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Acquisitions Driven by Stock Overvaluation

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**ACQUISITIONS DRIVEN
BY STOCK OVERVALUATION**



LEMING LIN

**SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER
OF SCIENCE IN FINANCE**

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Abstract

Overvaluation might drive a firm to use its stock to acquire another firm whose stock is not as overpriced. Though hypothetically desirable, these acquisitions create little, if any, value for acquirer shareholders. Two factors impede value creation for acquirer stockholders from these transactions (despite large differences in relative overvaluation at announcement): acquirers paying large premiums to targets, and investors' correction of acquirer overvaluation during the bid period. Furthermore, acquirer CEOs obtain a large amount of new stock and option grants after acquisitions and realize a net gain in wealth, further suggesting that equity overvaluation increases agency costs and the resulting actions benefit managers more than shareholders (Jensen (2005)).

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On March 22, 2000, PSINet Inc., a giant Internet service provider, announced its intention to acquire Metamor Worldwide Inc., a technology consulting firm, for \$1.9 billion in stock. Each share of Metamor would be exchanged for 0.9 shares of PSINet. The price of PSINet shares was \$49.50 and the price of Metamor was \$16.00 before the announcement.

“The deal is also the latest example of how a company such as PSINet can use its highflying stock as currency for stock-swap acquisitions. PSINet's stock has soared 51% in the past three months, while the stock of Metamor has fallen 45% in the same time period.”

--Wall Street Journal, March 22, 2000

“Wall Street's initial reaction, however, was that the deal was better for Metamor's stockholders than for PSINet. Metamor's share price more than doubled, to \$ 33.31 1/4, up \$ 17.31 1/4 for the day. Meanwhile, shares of PSINet fell 16 percent, to \$ 41.56 1/4.”

--Washington post, March 23, 2000

“We purchased Metamor, in retrospect, at exactly the wrong time,” Mr. William Schrader (then CEO of PSINet) said in an interview.

-- New York Times, November 3, 2000

PSINet Inc. filed for Chapter 11 bankruptcy in May 2001.

1. Introduction

In an influential study, Shleifer and Vishny (2003) suggest that stock market overvaluation motivates merger and acquisition activity. If a firm's stock is overvalued, managers have an incentive to use the overpriced stock as cheap currency to buy a target firm as long as the stock of the target is *less overvalued* (and the premium offered not too high). Such acquisitions would benefit existing acquirer shareholders even if they do not generate economic synergies.¹ Empirical evidence generally supports the claim that stock overvaluation motivates firms to pursue stock-swap acquisitions: Rhodes-Kropf, Robinson,

¹ Why would the target agree to a stock swap with an overvalued acquirer? Shleifer and Vishny (2003) argue that target shareholders might have short investment horizons, hoping they can cash out by selling acquirer shares before the overvaluation is corrected. It is also possible that acquirers make side payments to target managers to agree to the deal through, for example, acceleration of stock option exercises, severance pay, or promises of future employment. Rhodes-Kropf and Viswanathan (2004) further suggest that targets might over-estimate the potential synergies when market-wide overvaluation is severe.

and Viswanathan (2005), Dong, Hirshleifer, Richardson, and Teoh (2006), and Ang and Cheng (2006) show that acquirers are more overvalued than their targets before merger announcements and that the probability of using stock as the method of payment is positively related to acquirer overvaluation.

However, an important, and unresolved, question is whether acquirer shareholders actually benefit from acquisitions driven by equity overvaluation. Rational investors would correct overvaluation of the acquirer's stock, at least to some extent, once the acquisition attempt is revealed. Moreover, target shareholders would demand a sizable premium to be taken over by the acquirer. These two factors would decrease the stock price of the acquirer during the acquisition process and reduce the fraction of any synergies generated that accrue to pre-merger acquirer shareholders, eroding the potential benefits to acquirer shareholders.

We examine completed mergers and acquisitions in the U.S. between 1985-2006 to examine whether shareholders of overvalued acquirers benefit from acquisitions. Using two different measures of equity overvaluation, we confirm that bidders are more overvalued than the targets on average, especially in stock-swap acquisitions. However, relative overvaluation (bidder compared to the target) almost disappears by the date that the merger is completed. We then sort acquisitions by relative overvaluation before announcement and focus our attention on the one-third of stock-swap deals with the largest relative overvaluation: we label this group as acquisitions driven by overvaluation, or OV acquisitions. The one-third of stock-swap acquisitions with the lowest (and often negative) relative overvaluation are assumed not to be motivated by overvaluation, and are labeled as

NOV acquisitions. The middle one-third stock acquisitions are excluded from our analyses to mitigate potential measurement errors associated with our measures of equity overvaluation.

