the proxy for overvaluation. The most basic regression appears in column (1). The differential impact of B/M on the premium in stock deals (-13.411) is negative and highly statistically significant (more on the economic significance of this coefficient below). Since B/M decreases with the overvaluation of the company, these significant negative coefficients confirm the prediction of the SMDA model: Overvalued equity acquirers pay higher premia relative to similar cash bidders. The estimated stock fixed effect (-7.918) picks up the lower average premium in stock deals, as mentioned above.[13]

The remaining columns of Table 4 add to the basic specification of column (1). Column (2) adds three dummy variables indicating that the target and acquirer are in different primary industries at the 1-, 2-, and 3-digit levels; the coefficient of interest is virtually unchanged. Column (3) further adds 2-digit SIC industry fixed effects. If companies in more highly valued industries pay higher average premia and are more likely to use equity, the basic regression might erroneously attribute this effect to the overvaluation proxy. The differential impact of B/M in equity deals falls in magnitude to -11.153 when I control for mean industry premia, but the effect is

[12] The SIC code recorded for each company in the main CRSP/COMPUSTAT database is only the "primary" line of business. Thus, this classification may overestimate the extent to which the industries of the target and the acquirer differ. To check this possibility, I used the Compustat Industry Segment Data to construct a new dummy variable to indicate if *any* of the acquirer's or target's industries overlapped. The sample size was too small for strong statistical inference, but these effects were never significant and, in this smaller sample, their inclusion did not affect the parameter of interest.

[13] Some have argued that a "Cash" bid can be misleading if a company simultaneously issues large amounts of stock. To explore this potential problem, I have recalculated all of these analyses after removing "Cash" bidders with large increases in shares outstanding within one year of the announcement date of the merger. The results are substantially unchanged.

still statistically significant at the 1% level. Column (4) allows separate mean premia for different methods of payment in different industries, and the estimate of the SMDA effect increases to -12.827. Column (5) adds year fixed effects. This final specification may actually be a bad control. If the average level of overvaluation changes across years, but also affects premia, the year dummies remove this potentially valuable source of variation. Nevertheless, the SMDA effect remains statistically significant at -11.109.

The impact of overvaluation on target premia, as measured in Table 4, is not only statistically significant but also economically important. An IQR-sized increase in overvaluation in equity acquirers would decrease B/M by 0.43 and therefore raise the premium paid by 4.8 percentage points (using the estimate from column 5). Since the median target premium in equity mergers is 17%, this effect is equivalent to a 28% increase in the median equity target premium. Viewed from another perspective, the SMDA effect of 4.8 percentage points is about 10% of the IQR in the distribution of target premia in equity deals, implying that, by this crude measure, concerns related to acquirer overvaluation drives 10% of the payments in equity mergers. This low number perhaps accounts for much of the difference in opinion in this literature over the importance of SMDAs in driving mergers; though overvaluation does have a statistically identifiable and economically important impact on mergers, it appears that the great majority of the variation has other causes.

Table 5 repeats this analysis using the "short" announcement window to measure the target premium. The coefficients in Table 5 are smaller than those in Table 4, as one might expect from the decreased magnitude of "short" window premia, but the results are still statistically and economically significant. The addition of year and industry fixed effects lower the coefficient of interest somewhat, though it remains statistically significant even in the full specification. Using the most conservative estimate of the SMDA effect in column (5), the same calculation as above implies a 1.1 percentage point increase in the target premium if one lowered B/M by the IQR. This effect is 11% of the median and 6% of the IQR of the distribution of target premia in equity deals, in each case smaller than in the long window.

In order to further account for differences across mergers that might impact premia differentially in equity and cash deals, Table 6 adds the balance sheet control variables described in Section 4.1. I run each specification for both the "long" and "short" window. Columns (1) and (5) replicate the specification from column (4) of Tables 4 and 5 for ease of comparison. Columns (2) and (6) add the balance sheet controls. The coefficient for the "long"

window decreases a bit, implying some positive selection into equity as a method of payment. The results for the "short" window show the opposite effect, however; the magnitude of the coefficient actually increases. Columns (3) and (7) allow the balance sheet variables to affect the target premia differently in cash and equity mergers, but the estimated SMDA effect hardly changes. Columns (4) and (8) include the year fixed effects. The coefficients of interest decrease in magnitude in this final specification, relative to the previous columns' estimates, but they remain significant. Using the "short" window, the SMDA effect in the full model is actually greater than in the basic functional form in Column (5); adding the balance sheet controls helps identify the SMDA theory. The weakest estimate of the SMDA effect over the "long" window would imply a 4.3 percentage point or 25% increase in the median equity target premium from an IQR-sized decrease in B/M. This consrvative estimate suggests that SMDA-related effects drive 9.2% of the variation in equity target premia.

Since much of this analysis was motivated by the apparent pattern of SMDAs in the 1990s, it is useful to look how this theory performs in the different periods of this analysis. Table 7 runs the primary specifications - one with and one without the balance sheet controls - separately for the sub-periods 1973-1989 and 1990-2000. (There are few observations in the 1970s, and so I merge the two earlier decades for this table). The interpretation of the results differs between the "short" and "long" windows. In the "long" window, the SMDA effect seems present in both periods. Without balance sheet controls, the differential effect of B/M in equity mergers is statistically significant and of similar magnitude to the estimates in the full sample. These coefficients become smaller and lose statistical significance when year dummies and balance sheet controls are added, but the estimates are statistically indistinguishable from the full-sample estimates in Table 6.

The estimates using the "short" window demand a different interpretation, though. In the earlier decades, the coefficient measuring the SMDA effect is statistically insignificant (and of the wrong sign). But in the 1990s the coefficient is much larger in both magnitude and statistical significance than before. This relationship holds both with and without the year dummies and balance sheet controls. Perhaps information flowed less well into the market in earlier decades, and so the "short" window measures the target premium imprecisely for that period.

Tables 4 through 7 have established a clear differential impact of the acquirer B/M on the target premium in equity deals. It remains possible, however, that this relationship may not be driven by overvaluation, though, but instead by some particular aspect of B/M. Therefore, as a further check on robustness, Tables 8 and 9 repeat the

exercise of Table 6 using the earnings-to-price ratio (E/P) and pre-merger abnormal equity return, respectively, as proxies for overvaluation. Since E/P can be negative, I adapt the functional form in line 3 to allow a separate intercept and slope in both cash and equity mergers when E/P is negative. This also helps to improve the accuracy of this proxy for overvaluation: For instance, a negative E/P might signal either an overpriced internet start-up or a fading "old economy" conglomerate. The coefficient of interest in Table 8 is the estimate of the impact of E/P in equity deals relative to the effect in cash deals.