We find that OV acquirers tend to pay significantly higher premiums to their target and incur a larger drop in stock price during the bid period relative to both NOV and cash acquirers. Reflecting higher premiums, the *targets* of OV acquisitions realize a significantly larger increase in stock price over the bid period than the targets of other acquisitions. We also find that stock acquisitions driven by overvaluation have significantly lower market estimates of deal synergies relative to NOV and cash acquisitions. This result is inconsistent with the argument in Shleifer and Vishny (2003) that high synergies help justify the acquirer's choice to use its overvalued stock in an acquisition rather than try to sell it to the public (via an SEO, for example). Examination of acquirer post-acquisition operating performance yields a similar conclusion. Specifically, merged firms in OV acquisitions experience significant post-acquisition deterioration in operating ROA. Taken together, these findings cast doubt on the effectiveness of acquirers' use of temporarily overvalued stock in stock-swap mergers and acquisitions – pre-closing correction of overvaluation and the high premiums paid to targets appear to erode most of the gains that would otherwise accrue to an overvalued acquirer buying a less-overvalued target.

These results lead us to the question of what motivates overvalued acquirers to buy less-overvalued targets if there is little shareholder wealth creation. We find that acquirer CEOs in OV acquisitions obtain substantial pecuniary benefits following these transactions, specifically large new stock and option grants and increases in cash salary and bonuses.

These large increases in compensation dominate the relatively small decrease in the value of the average CEO's equity holding in the acquiring firm.

Combined, our findings are consistent with Jensen's (2005) hypothesis that equity overvaluation generates substantial agency costs for shareholders. Overvaluation, by definition, implies that the firm will be unable to deliver the operating performance priced into its pre-acquisition stock price. Managers under pressure to meet such unachievable expectations potentially take risky actions that harm shareholder value, such as ill-conceived acquisitions. Jensen points out that the prevalence of equity-based managerial compensation in the past two decades, such as incentive bonuses based on stock price appreciation and stock option grants, exacerbates this problem. Our results demonstrate tangible losses for overvalued acquiring firms (poor acquisitions that produce negligible synergies and harm operating performance), and that the CEOs of these overvalued acquiring firms are generally rewarded with large amounts of, principally stock-based, incentive compensation.

Our paper is closely related to several recent strands of the M&A literature. Moeller, Schlingemann, and Stulz (2005) show that acquirer shareholders, in aggregate, lose \$240 billion during the three-day announcement period in a small sub-sample of mergers and acquisitions between 1998-2001, principally in acquisitions by what appear to be overvalued acquirers (high market-to-book). Dong, Hirshleifer, Richardson, and Teoh (2006) find, as do we, that overvalued acquirers suffer more significant announcement-period stock-price declines than other categories of acquirers do: the principal differences between our study and theirs are that we also examine total bid-period returns to acquirers

(and targets) and examine post-completion operating performance. Two recent papers further examine the wealth effects of acquisitions for overvalued acquirers, taking slightly different perspectives. Gu and Lev (2008) study acquisitions driven by equity overvaluation, and find that such deals frequently trigger large goodwill write-offs by the acquirer in the years after the acquisition is completed. Furthermore, Gu and Lev conclude that the acquirer's stock price, on average, performs poorly after the merger beyond the correction necessary to correct overvaluation – these results suggest, as ours do, that overvalued acquirers make systematically worse acquisition decisions than acquirers that are not overvalued. Savor and Lu (2008) focus on *unsuccessful* acquiring firms (without conditioning on overvaluation) and report that unsuccessful stock acquirers have significantly lower long-run stock returns than successful stock acquirers do, concluding that there must be some value to success for stock acquirers in general. In a similar spirit to our examination of the wealth consequences for CEOs of acquisitions by overvalued acquirers, Harford and Li (2007) show that acquirer CEOs are, on average, better off due to new stock and option grants following mergers. One way to interpret the results in this paper is that this effect is concentrated in the sub-sample of acquisitions by overvalued acquiring firms using their own stock as the method of payment.

The remainder of the paper proceeds as follows. Section 2 describes our data and Section 3 introduces our empirical measures of stock overvaluation. Section 4 investigates the relative overvaluation of the acquirer to the target and how it varies during the acquisition process. Section 5 examines acquisition synergies post-acquisition operating performance.

Section 6 investigates changes in compensation and wealth of acquirer CEOs following acquisitions. Section 7 concludes.

2. Data

Our mergers and acquisitions data are obtained from the Securities Data Company's (SDC) U.S. database. We use the following criteria to select the final sample:

The acquisition is announced and completed between 1985 and 2006.

Both the acquirer and target are public firms listed on the NYSE, AMEX, or Nasdaq.

The deal value is at least \$10 million and at least 1% of the acquirer's market value of equity.

The acquirer controls less than 50% of the target's shares prior to the announcement and owns 100% of the target's shares after the transaction.

Both the acquirer and target has positive book value of equity and sufficient data items in the Compustat and CRSP merged database to compute market-to-book (assets) ratios at the end of the fiscal year prior to announcement.

The final sample has 1,367 stock-financed mergers, 692 cash-financed mergers, and 990 mixed-financed mergers. Table 1 reports the number of acquisitions by the calendar year of acquisition announcement and the relative deal size—the ratio of deal value to the acquirer's market value of equity at the end of the fiscal year prior to announcement.

Consistent with extant studies, there are more mergers and acquisitions in the late 1980s and during 1994-2000. Cash-financed acquisitions appear relatively more popular in the 1980s, but since 1989 the majority of the acquisitions are financed, at least partially, by stock. On average, the deal value is 24% of the acquirer's existing market value of equity.

Table 2 summarizes firm characteristics and the operating and stock price performance of the merging firms in the fiscal year prior to the acquisition announcement. Overall, bidders are larger in size, have better operating performance, and have higher leverage than targets. But there are no substantial differences between bidders that use stock as the method of payment and those that use cash, nor between the targets in these two groups. Relative to the market, stock bidders experience a significant price increase in the year prior to the announcement, while all targets earn returns that are approximately equal to the market return.

3. Measures of stock overvaluation

We use two different methods to measure equity overvaluation for both acquirers and targets. The first follows a methodology developed by Rhodes-Kropf, Robinson, and Viswanathan (2005, hereafter RKR), in which the market-to-book equity ratio is decomposed into components related to misvaluation and related to growth options. In other words, this method produces a measure of misvaluation while controlling for systematic differences in growth options among firms and industries. This decomposition has also been used in recent studies such as Hertz and Li (2007) and Ma, Whidbee, and Zhang (2008).

A firm's log market-to-book equity ratio (M/B) can be decomposed into two items,

$$\ln(M / B) = \ln(M / V) + \ln(V / B), \quad (1)$$

where M is the observed market value of equity and B is the book value of equity. V stands for the intrinsic value of equity, which is unobservable. Previous studies, for example Lee, Myers, and Swaminathan (1999), Ang and Cheng (2006), and Dong, Hershleifer, Richardson, and Teoh (2006), use a residual income model from the accounting literature to estimate V. However the residual income model relies on a number of fairly restrictive assumptions, and, more importantly, the use of analyst forecasts (to compute residual income) would bias our tests toward large M&A transactions.

RKRV (2005) relax the residual income model and assume that a firm's intrinsic value is a linear function of its book value of equity, net income (i.e., the growth of book value of equity), and leverage. The parameters of the linear function are allowed to vary over time and across industries to reflect the variation in investment opportunities across times and industries. The parameters can also capture difference in discount rates amongst firms. Specifically,

$$\ln(M_{it}) = \alpha_{0jt} + \alpha_{1jt} \ln(B_{it}) + \alpha_{2jt} \ln(|NI_{it}|) + \alpha_{3jt} I_{(<0)} \ln(|NI_{it}|) + \alpha_{4jt} LEV_{it} + \varepsilon_{it} \quad (2)$$

$|NI_{it}|$ stands for the absolute value of net income of firm i at time t. $I_{(<0)}$ is an indicator variable which equals one for negative net income and zero otherwise. LEV is the market leverage ratio. ε_{it} captures the deviation of intrinsic value from the observed market value of equity and, therefore, is a natural proxy for misvaluation.

We run cross-sectional regressions of Eq. (2) for each industry and each year to estimate the parameters α_{jt} . The subscript j stands for industry. We use the industry classification scheme developed by Fama and French (1997) to classify firms into 12 industries. We find similar results to RKR (2005). These three variables, i.e., book value of equity, net income, and leverage ratio, are able to explain the within-industry cross-sectional variations of market value of equity well, with regression R2s over 80% for almost all industries.