The pattern of coefficients in Table 8 matches that displayed in the regressions based on the B/M proxy in Table 6 quite closely. Since a lower E/P implies a higher degree of overvaluation, the negative and statistically significant coefficients for the differential impact of E/P in equity mergers broadly confirm the prediction of the SMDA theory. As above, the addition of balance sheet variables increases the estimated impact in the "short" window. An increase in overvaluation equal to the interquartile range of E/P increases the target premium over the "long" window by 5 percentage points, a magnitude almost identical to the B/M effect measured above.

Table 9 replicates the previous results using the pre-merger abnormal return to the acquirer stock as the measure of overvaluation. The positive and significant differential effect of past abnormal returns in equity mergers again confirms the prediction of the SMDA theory. This result is robust to the length of the announcement period window, the length of the pre-merger window, and the inclusion of the full slate of controls. The economic magnitude of these coefficients is slightly larger than with either B/M or E/P as the overvaluation proxy. A calculation similar to those above suggests that an IQR-sized increase in past abnormal equity returns increases the target premium by 8 percentage points, nearly one-half of the median premium in equity mergers. Such an impact would account for 20% of the variation in equity target premia.

It is always possible, of course, that there exists an omitted variable that correlates positively with each of my measures of perceived overvaluation and also with the target premium differentially in equity mergers. If so, then the results in Tables 4 through 8 would be biased in favor of results consistent with Hypothesis 1. But the many specifications to which this analysis is robust suggest such is not the case. The data support Hypothesis 1 and suggest that acquirer valuation drives 9.2% - a small though economically important fraction - of the variation in equity target premia.

6 Target Premia and Post-Merger Returns

The latter two hypotheses from the model concern post-merger equity returns. If firms that merge using equity are truly overvalued, one should expect negative abnormal returns following equity mergers as the overvaluation dissipates, and these declines should be greater in firms that paid larger premia. Furthermore, post-merger declines in stock prices are another noisy proxy for overvaluation; as with the accounting proxies for overvaluation studied in Section 5, the post-merger stock decline should have a more positive relationship with target premia in equity deals than in cash ones.

Table 10 displays summary statistics for the post-merger abnormal and simple returns. Abnormal returns are calculated as "Jensen's Alpha" from a three-factor regression model. Acquiring firms, on average, earn negative returns following the close of the merger, and these losses are even greater after controlling for the predicted model return. Especially over the one-year horizon, equity acquirers do worse than cash buyers throughout the distribution, as predicted in the model.

To test Hypothesis 2, I sort acquirers in 8 categories by the method of payment used and by the quartile of premium.[14] I then form eight equal-weighted portfolios, each of which holds stocks in the appropriate group for one year beginning the day after the close of the merger. The average monthly abnormal returns from a three-factor model appear in Table 11, along with standard errors for the "alphas."[15] The pattern of returns across the different portfolios is clear: Larger premia predict more positive post-merger abnormal returns for cash acquirers, but larger relative declines for equity buyers. The portfolio of small-premia equity acquirers is extremely volatile, and so the difference between it and the large-premia portfolio is not statistically significant, but there is a significant difference between the "Low Mid" portfolio and the "High" portfolio. Since the pattern of returns for cash mergers is opposite that in equity deals (and significantly so), the predictive power of the premia in equity deals cannot be a general relationship operating in all mergers. The data support Hypothesis 2.

I test Hypothesis 3 using a regression framework parallel to that in Section 5 above. The *negative* of the

[14] To avoid a "look-ahead" bias, I use the premium quartiles of the previous year (for cash and stock mergers separately) to classify acquirers. For instance, a stock merger announced in 1997 would be sorted into bins based on the distribution of target premia in stock deals announced in 1996.

[15] These average abnormal returns are the "alphas" from a regression of the equal-weighed portfolio return on the market, high-minus-low, and small-minus-big. I weight the observations by the average number of stocks in the portfolio in a given month.

abnormal post-merger return (which is the post-merger decline) is the key independent variable; the dependent variable is, once again, the abnormal announcement-period return to the target stock.

Table 12 displays these regressions. Column (1) presents the basic specification, which allows a method-of-payment-specific effect for the post-merger decline and no other controls or fixed effects; it is the basic prediction equation. As predicted by the model, more overvalued firms, as measured now by the post-merger stock price decline, pay differentially high premia in equity mergers. This effect is both statistically and economically significant; an increase in the post-merger decline equal to the IQR in the distribution, which is 50 percentage points, predicts a 4.25 percentage point increase in the premia. Such a movement would increase the median premium in equity deals by 25%, a figure remarkably similar to the 28% increase predicted by a similar movement in the book-to-market ratio in Table 4 above. Columns (2) and (3) add the full slate of balance sheet controls with method-of-payment-specific coefficients, as well as year fixed effects in column (3); the results only get stronger with these additional covariates. The relationship between post-merger abnormal returns and merger premia is robust to these additional control variables. These data support Hypothesis 3.

This relationship is similar to that shown by Rau and Vermaelen (1998), but there are important differences. First, that study focused on the decline in stock value after mergers as opposed to tender offers and showed that the difference was primarily due to the underperformance of "glamour" bidders. Instead, I focus on the difference between the effect of overvaluation in cash and stock bids. Second, Rau and Vermaelen do not show the connection of merger premia to post-merger stock price declines and thus speak more to the sources of market misvaluation than the determinants of mergers.

The remaining columns in Table 12 explore the robustness of this result across a broader class of specifications. Column (4) calculates the post-merger decline as the negative of the annualized post-merger abnormal return over three years. The estimate is smaller in magnitude but no less statistically significant. The post-merger decline resulting from overvaluation at the time of the merger must mostly occur, on average, within the first year after the close. Columns (5) and (6) fit the specification in column (3) in two sub-periods within my sample. The predicted effect of the post-merger decline appears most prevalent in the 1990s. This finding is consistent both with results presented earlier in this paper and with anecdotal evidence about the different nature of mergers in 1970s and 1980s relative to those in the 1990s.

Columns (7) and (8) estimate the full regression from column (3) using simple returns to calculate the post-merger decline. To the extent that managers are selling equity before a predictable price decline, it should not matter to the managers whether the decline is firm-specific or market-wide; simple returns may thus offer a more relevant measure. Column (7) calculates the decline in the year following the close, while column (8) uses a longer three-year window. The results in these columns mirror those in columns (3) and (4) quite closely, though the estimated magnitudes are slightly larger. The relationship between the post-merger decline and the merger premia in these regressions lend further support to the conclusions drawn in Section 5: acquirer overvaluation accounts for a small though economically important 10% of the variation in the gains to acquirers from equity mergers.

7 Conclusion

In this paper, I contribute to the literature on stock market driven acquisitions in two ways. First, I investigate the theoretical prediction that target premia should be more positively correlated with the Tobin's Q of the acquirer in equity deals than in cash deals. Using the book-to-market ratio, the earnings-to-price ratio, and the pre-merger abnormal return of the acquirer, Section 5 presents statistical evidence of such a relationship; a move from the 25th to the 75th percentile in the book-to-market ratio distribution, for instance, increases the median target premium by 4.5 percentage points, or 25%, more than in cash deals. The results are robust to the inclusion of a number of control variables, including industry*method-of-payment fixed effects, year fixed effects, and a slate of balance sheet variables with method-of-payment specific coefficients. I further investigate this empirical regularity using post-merger returns to proxy for *ex ante* acquirer overvaluation, an analysis which yields very similar magnitudes to the former specifications, as well as demonstrating the predictive power of merger premia for post-close stock returns.

Second, I estimate the relative importance of SMDA-related factors in driving the variation in benefits to acquirers from equity mergers. Though target premia are not, in general, fixed percentages of the total surplus from deals, they make up a large fraction of it; determining the salience of different drivers of target premia helps to shed light on the more fundamental question of what causes mergers. I find that 9.2% of this variation - a small but economically important fraction - comes from buyer mispricing.

This figure may actually underestimate the effect of acquirer overvaluation on mergers for several reasons. First, it reflects only the effect of a single measure of overvaluation on merger premia. On the other hand, the independent estimates of this magnitude in this paper are quite similar, and so each of the different proxies may be accurately measuring the same underlying effect of overvaluation. Second, targets may be less able to capture the rents from selling overvalued stock to the market than other, more public elements of the surplus in a merger. As discussed in Section 3.4, different models of SMDAs make different predictions as to the extent that the target shares in the benefits of an SMDA. Nevertheless, understanding the determinants of target premia is an important first step to comprehending the drivers of mergers as a whole.

Though this paper provides evidence in support of the SMDA theory, it does not take a stand on this question of the particular mechanism through which SMDA effects operate. Are target managers completely unaware of the mispricing of the acquirer's stock, as in my model? Are they partially aware, as in Rhodes-Kropf and Viswanathan (2003)? Or are they bribed with golden parachutes or executive positions in the new company, as in Hartzell, Ofek, and Yermack (2001)? This puzzle would be an interesting topic of future research.

The results presented here have several important broader implications. First, stock market driven acquisitions can simultaneously decrease the joint profitability of the two companies *and* increase the value of the acquiring firm's stock. Intuitively, this situation occurs when the value created for the acquirer by selling overpriced stock outweighs the negative economic effects of the merger per se. But, because the gains from the sale of overpriced stock are transfers from the eventual purchasers to current shareholders, and thus are not welfare improving, these mergers can be socially inefficient even when they add value to the acquiring firm. Furthermore, unlike acquisitions (such as those motivated by agency problems) that actively both destroy company value and reduce social welfare, these mergers are in the interests of the shareholders despite lowering aggregate profitability.

Second, these results suggest a possible explanation for merger waves. As noted by Andrade, Mitchell and Stafford (2001), among others, mergers occur in large waves, both across time and across industries. Shleifer and Vishny (2003) suggest this application of their model as well. A large upswing in shares prices could trigger mergers motivated by stock market considerations alongside other equity issues. Not only did the proliferation of mergers in the late 1990s correlate with historically large returns to equity, but prior merger waves also appear to have occurred during large bull markets. For example, Andrade et al. (2001) mention two other merger waves,

one cresting in 1967-1968 and the other during 1985-1986. The S&P 500 earned a 13.5% annual return during the first wave and a whopping 23.6% per year during the latter, compared to an average yearly return of 9.5% since 1945. Though hardly conclusive , these basic facts suggest an empirical connection between market timing in mergers and merger waves.

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9 Theoretical Appendix

Proposition 1: *The optimal bid, Q^*_{Cash}, satisfies the first order condition*

$$f\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right) = F\left(Q^*_{Cash}\right).$$

The optimal bid in a cash merger is increasing in the economic synergy of the merger. Firm A's overvaluation has no impact on the optimal bid.

Proof. In expectation, firm A gets value

$$EV\left(Q\right) = F\left(Q\right)\left[R - Q\right] + V_A K_A$$

from bidding Q for a firm with economic synergy R. Differentiating this expression with respect to Q and setting equal to zero yields the first order condition

$$f\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right) = F\left(Q^*_{Cash}\right).$$

The problem is concave if the second derivative of the expected value function is negative. This derivative is

$$\frac{\partial^2 EV}{\partial Q^2} = f'\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right) - 2f\left(Q^*_{Cash}\right) < 0$$

for all $R > Q$ since $f' < 0$ by assumption in the text. But it must be that $R > Q^*_{Cash}$ in order to satisfy the first order condition since f and F are everywhere non-negative. The problem is thus concave and the solution produced by the first order condition is a maximum.

In order to derive comparative statics on Q^*_{Cash}, I totally differentiate the first order condition. Done with respect to the economic synergy, this process yields

$$\frac{\partial Q^*_{Cash}}{\partial R} = \frac{f\left(Q^*_{Cash}\right)}{2f\left(Q^*_{Cash}\right) - f'\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right)} > 0$$

since the denominator must be negative from above. The optimal bid in a cash deal is increasing in the economic synergy. ■

Proposition 2: *The optimal bid, Q^*_{Stock}, satisfies the first order condition*

$$f\left(Q^*_{Stock}\right)\left[R - Q^*_{Stock}\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right] = F\left(Q^*_{Stock}\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right).$$

The optimal bid in a stock merger is increasing with respect to P_A and R. If there is no mispricing, then $\frac{\partial Q^*_{Stock}}{\partial R} = \frac{\partial Q^*_{Cash}}{\partial R}$. Firms choose to pay with stock if they are overvalued, cash if undervalued, and are indifferent if properly valued.

Proof. In expectation, firm A gets value

$$EV\left(Q\right) = F\left(Q\right)\left[R - Q\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right] + V_A K_A$$

from bidding Q for a firm with economic synergy R. Differentiating this expression with respect to Q and setting equal to zero yields the first order condition

$$f\left(Q^*_{Stock}\right)\left(R - Q^*_{Stock}\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right) = F\left(Q^*_{Stock}\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right).$$

The problem is concave if the second derivative of the expected value function is negative. This derivative is

$$\frac{\partial^2 EV_{Stock}}{\partial Q^2} = f'\left(Q\right)\left(R - Q\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right) - 2f\left(Q\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right) < 0$$

for all $R > Q$ since $f' < 0$ by assumption in the text. But it must be that $R > Q^*_{Stock}$ in order to satisfy the first order condition since f and F are everywhere non-negative. The problem is thus concave and the solution produced by the first order condition is a maximum.