The residual from Eq. (2) ε_{it} can be interpreted as the firm-level mispricing at a point of time. Previous studies suggest, however, that there is an important component of industry-specific misvaluation, and the magnitude of industry-level misvaluation also varies over time. So the effective mispricing for a firm should be the sum of firm-level and industry-level mispricing. Following RKR (2005), we take the time-series average of $\hat{\alpha}_{jt}$, the estimated α_{jt} from Eq. (2) to compute the long-run parameters, $\bar{\alpha}_j = \frac{1}{T} \sum_t \hat{\alpha}_{jt}$. The final measure of RKR mispricing is:

$$\ln(M_{it}/V_{it}) = \ln(M_{it}) - [\bar{\alpha}_{0j} + \bar{\alpha}_{1j} \ln(B_{it}) + \bar{\alpha}_{2j} \ln(|NI_{it}|) + \bar{\alpha}_{3j} I_{(<0)} \ln(|NI_{it}|) + \bar{\alpha}_{4j} LEV_{it}] \quad (3)$$

Our second measure of overvaluation is the industry-adjusted market-to-book ratio of equity,

$$\text{Ind-adj OV} = \frac{\left(\frac{M}{B}\right)_{it} - \left(\frac{M}{B}\right)_{jt}}{\left(\frac{M}{B}\right)_{it}} \quad (4)$$

$\left(\frac{M}{B}\right)_{it}$ is the market-to-book equity ratio of stock i at time t . $\left(\frac{M}{B}\right)_{jt}$ is the median market-to-book equity ratio of industry j which stock i belongs at time t . The subtraction of the industry median is intended to control for investment opportunities or risk. We use the Fama and French (1997) 48-industry scheme to classify firms into industries. A positive number suggests overvaluation relative to the industry median while a negative number suggests undervaluation. This measure has been used by previous studies such as Ang and Cheng (2006).

Table 3 reports the results of RKR decomposition of the market-to-book equity ratio and the industry-adjusted market-to-book equity ratio for merging firms. The cross-firm correlations between these two measures of overvaluation are over 0.60, thus results from these two methods are very similar. Consistent with the predictions of Shleifer and Vishny (2003) and the empirical evidence in RKR (2005), Ang and Cheng (2006), and Dong et al. (2006), we find that bidders have significantly higher market-to-book ratios and are overpriced by more than targets. Among bidders, those undertaking stock-financed acquisitions are overvalued by more than cash-financed bidders. Targets acquired by stock bidders are generally overvalued prior to the merger, but targets acquired by cash bidders are approximately fairly valued. Overall, the large overvaluation of the acquirer relative to the target is consistent with the Shleifer and Vishny (2003) explanation of the motivation for stock-financed acquisitions.²

² However, the stock of cash bidders is also more overvalued than the stock of their targets. If relative overvaluation determines bidder's choice for the medium of payment, as suggested by Shleifer and Vishny (2003), this raises a question that why don't these bidders use stock instead of cash as the medium of payment.

4. Relative overvaluation of the acquirer to the target

As long as the acquirer's stock is more overvalued than the target's stock, a stock-swap acquisition would benefit acquirer shareholders. As an ex-ante motivation for acquisitions, however, this justification overlooks two typical facts about stock acquisitions. First, the acquirer often needs to pay a significant premium to take over the target. Second, the revelation of acquisition attempt signals information to the market and during the bid period investors may correct the overvaluation of the acquirer stock to a large extent. As a result, the stock price of the target typically increases and the stock price of the acquirer typically decreases. This price movement of the merging firms shrinks or even eliminates the relative overvaluation that initially motivates the acquisition.

Table 4 shows the relative overvaluation of the stock-financed merging firms at the end of the month before the merger announcement and on the date of completion. The results of Panel A are based on the RKR_V measure and the results of Panel B are based on the industry-adjusted measure of overvaluation. Both acquirers and targets in the stock mergers are overvalued on average before the announcement but acquirers tend to be more overvalued than their targets (consistent with Shleifer and Vishny (2003)). However, the relative overvaluation of the acquirer declines considerably by the date on which the merger is finally consummated. As long as the terms of the acquisition, specifically the exchange ratio at which target stock is converted into acquirer stock, do not change to reflect the change in relative valuation, the acquiring firm will be able to lock in the transactional gains from acquiring hard assets using overvalued paper. What these results do suggest, however, is that the relative overvaluation that may have motivated the acquirer to pursue a

transaction in the first place almost completely dissipates by the time the transaction is completed.

Next we examine changes in stock price for the acquirer and target during the acquisition process. We first sort our sample by overvaluation of the acquirer relative to the target before the announcement and divide stock-financed acquisitions into terciles. The top third with the highest values of relative overvaluation are more likely to be motivated by the stock overvaluation of the acquirer relative to the target. We label this group OV acquisitions—acquisitions driven by stock overvaluation. The bottom third of acquisitions with the lowest values of relative overvaluation are assumed not to be driven by stock overvaluation. We label these NOV acquisitions. Each of these two groups has 446 acquisitions. We exclude the middle third to mitigate any potential effects of measurement errors associated with our measures of overvaluation. As our research question is whether OV acquisitions generate value for the shareholders of acquirer, we use NOV and cash acquisitions as a benchmark in the following analyses.