In order to derive comparative statics on Q^*_{Stock}, I totally differentiate the first order condition. With overvaluation, this derivative is

$$\frac{\partial Q^*_{Stock}}{\partial P_A} = \frac{f\left(Q^*_{Stock}\right) Q^*_{Stock}\left(\frac{V_A K_A + R}{(P_A K_A + R)^2}\right) + F\left(Q^*_{Stock}\right)\left(\frac{V_A K_A + R}{(P_A K_A + R)^2}\right)}{2f\left(Q\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right) - f'\left(Q\right)\left(R - Q\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right)} > 0.$$

Thus the optimal bid in a stock deal is increasing in the overvaluation of the buyer.

It is also straightforward to show that

$$\frac{\partial Q^*_{Stock}}{\partial R} = \frac{f\left(Q^*_{Stock}\right) - \left(\frac{(P_A - V_A)K_A}{(P_A K_A + R)^2}\right)\left[f\left(Q^*_{Stock}\right) Q^*_{Stock} + F\left(Q^*_{Stock}\right)\right]}{2f\left(Q\right)\left(\frac{V_A K_A + R}{P_A K_A + R}\right) - f'\left(Q\right)\left(R - Q\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right)}.$$

This expression is non-positive if and only if the numerator is non-positive, which would imply that

$$f\left(Q^*_{Stock}\right) \leq \left(\frac{\left(P_A - V_A\right) K_A}{\left(P_A K_A + R\right)^2}\right)\left[f\left(Q^*_{Stock}\right) Q^*_{Stock} + F\left(Q^*_{Stock}\right)\right].$$

But we know from the first order condition that

$$F\left(Q^*_{Stock}\right) + f\left(Q^*_{Stock}\right) Q^*_{Stock} = \frac{f\left(Q^*_{Stock}\right) R}{\left(\frac{V_A K_A + R}{P_A K_A + R}\right)},$$

which, when plugged into the previous expression, would imply that

$$1 \leq \frac{P_A K_A R - V_A K_A R}{\left(P_A K_A + R\right)\left(V_A K_A + R\right)},$$

which is a contradiction for K and R positive. Thus,

$$\frac{\partial Q^*_{Stock}}{\partial R} > 0.$$

If there is no overvaluation, and so $P_A = V_A$, then a number of terms cancel and

$$\frac{\partial Q^*_{Stock}}{\partial R} = \frac{f\left(Q^*_{Cash}\right)}{2f\left(Q^*_{Cash}\right) - f'\left(Q^*_{Cash}\right)\left(R - Q^*_{Cash}\right)} = \frac{\partial Q^*_{Cash}}{\partial R}.$$

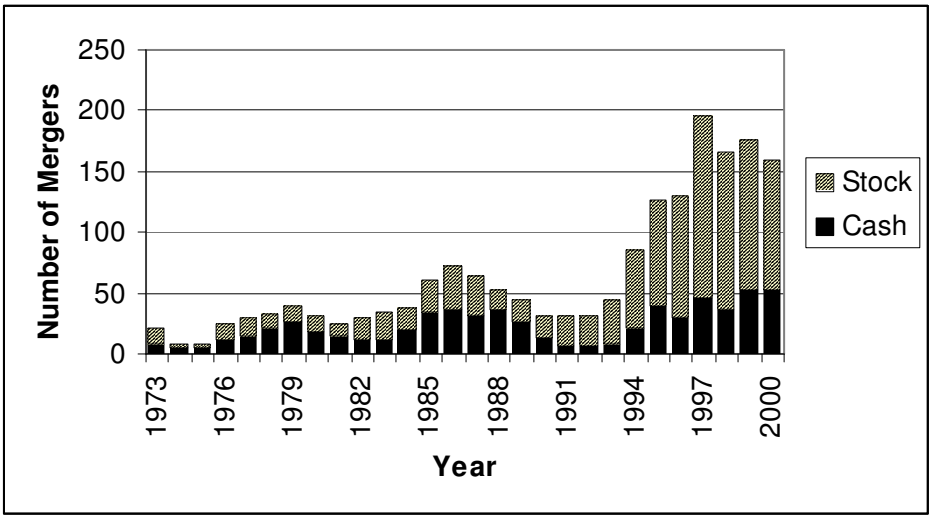
If $P_A > V_A$, then it must be that $EV_{Stock} > EV_{Cash}$. The proof is by constuction. Consider the stock bid where $Q = Q^*_{Cash}$. In this case

$$\begin{aligned} EV_{Stock}\left(Q^*_{Cash}\right) &= F\left(Q^*_{Cash}\right)\left[R - Q^*_{Cash}\left(\frac{V_A K_A + R}{P_A K_A + R}\right)\right] + V_A K_A \\ &> F\left(Q^*_{Cash}\right)\left[R - Q^*_{Cash}\right] + V_A K_A = EV_{Cash}\left(Q^*_{Cash}\right). \end{aligned}$$

Since $EV_{Stock}\left(Q^*_{Stock}\right) \geq EV_{Stock}\left(Q^*_{Cash}\right)$ by the optimality of Q^*_{Stock}, firm A must prefer stock when there is some overvaluation. The opposite clearly holds when $P_A < V_A$, and the value functions are clearly equal for all Q when $P_A = V_A$. ■

Tables and Figures

Figure 1: Mergers by Year and Method of Payment



Source: CRSP/Mitchell Merger Database. This represents only the 1792 mergers used in my analysis.