We follow the standard event study methodology to compute a three-day cumulative abnormal return (CAR) for each acquirer, a CAR from day -1 to day +1 relative to the announcement day. The market model is employed to estimate CARs. In particular, we use the CRSP value-weighted index as the market portfolio, estimate the parameters of the market model using returns from the trading day -253 to day -45, and use the estimated parameters to compute the expected return during the event window.³ The daily pricing

³ Schwert (1996) finds that target stock prices tend to run up beginning on trading day -42 on average, and suggests that information about the acquisition might leak out during this period.

errors—the differences between the realized return and the estimated expected return are cumulated over the three days of the event window to compute CARs.

Table 5 reports CARs respectively for stock bidders in the OV group, stock bidders in the NOV group, and cash bidders. Stock bidders realize significantly negative CARs in the three-day announcement window. Both the mean and median CARs for cash bidders are positive, though only the mean is statistically significantly different from zero. If we compare the three-day announcement CARs of OV bidders to that of NOV or cash bidders, OV stock bidders experience substantially larger drops in stock price (approximately 1% more negative CARs relative to NOV stock bidders and 4% more negative relative to cash bidders, both statistically significant at greater than the 5% level).

The market's assessment at announcement is, however, affected by the expected probability of merger completion – the announcement return potentially underestimates the value implications of the mergers that are finally completed. Following Andrade et al. (2001), we compute a full-period CAR from 20 days prior to the announcement date through to the completion date, [-20, close]. The inclusion of 20 days before the announcement is to account for the possible price movement due to investors' anticipation of the merger. Table 5 shows that the results using CARs during the full bid period are very similar to the results from three-day announcement returns. Stock bidders realize significantly negative returns while cash bidders do not. Among stock bidders, those in the OV group incur substantially more negative returns than those in the NOV group. The differences in means or medians are all statistically significantly different from zero with p-values below 0.001.

The evidence that OV bidders realize significantly lower CARs than NOV bidders and cash bidders suggests one of three possibilities: (i) OV acquirers pay significantly higher premiums to acquire their target than other types of bidders do; (ii) the market is pessimistic that OV acquirers are able to create value from these acquisitions (i.e., these deals generate the lowest or even negative synergies); or (iii) the market substantially corrects the overvaluation of OV acquirers around and after announcement. A distinction between (ii) and (iii) above is difficult to infer from stock price changes alone, because changes in market value potentially reflect both effects. Therefore, later in this paper we rely on post-acquisition differences in operating performance to assess the scope for value creation by OV stock acquirers.

We can, however, say something about target premiums ((i) above) using stock price data. Specifically, we measure acquisition premiums using the approach suggested in Schwert (1996), where the premium is the sum of the pre-bid run-up and the post-announcement increase in the target's stock price. We therefore estimate acquisition premiums as the CAR of the target from trading day -42 to the date of deal completion.⁴ The results are reported in the bottom panel of Table 5. Consistent with the acquirer return evidence, OV bidders pay substantially higher premiums than NOV bidders do. Bidders in the OV group pay an average acquisition premium of 35.33% for their target while NOV bidders pay an average premium of 19.87% (using the RKR measure to classify OV groups). The difference is even more striking if the industry-adjusted measure of

⁴ Barger, Schlingemann, Stulz, and Zutter (2007) adopt a similar method to estimate acquisition premium.

overvaluation is used to define OV groups. Our evidence suggests, however, that the premiums paid by OV stock bidders are about equal to the premiums paid by cash bidders.

Next we examine if the higher premium paid by OV bidders is driven by the differences in target firm and deal characteristics. We run a regression of acquisition premium on various target and deal characteristics variables plus an indicator variable OV that takes the value of one if the deal is in the OV group and zero otherwise. Barger, Schlingemann, Stulz, and Zutter (2007) use a similar method to examine if private acquirers pay a different premium from public acquirers to public targets. We follow their study to construct the control variables. Table 6 presents the regression results. One set of results is for stock mergers only and the other for both stock and cash mergers. We find that controlling for target firm and deal characteristics, OV bidders tend to pay to their target an average premium of 12% higher than other bidders. The differences are statistically significant.

5. Do acquisitions driven by stock overvaluation generate synergies?

Why do OV acquirers pay such high premiums in acquisitions? Shleifer and Vishny (2003) emphasize the importance of having high synergies to justify the acquirer's choice to make an acquisition, and it is possible that acquisitions by overvalued acquirers would actually generate larger synergies than NOV and cash-financed acquisitions (thereby justifying the higher premiums). In this section we investigate whether acquisitions driven by stock overvaluation generate larger synergies than other acquisitions using two techniques: backing out synergies from the combined stock price movements of the

acquirer and target around deal announcement (section 5.1) and examining the post-completion operating performance of the acquirer (section 5.2).

5.1. Acquisition synergies derived from stock returns

We estimate merger synergies by using a method similar to Moeller, Schlingemann, and Stulz (2005). In particular, we estimate dollar abnormal returns by multiplying the CAR over the bid period [trading day -20, close] by the market value of equity of the firm 21 trading days before the announcement. Acquisition synergies are then calculated as the sum of the dollar abnormal returns for the bidder and the target divided by the market value of equity of the merged firm upon completion,

$$Synergies = \frac{\left(CAR_{[-21, close]}^{bidder} \times ME_{-21}^{bidder} \right) + \left(CAR_{[-21, close]}^{target} \times ME_{-21}^{target} \right)}{ME_{close}^{merged}} \quad (5)$$

To remove the effect of outliers, the value of synergies is winzORIZED at the 1% level for each group of mergers, and the groups are based on the RKRK overvaluation metric.

Table 7 reports the mean and median synergies of OV, NOV, and cash acquisitions. Acquisitions made by OV stock bidders generate the lowest, and negative, synergies among these three groups. On average almost 20% of the merged firm's market value of equity dissipates during the process of OV acquisitions, compared to a loss of 10.8% for NOV acquisitions and a gain of 2.8% for cash acquisitions. The differences are statistically significant in both the means and medians. This evidence clearly suggests that synergies cannot explain the substantially higher premiums paid by OV stock bidders, and also make

it difficult to explain OV bidders' choice of acquisitions as a use of their overvalued stock relative to a seasoned equity offering.

Diversifying acquisitions are generally considered more likely to be value-destroying (see, e.g., Malmendier and Tate, 2007). As a quick test, we examine which group of acquisitions has more diversifying deals. A merger is classified as a diversifying deal if the bidder and target have different two-digit SIC codes. We find that 35% of the deals in the OV group are diversifying deals while only 28% of the NOV acquisitions are diversifying deals. A Chi-square test suggests that these percentages are statistically significantly different from one another. We find, however, that 43.5% of the cash acquisitions are diversifying deals, though cash deals on average generate positive synergies. One possible explanation is that the choice of cash as the method of payment is endogenous – target shareholders would likely prefer cash to stock if the acquirer is in a different industry. Amongst stock acquisitions, however, OV acquirers are much more likely to engage in a diversifying acquisition, and those acquisitions appear, on average, to destroy considerable value in the merged firm.

5.2. Operating performance following mergers

As noted above, using evidence from stock returns to infer value (or synergy) creation in mergers is problematic in this context because we are assuming that stock prices do not reflect intrinsic value for a substantial portion of our sample of acquirers. The stock price declines observed in Tables 5 and 6 may simply reflect correction of the overvaluation that we have identified as a principal determinant of the decision to go through an acquisition to begin with. To more directly address the question of whether mergers by OV acquirers

fundamentally impair the firms' operations, we examine operating performance after the deal is complete. An examination of post-completion operating performance sheds light on the source of economic gains or losses associated with the mergers in our sample, and allows us to evaluate whether the merger creates real value for existing shareholders.

Our primary measure of operating performance is earnings before interest, taxes, depreciation and amortization (EBITDA, also called operating income before depreciation) divided by the market value of the assets at the beginning of the fiscal year.⁵ Market value of assets is the sum of the market value of equity and the book values of preferred stock and debt net of cash. We call this measure operating ROA. Another measure of operating performance is asset turnover, calculated as sales divided by the market value of assets at the beginning of the fiscal year. It measures the productivity of the firm's assets. Panel A of Table 8 reports the median operating performance of merged firms from three years before the acquisitions to five years after the acquisitions, respectively for OV, NOV, and cash mergers. Operating performance before the merger is the weighted-average of the performance of the acquirer and target, with the weights being their relative market value of assets at the beginning of the fiscal year.

We employ two different methods to examine abnormal changes in operating performance after mergers. The first method follows Healy, Palepu, and Ruback (1992). We first identify the industry median operating performance of the bidder and target respectively in each year, and then calculate their weighted-average. The weights are the

⁵ Healy, Palepu, and Ruback (1992) argue that the rationale for using the market value of the assets rather than the book value to deflate operating income is that market value represents the opportunity cost of the assets and therefore facilitates intertemporal and cross-sectional comparisons. Furthermore, using the market value of assets mitigates any effects arising from the choice of the accounting method for mergers.