Table 1: Target Premia Summary Statistics

Method of Payment:		Cash	Stock	All
Target Announcement Period	95%	49.56%	39.00%	49.56%
Abnormal Return [-1,+1]	75%	30.31%	17.64%	20.71%
Quantiles	50%	14.44%	6.19%	8.89%
	25%	4.96%	-1.48%	-0.11%
	5%	-3.69%	-11.22%	-11.04%
	Mean	**18.66%**	**9.24%**	**12.14%**
Target Announcement Period	95%	99.99%	95.14%	99.99%
Abnormal Return [-20,close]	75%	56.08%	43.30%	48.68%
Quantiles	50%	33.81%	16.97%	23.60%
	25%	14.47%	-3.47%	2.82%
	5%	-9.21%	-30.45%	-30.45%
	Mean	**36.91%**	**22.48%**	**26.95%**
Sample Size		647	1145	1792

Period:		1973-1989	1990-2001	All
Target Announcement Period	95%	46.83%	49.56%	49.56%
Abnormal Return [-1,+1]	75%	18.10%	22.62%	20.71%
Quantiles	50%	6.73%	10.06%	8.89%
	25%	-0.22%	0.08%	-0.11%
	5%	-7.28%	-11.22%	-11.04%
	Mean	**10.72%**	**12.89%**	**12.14%**
Target Announcement Period	95%	99.37%	99.99%	99.99%
Abnormal Return [-20,close]	75%	48.27%	49.07%	48.68%
Quantiles	50%	23.26%	23.92%	23.60%
	25%	3.91%	2.01%	2.82%
	5%	-30.45%	-29.10%	-30.45%
	Mean	**26.85%**	**27.01%**	**26.95%**
Sample Size		615	1177	1792

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. The abnormal returns are calculated from one day before the announcement until one day after the announcement in the short upper panel. The period is from 20 trading days before the announcement to the close of the merger in the lower panel. The abnormal returns are calculated using a three-factor market model.

Table 2: Basic Summary Statistics, by Method of Payment

Method of Payment:		Cash	Stock	All
Sample Size		647	1145	1792
Hostile or Neutral Merger		0.77%	0.17%	0.39%
Industry Difference:				
1 Digit of SIC Code		32.15%	18.95%	23.72%
2 Digits of SIC Code		58.11%	43.76%	48.94%
3 Digits of SIC Code		71.87%	55.11%	34.88%
Acquirer Book-to-Market Ratio	95%	1.769	1.801	1.746
Quantiles:	75%	0.775	0.509	0.603
	50%	0.423	0.215	0.271
	25%	0.151	0.077	0.093
	5%	0.014	0.002	0.002
	N	520	981	1501
Acquirer Earnings-to-Price Ratio	95%	0.205	0.162	0.173
Quantiles:	75%	0.092	0.053	0.070
	50%	0.056	0.023	0.030
	25%	0.017	0.005	0.008
	5%	-0.034	-0.193	-0.134
	N	524	972	1496
Acquirer Pre-Merger Abnormal	95%	34.13%	48.82%	48.45%
Return Quantiles (six months):	75%	6.79%	12.75%	10.43%
	50%	-5.81%	-3.53%	-4.15%
	25%	-19.95%	-20.28%	-20.11%
	5%	-57.03%	-70.13%	-69.96%
	N	625	1104	1729
Acquirer Pre-Merger Abnormal	95%	48.61%	70.31%	70.31%
Return Quantiles (one year):	75%	7.59%	16.53%	12.72%
	50%	-11.00%	-7.14%	-9.20%
	25%	-32.00%	-39.29%	-35.79%
	5%	-80.00%	-92.67%	-92.67%
	N	600	1064	1664
Total Sample Overlap		486	894	1380

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Percents may not add to one due to rounding. Pre-merger abnormal returns are calculated over the a period of the relevant length that ends 1 month before the announcement date. Earnings-to-Price ratios are calculated using the stock price on the day before the beginning of the announcement window and the twelve-month moving sum of earnings per share. Book-to-Market ratios are calculated as the ratio of the book value of a company (total assets – total liabilities – preferred stock + deferred taxes + convertible debt) to the market value of a company (total assets + market equity – book equity) using balance sheet data from the end of the last fiscal year within the "pre-announcement period." For each overvaluation proxy, I give the specific sample size. "Total Sample Overlap" represents the observations with all four measures.

Table 3: Balance Sheet Summary Statistics, by Method of Payment

Method of Payment:		Cash	Stock	All
Acquirer Cash / Assets	95%	37.01%	60.39%	55.73%
Quantiles:	75%	15.12%	18.54%	16.69%
	50%	6.07%	6.65%	6.43%
	25%	2.22%	2.65%	2.47%
	5%	0.45%	0.45%	0.45%
Acquirer Leverage Ratio	95%	94.51%	94.48%	94.49%
Quantiles:	75%	73.23%	91.03%	87.67%
	50%	60.26%	62.29%	61.44%
	25%	46.88%	42.56%	43.83%
	5%	23.86%	15.46%	18.17%
Acquirer Dividends / Assets	95%	4.15%	4.01%	4.08%
Quantiles:	75%	2.11%	0.84%	1.41%
	50%	0.72%	0.29%	0.34%
	25%	0.00%	0.00%	0.00%
	5%	0.00%	0.00%	0.00%
Acquirer Issues Dividends?		72.11%	62.69%	65.95%
Acquirer Total Assets (in $MM)	95%	16,572.0	32,114.0	26,654.0
Quantiles:	75%	3,025.0	4,139.0	3,482.1
	50%	768.0	914.0	877.5
	25%	210.8	184.3	194.8
	5%	38.6	22.6	26.3
Target Total Assets (in $MM)	95%	2,413.0	10,651.0	7,170.0
Quantiles:	75%	477.5	1,395.0	824.6
	50%	140.7	267.4	213.2
	25%	56.7	67.0	62.9
	5%	15.4	11.5	12.9
Relative Target Size (Market Cap Ratio)		21.12%	23.05%	22.34%
Sample Size		442	792	1234

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Figures are calculated from the annual report preceding the merger announcement. The leverage ratio is the ratio of short- and long-term outstanding debt to the sum of this debt and the book value of equity.

Table 4: Basic Acquirer Book-to-Market Specification, Long Announcement Period

Explanatory Variables:	*Dep. Variable: Target Abnormal Return, [-20, close]* (1)	(2)	(3)	(4)	(5)
Acquirer B/M	2.849	2.834	1.273	1.823	1.210
	(2.435)	(2.433)	(2.527)	(2.647)	(2.705)
*Acquirer B/M * Stock*	-13.411***	-13.274***	-11.153***	-12.827***	-11.109***
	(2.948)	(2.947)	(3.051)	(3.203)	(3.236)
Stock Fixed Effect	-7.918***	-8.298***	-7.326***	--	--
	(2.361)	(2.391)	(2.727)		
Industry Difference FX	no	yes	yes	yes	yes
Industry Effects	no	no	yes	yes	yes
*Industry*Cash Effects*	no	no	no	yes	yes
Year Effects	no	no	no	no	yes
R-Squared	0.0651	0.0692	0.1130	0.1297	0.1512
N	1542	1542	1542	1542	1542

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger, is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The acquirer book-to-market ratio is calculated as the ratio of book value (total assets) to market value (market cap. + total liabilities + preferred stock – deferred taxes – convertible debt) using the most recent annual report. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 5: Basic Acquirer Book-to-Market Specification, Short Announcement Period

Explanatory	*Dep. Variable: Target Abnormal Return, [-1, +1]*				
Variables:	(1)	(2)	(3)	(4)	(5)
Acquirer B/M	0.836	0.821	0.725	0.685	0.946
	(1.174)	(1.174)	(1.229)	(1.282)	(1.286)
*Acquirer B/M * Stock*	-3.316***	-3.278**	-2.997**	-3.034**	-2.631*
	(1.149)	(1.420)	(1.484)	(1.549)	(1.537)
Stock Fixed Effect	-7.916***	-8.002***	-7.896***	--	--
	(1.131)	(1.147)	(1.255)		
Industry Difference FX	no	yes	yes	yes	yes
Industry Effects	no	no	yes	yes	yes
*Industry*Cash Effects*	no	no	no	yes	yes
Year Effects	no	no	no	no	yes
R-Squared	0.0817	0.0834	0.1128	0.1382	0.1879
N	1542	1542	1542	1542	1542

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger, is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The acquirer book-to-market ratio is calculated as the ratio of book value (total assets) to market value (market cap. + total liabilities + preferred stock – deferred taxes – convertible debt) using the most recent annual report. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 6: Full Acquirer Book-to-Market Specification with Balance Sheet Controls

	Dependent Variable:							
Explanatory	*Target Premium [-20, close]*				*Target Premium [-1, +1]*			
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acquirer B/M	1.823	1.318	1.524	0.476	0.685	2.085	2.082	1.730
	(2.647)	(2.857)	(2.912)	(2.978)	(1.282)	(1.381)	(1.409)	(1.414)
*Acquirer B/M * Stock*	-12.827***	-11.099***	-11.308***	-10.083***	-3.034**	-3.984**	-3.953**	-3.373**
	(3.203)	(3.472)	(3.575)	(3.619)	(1.549)	(1.676)	(1.727)	(1.718)
Acq. Cash/Assets		-8.032	-5.911	-7.067		-0.538	0.32	-2.231
		(6.658)	(7.682)	(7.803)		(3.195)	(3.693)	(3.681)
Acq. Leverage Ratio		-5.352	-0.362	-1.049		-2.552	-2.642	-2.832
		(5.509)	(7.086)	(7.152)		(2.645)	(3.413)	(3.382)
Acq. Dividends > 0		1.492	3.449	4.094		0.507	1.421	2.391
		(2.704)	(3.406)	(3.458)		(1.299)	(1.641)	(1.694)
Acq. Dividends / Assets		-96.616*	-117.578**	-123.852**		-40.232	-37.811	-40.884
		(54.348)	(60.680)	(61.406)		(26.104)	(29.279)	(29.025)
Ln(Acquirer Assets)		3.519***	4.773***	4.569***		1.877***	2.262***	2.088***
		(0.869)	(1.155)	(1.163)		(0.417)	(0.555)	(0.549)
Ln(Target Asset)		-2.002**	-3.553***	-3.702***		-0.861**	-1.316**	-1.536***
		(0.904)	(1.153)	(1.166)		(0.434)	(0.555)	(0.551)
Industry Difference FX	yes	yes	yes	yes	yes	yes	yes	yes
Industry Effects	yes	yes	yes	yes	yes	yes	yes	yes
*Industry*Cash Effects*	yes	yes	yes	yes	yes	yes	yes	yes
*Controls*Cash*	-	no	yes	yes	-	no	yes	yes
Year Effects	no	no	no	yes	no	no	no	yes
R-Sauared	0.1297	0.1491	0.1550	0.1739	0.1382	0.1736	0.1757	0.2233
N	1542	1375	1375	1375	1542	1375	1375	1375

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger (or one day before to one day after the announcement date, for the short window), is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The acquirer book-to-market ratio is calculated as the ratio of book value (total assets) to market value (market cap. + total liabilities + preferred stock – deferred taxes – convertible debt) using the most recent annual report, as are all other balance sheet variables. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. In columns (3)-(4) and (7)-(8), I interact the six balance sheet control variables with a dummy for cash payment as well, so the coefficient reported in the table for the controls can be interpreted as the effects in stock deals. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 7: Full Book-to-Market Specification By Period

	Dependent Variable and Period of Analysis:							
	Target Premium [-20, close]				*Target Premium [-1, +1]*			
Explanatory	*1973-1989*		*1990-2000*		*1973-1989*		*1990-2000*	
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acquirer B/M	2.747	1.494	1.143	-1.157	-0.801	-0.539	6.830***	7.153***
	(3.340)	(3.840)	(4.889)	(5.345)	(1.681)	(1.927)	(2.321)	(2.520)
*Acquirer B/M * Stock*	-9.927**	-8.551	-11.033**	-7.793	2.628	2.52	-10.975***	-10.600***
	(4.435)	(5.308)	(5.500)	(6.013)	(2.223)	(2.655)	(2.611)	(2.836)
Acq. Cash/Assets		14.312		-4.570		4.063		-3.112
		(28.033)		(8.656)		(14.003)		(4.071)
Acq. Leverage Ratio		-20.077		2.929		2.607		-3.992
		(17.774)		(8.265)		(8.860)		(3.897)
Acq. Dividends > 0		10.817		3.274		-0.176		2.857
		(10.320)		(3.911)		(5.158)		(1.844)
Acq. Dividends / Assets		-180.025		-157.040*		47.083		-79.970**
		(183.643)		(84.927)		(91.560)		(40.022)
Ln(Acquirer Assets)		2.857		4.561***		1.235		2.194***
		(2.908)		(1.314)		(1.449)		(0.618)
Ln(Target Asset)		-0.284		-3.751***		-0.528		-1.572
		(3.210)		(1.310)		(1.603)		(0.617)
Industry Difference FX	yes	yes	yes	yes	yes	yes	yes	yes
Industry Effects	yes	yes	yes	yes	yes	yes	yes	yes
*Industry*Cash Effects*	yes	yes	yes	yes	yes	yes	yes	yes
*Controls*Cash*	-	yes	-	yes	-	yes	-	yes
Year Effects	no	yes	no	yes	no	yes	no	yes
R-Squared	0.3506	0.4421	0.1349	0.1739	0.2586	0.3672	0.1878	0.2477
N	480	383	1062	992	478	381	1065	995

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger (or one day before to one day after the announcement date, for the short window), is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The acquirer book-to-market ratio is calculated as the ratio of book value (total assets) to market value (market cap. + total liabilities + preferred stock – deferred taxes – convertible debt) using the most recent annual report, as are all other balance sheet variables. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. In columns (3)-(4) and (7)-(8), I interact the six balance sheet control variables with a dummy for cash payment as well, so the coefficient reported in the table for the controls can be interpreted as the effects in stock deals. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 8: Full Acquirer Earnings-to-Price Specification with Balance Sheet Controls