relative market value of assets of the two merging firms at the beginning of each year for the performance of the pre-merger years (years -3 to -1) and at the beginning of year 0 for the performance of year 0 and the post-merger years (years 1 to 5). Year 0 is the fiscal year that the merger is completed. We use Fama and French's (1997) scheme to classify acquirers and targets into 48 industries, and use this weighted-average of the industry median performance as the benchmark for the merged firm. Abnormal operating performance, the difference between the operating performance of the merged firm and the benchmark performance, is calculated each year for each acquisition. We then run a cross-sectional regression to compute abnormal changes in performance due to the mergers,

$$, \quad PERFORMANCE_{post_i} = \alpha + \beta PERFORMANCE_{pre_i} + \varepsilon_i \quad (6)$$

where the explanatory variable, $PERFORMANCE_{pre_i}$, is the median abnormal operating performance for the merging firms of acquisition i during the pre-merger years (years -3 to -1) and the dependent variable, $PERFORMANCE_{post_i}$, is the median abnormal operating performance during the post-merger years (years 1 to 5). The slope coefficient β captures the possible correlation in abnormal performance between the pre-and post-merger years. The intercept α measures the average change in the industry-adjusted abnormal performance that is due to the merger, and is our main coefficient of interest.

Barber and Lyon (1996) emphasize the importance of matching firm size and the pre-event operating performance in estimating firms' abnormal performance after events. Therefore, our second method adopts this approach. For every bidder and target firm, we find a control firm that (1) has total assets of 50%-150% of the merging firm, and (2) has

the closest operating ROA to the merging firm in the fiscal year before the merger. As a result, we have a pair of control firms for each pair of merging firms. Control firms are required to exist for at least three years and not to conduct seasoned equity offerings or be involved in acquisitions in the following five years. The weighted-average operating performance of the control firm pair is calculated each year as the benchmark performance for the merged firm. The weights are the relative market value of assets of the two merging firms at the beginning of fiscal year 0. Abnormal operating performance is the difference in operating performance of the merged firm and its benchmark. We compute the median abnormal operating performance over the five post-merger years to make statistical inferences.⁶

Panel B of Table 8 presents the abnormal changes in operating performance after mergers. Consistent with Ghosh (2001), Healy, Pelepu, and Ruback's (1992) method seems to yield more optimistic post-merger operating performance than the Barber and Lyon (1996) method does. The estimates of abnormal operating ROA generated using the first method (Healy, Pelepu, and Ruback's (1992)) are consistently more positive for all three groups of acquisitions. However, both methods suggest significant deterioration in operating ROA following acquisitions driven by stock overvaluation. This deterioration can be at least partly attributed to a significant drop in asset turnover—the productivity of the merged firm's assets.

⁶ Ghosh (2001) uses a similar method to examine post-merger operating performance for acquisitions. Using control firms matched on pre-merger performance and size, he finds no evidence that operating performance improves following acquisitions. He also shows that operating performance increases following cash acquisitions but decline for stock acquisitions.

Poor operating performance following OV acquisitions casts considerable doubt on the notion that these acquisitions generate large synergies. Even more puzzling, why would OV acquirers pay such high premiums to their targets when post-completion performance is so poor? What is the true motivation behind these transactions? Studies suggest that managerial incentives affect the magnitude of acquisition premiums. For example, Barger, Schlingemann, Stulz, and Zutter (2007) show that public acquirers pay significantly more than private acquirers in acquisitions. In that study, the difference in acquisition premiums between publicly-traded and privately-held acquirers cannot be explained by deal or target characteristics, but is related to the incentives of the acquiring firm managers. If the public acquirer has high managerial ownership, it pays a relatively lower acquisition premium. Therefore, we next turn to the issue of managerial incentives and compensation as a potential explanation for the high premiums and poor post-completion operating performance that we observe in OV acquisitions.

6. Changes in compensation and wealth of acquirer CEOs after mergers

Jensen (2005) proposes that equity overvaluation generates substantial agency costs, and suggests that ill-conceived acquisitions, driven by stock overvaluation, reflect these agency costs. Studies of CEO compensation suggest this is highly plausible. For instance, Grinstein and Hribar (2004) show that CEOs having more power to influence board decisions receive significantly larger M&A bonuses, but these bonuses are not related to deal performance. Based on 1,508 acquisitions during 1993-2000, Harford and Li (2007)

find that acquirer CEOs are significantly better off due to new stock and option grants following acquisitions. The addition of large new grants offset the wealth reduction of the CEO's existing portfolio even for poorly performing firms. Moreover, CEO's pay and wealth become insensitive to poor performance, but remain sensitive to good performance, after acquisitions.