Explanatory Variables:	*Dependent Variable: Target Premium [-20, close]* (1)	(2)	(3)	*Target Premium [-1, +1]* (4)	(5)	(6)
Acquirer E/P	8.354	22.633	8.515	16.819	37.069**	37.688**
	(30.402)	(33.622)	(27.071)	(14.571)	(16.166)	(16.482)
*Acquirer E/P * Stock*	-121.48***	-117.92**	-99.639**	-40.315**	-52.559***	-50.379**
	(41.106)	(46.095)	(47.177)	(19.645)	(22.120)	(22.205)
Acquirer E/P ≤ 0	8.718	8.346	8.166	0.901	1.541	0.517
	(9.116)	(10.125)	(10.338)	(4.342)	(4.847)	(4.851)
*Acquirer E/P * Acq. E/P ≤ 0*	98.147	61.793	89.157	0.848	-38.682	-58.874
	(96.240)	(105.420)	(109.401)	(45.851)	(50.491)	(51.336)
*Acq. E/P ≤ 0 * Stock*	-17.151*	-14.43	-14.929	-0.293	-1.335	-1.713
	(10.180)	(11.188)	(11.433)	(4.849)	(5.356)	(5.364)
*Acquirer E/P * Stock * Acq. E/P ≤ 0*	51.705	69.144	36.100	81.334	100.09*	117.29**
	(111.120)	(121.690)	(124.563)	(52.887)	(58.218)	(58.410)
Acq. Cash/Assets		-3.301	-3.815		3.807	2.362
		(7.874)	(7.967)		(3.764)	(3.733)
Acq. Leverage Ratio		1.511	1.556		-1.689	-1.574
		(7.241)	(7.302)		(3.466)	(3.425)
Acq. Dividends > 0		3.127	3.297		1.73	2.723*
		(3.427)	(3.480)		(1.641)	(1.633)
Acq. Dividends / Assets		-68.758	-73.155		-28.972	-30.51
		(52.919)	(53.427)		(25.342)	(25.053)
Ln(Acquirer Assets)		4.904***	4.760***		1.998***	1.812***
		(1.197)	(1.208)		(0.573)	(0.566)
Ln(Target Asset)		-3.866***	-4.017***		-1.311**	-1.549***
		(1.183)	(1.196)		(0.566)	(0.561)
Industry Difference FX	yes	yes	yes	yes	yes	yes
Industry Effects	yes	yes	yes	yes	yes	yes
*Industry*Cash Effects*	yes	yes	yes	yes	yes	yes
*Controls*Cash*	-	yes	yes	-	yes	yes
Year Effects	no	no	yes	no	no	yes
R-Sauared	0.1212	0.1439	0.1641	0.1484	0.1809	0.2319
N	1496	1324	1324	1496	1324	1324

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger (or one day before to one day after the announcement date, for the short window), is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The acquirer earnings-to-price ratio is calculated as the ratio of annual earnings per share to share price 1 month before the announcement date. The balance sheet variables are calculated from the most recent annual report before the announcement period. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences between acquirer and target at the 1-, 2-, and 3-digit SIC code level. In columns (2)-(3) and (5)-(6), I interact the six balance sheet control variables with a dummy for cash payment as well, so the coefficient reported in the table for the controls can be interpreted as the effects in stock deals. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 9: Full Acquirer Pre-Merger Return Specification with Balance Sheet Controls

	Dependent Variable and Primary Independent Variable:							
	Target Premium [-20, close]				*Target Premium [-1, +1]*			
Explanatory	*6 Month Pre-Ret*		*1 Year Pre-Ret*		*6 Month Pre-Ret*		*1 Year Pre-Ret*	
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acquirer Pre-Merger Abnormal Return	-11.876**	-11.949*	-5.738	-3.825	-8.202***	-6.267**	-4.587**	-2.981
	(5.544)	(6.284)	(3.931)	(4.520)	(2.652)	(3.023)	(1.889)	(2.169)
*Acquirer Pre-Merger Abnormal Ret*Stock*	23.034***	27.189***	14.886***	15.441***	10.222***	10.551***	6.208***	4.955**
	(6.429)	(7.019)	(4.537)	(5.173)	(3.072)	(3.456)	(2.179)	(2.483)
Acq. Cash/Assets		-2.549		1.791		-1.295		0.198
		(7.640)		(8.065)		(3.662)		(3.869)
Acq. Leverage Ratio		-6.741		-3.547		-5.665*		-5.135
		(7.166)		(7.272)		(3.435)		(3.489)
Acq. Dividends > 0		8.671**		9.208***		3.913**		4.567
		(3.398)		(3.461)		(1.629)		(1.662)
Acq. Dividends / Assets		-130.999**		-112.930*		-54.589*		-53.210*
		(61.336)		(61.450)		(29.397)		(29.483)
Ln(Acquirer Assets)		5.791***		5.506***		2.250***		1.986***
		(1.145)		(1.191)		(0.549)		(0.572)
Ln(Target Asset)		-3.857***		-3.776		-1.666***		-1.463
		(1.139)		(1.169)		(0.546)		(0.561)
Industry Difference FX	yes	yes	yes	yes	yes	yes	yes	yes
Industry Effects	yes	yes	yes	yes	yes	yes	yes	yes
*Industry*Cash Effects*	yes	yes	yes	yes	yes	yes	yes	yes
*Controls*Cash*	-	yes	-	yes	-	yes	-	yes
Year Effects	no	yes	no	yes	no	yes	no	yes
R-Squared	0.1266	0.1949	0.1285	0.1933	0.1355	0.2330	0.1392	0.2400
N	1782	1397	1712	1348	1781	1394	1711	1345

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable, the abnormal return to the stock of the target company from one month before the announcement date to the close of the merger (or one day before to one day after the announcement date, for the short window), is generated from a three-factor market model. I use betas estimated in the period 6 months before the start of the window. The pre-merger abnormal return to the acquirer stock is calculated using a three-factor model over the relevant horizon. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. In even columns, I interact the six balance sheet control variables with a dummy for cash payment as well, so the coefficient reported in the table for the controls can be interpreted as the effects in stock deals. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.

Table 10: Post Merger Returns, by Method of Payment

Transaction Form:		Cash	Stock	All
Post-Merger Abnormal Return	95%	67.58%	67.58%	67.32%
[close, + 1 yrs]	75%	13.60%	5.91%	8.49%
	50%	-12.12%	-15.04%	-14.08%
	25%	-34.95%	-45.63%	-41.79%
	5%	-80.68%	-86.54%	-86.47%
	Mean	**-10.83%**	**-17.41%**	**-15.01%**
Sample Size		614	1066	1680
Post-Merger Return	95%	81.19%	73.62%	81.19%
[close, + 1 yrs]	75%	29.08%	21.85%	24.82%
	50%	2.02%	-6.22%	-2.77%
	25%	-24.13%	-36.00%	-31.72%
	5%	-66.53%	-74.85%	-74.85%
	Mean	**2.73%**	**-6.00%**	**-2.58%**
Sample Size		614	1066	1680
Post-Merger Abnormal	95%	31.91%	31.91%	31.91%
Annualized Return	75%	2.11%	-0.78%	1.03%
[close, + 3 yrs]	50%	-15.31%	-15.69%	-15.50%
	25%	-32.78%	-32.64%	-32.72%
	5%	-58.33%	-59.46%	-59.46%
	Mean	**-15.42%**	**-15.81%**	**-15.50%**
Sample Size		380	654	1034
Post-Merger Annualized Return	95%	35.82%	37.28%	37.28%
[close, + 3 yrs]	75%	11.63%	5.87%	8.20%
	50%	-4.27%	-9.30%	-7.61%
	25%	-22.48%	-27.54%	-25.54%
	5%	-49.04%	-52.11%	-52.11%
	Mean	**-5.46%**	**-10.24%**	**-8.40%**
Sample Size		620	989	1609

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Returns are calculated beginning the day after the merger closed over a one- or three-year horizon. Abnormal returns are calculated using a three-factor market model estimated during the period.

Table 11: Post-Merger Monthly Portfolio Abnormal Returns

Method of Payment:	*Size of Target Premium* Low	Low Mid	High Mid	High
Cash	0.04%	-0.13%	-0.05%	0.88%*
	(0.30%)	(0.25%)	(0.28)	(0.40%)
Equity	0.17%	0.03%	-0.98%*	-1.11%*
	(1.00%)	(0.24%)	(0.28%)	(0.28%)

Source: CRSP Database at WRDS. Mergers are sorted into bins using the quartiles of the method of payment specific bid distribution in the calendar year before the close of the merger. Stocks are each held in an equal-weighted portfolio for one year after the close. The monthly returns on these portfolios are then fitted to a 3-factor model weighting the returns by the number of stocks in the portfolio in a given month. The table displays the abnormal monthly return alphas from a regression on the 3-factor model and the standard errors of the estimates. The monthly return observations are weighted in the regressions by the average number of stocks in the portfolio in a given month. A * denotes estimates statistical significance at the 5% level.

Table 12: Post-Merger Declines and Target Premia

	Dependent Variable: Target Premium [-20, close]							
	Regression Run:							
Explantory	*Abnormal Returns, 1-year*			*3-year*	*1973-1989*	*1990-2000*	*Simple Returns*	
Variables:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-Merger Decline	-7.180**	-10.393**	-9.271**	-3.025	-11.670	-7.866*	-10.803***	-3.577*
	(3.668)	(3.837)	(4.284)	(1.656)	(9.152)	(6.157)	(3.465)	(1.836)
Post-Merger Decline	8.511*	13.527***	13.116**	9.246***	3.202	13.976**	15.265***	11.277**
** Equity*	(4.804)	(5.067)	(4.811)	(2.940)	(12.136)	(4.470)	(4.270)	(4.203)
Acq. Cash/Assets		0.007	-2.915	-10.079	30.161	-3.592	-3.845	-10.560
		(8.839)	(11.171)	(10.693)	(21.958)	(13.362)	(10.729)	(10.102)
Acq. Leverage Ratio		-5.395	1.798	1.847	-29.992	7.931	2.430	2.919
		(5.145)	(5.522)	(9.375)	(19.991)	(6.230)	(5.568)	(8.972)
Acq. Dividends > 0		-2.208	1.153	2.214	15.058	-1.975	1.056	2.380
		(2.933)	(3.040)	(3.663)	(9.451)	(9.020)	(3.111)	(3.860)
Acq. Dividends /		-47.457	-55.977	-93.836	-216.92	-9.845	-55.281	-96.752
Assets		(32.417)	(46.738)	(87.389)	(132.38)	(70.157)	(47.322)	(90.146)
Ln(Acquirer Assets)		4.648***	4.381***	5.237***	5.771**	3.670***	4.389***	5.225***
		(0.954)	(1.056)	(1.406)	(2.822)	(1.168)	(1.041)	(1.381)
Ln(Target Asset)		-3.4666**	-3.203***	-5.155***	-1.684	-3.088**	-3.232***	-5.163***
		(0.829)	(0.909)	(1.294)	(3.913)	(0.967)	(0.908)	(1.332)
Industry Diff. FX	no	no	yes	yes	yes	yes	yes	yes
Industry Effects	no	no	yes	yes	yes	yes	yes	yes
*Industry*Cash FX*	no	no	yes	yes	yes	yes	yes	yes
*Controls*Cash*	no	yes	yes	yes	yes	yes	yes	yes
Year Effects	no	no	yes	yes	yes	yes	yes	yes
R-Squared	0.0497	0.0742	0.1672	0.2099	0.4530	0.1726	0.1692	0.2139
N	1677	1343	1343	1077	376	967	1343	1077

Source: CRSP/Mitchell Merger Database and CRSP/COMPUSTAT Database at WRDS. Standard errors appear in parentheses below the coefficient. Each column contains a separate regression. The dependent variable in columns (1)-(#) is the abnormal announcement-period return to the target stock, calculated from 20 days prior to announcement to the close, as in Table 1. The abnormal return is calculated using a three-factor market model estimated in the sample. The post-merger decline is the negative of the abnormal post-merger return to the joint company stock, beginning on the day after the close. In columns (1)-(3), I calculate the post-merger decline over the year following the close. Column (4) runs the same regression as column (3) but calculates the post-merger decline as the annualized decline over three years following the close. Columns (5) and (6) repeat the regression from column (3) but within the sub-periods 1973-1989 and 1990-2000. Columns (7) and (8) repeat columns (3) and (4) but using simple post-merger returns rather than abnormal returns to calculate the post-merger stock price decline. Industry effects are at the 2-digit SIC level. Industry difference fixed effects control for differences at the 1-, 2-, and 3-digit SIC code level. In columns (2)-(6), I interact the six balance sheet control variables with a dummy for cash payment as well as including them as standard controls, so the coefficient reported in the table for the controls can be interpreted as the effects in stock deals. Standard errors are clustered by year. Coefficients that are significantly different from 0 are denoted by the following system: * 10%, ** 5%, *** 1%.