We investigate whether the real driver of OV acquisitions is CEO enrichment rather than stockholder wealth creation (the latter of which seems unlikely given our results so far). We follow the empirical approach in Harford and Li (2007) and decompose CEO compensation into two components: cash payments (including annual salary and bonus compensation) and new grants of restricted stock and stock options. Portfolio value of equity measures the market value of CEO's holdings of stock and options at the end of the fiscal year. We compare these three variables (cash compensation, new grants, and portfolio value) in the fiscal year before the merger announcement (denoted by $ayr-1$) with their values in the fiscal year following the merger completion (denoted by $cyr+1$). CEO compensation data are obtained from Compustat's ExecuComp database. Like Harford and Li (2007), we require that the CEO be the same between $ayr-1$ and $cyr+1$ for a given firm. Our sample consists of 164 OV bidders, 122 NOV bidders, and 198 cash bidders with available compensation data. All dollar values are adjusted by CPI index to 2006 dollar for comparison over time, and are reported in thousands. Due to the severe positive skewness in the compensation data, we report medians.⁷

⁷ Results based on means do not alter our qualitative conclusions and are available from the authors by request.

Overall, acquirer CEOs enjoy an increase in their wealth after acquisitions. Of the three groups, CEOs in OV acquisitions are able to enjoy the largest increase in wealth despite having the poorest acquisition performance (high premiums, low or negative synergies). Compared to year $ayr-1$, the median CEO of an OV acquirer obtains an increase in cash pay of \$0.28 million, an increase in grants of \$0.96 million, and an increase in portfolio value of equity of \$2.70 million. However if the value of grants that the CEO obtains from the announcement year (ayr) to $cyr+1$ is deducted from the equity portfolio, the CEO realizes a loss of \$4.42 million.⁸ The median value of cumulative grants from the announcement year to $cyr+1$ is over \$10 million for the CEOs of OV acquisitions, compared to \$7.63 million for the CEOs of NOV acquisitions and \$5.84 million for the CEOs of cash acquisitions, which translate to 2.36%, 0.68%, and 1.89% of their deal value respectively.

In summary, acquirer CEOs in OV acquisitions substantially increase their total wealth via a large amount of new grants of stock and options. Although their deals perform poorly resulting in large stock price drops for the acquirer (affecting the value of the CEO's existing holdings in the company), the value addition due to new grants more than offsets the value loss on their existing portfolio of holdings in the acquirer. These results strongly suggest that agency costs might be the motivation for acquisitions by OV acquirers (Jensen (2005)) – their CEO's experience large increases in wealth despite the fact that value creation for shareholders is negligible (or, even worse, negative).

⁸ In a separate analysis, we control for CEO transactions during this period, including buying or selling stocks and exercising stock options. Due to the availability of insider trading data, the control severely reduces the number of observations but does not change our qualitative conclusions. The stock and option transaction data are from the Thomson Financial's database of insider trading. Tabulated results are available from the authors by request.

7. Conclusion

Equity overvaluation potentially drives managers of the overvalued firm to pursue acquisitions. If the acquisition is financed using the firm's overpriced equity, acquiring firms' existing shareholders might benefit from this transaction by being able to use their inflated stock to buy other firm's hard assets. In this study we show that the increase in the target's stock price over the bid period, and the decrease in acquirer stock price over the same period, often shrink or even eliminate the relative overvaluation of the acquirer to the target by the date of completion. This relative price movement is driven by the substantial premium paid by the acquirer to the target, the market's correction of acquirer stock overvaluation, and the lack of synergies of the deal itself. These findings cast substantial doubt on the notion that acquisitions by overvalued acquirers benefit acquirer shareholders.

We also find that acquirer CEOs increase their wealth considerably after acquisitions, especially in the sub-sample of acquirers that appear overvalued before the deal is announced. Although the drop in stock price and the poor performance of the deal decrease the value of CEO's holding of existing stock and options, the large amount of new stock and option grants more than offsets these losses. CEOs are clearly a beneficiary of acquisitions by overvalued acquirers, while acquirer shareholders are not. This evidence supports Jensen's (2005) agency costs hypothesis. Equity overvaluation generates agency costs for the firm, by making it more difficult, or even impossible, for managers to achieve the expected performance implied by the high level of stock price. This generates incentives for managers to pursue excessively risky investments – for example, ill-conceived

acquisitions that, ex-post, appear to destroy a considerable amount of wealth for all constituents other than the CEO herself.

References:

- Andrade, G., Mitchell, M., Stafford, E., 2001. New evidence and perspectives on mergers. *Journal of Economic Perspectives* 15, 103-120.
- Ang, J. S., Cheng, Y., 2006. Direct evidence on the market-driven acquisition theory. *Journal of Financial Research* 29, 199-216.
- Barber, B. M., Lyon, J. D., 1997. Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. *Journal of Financial Economics* 43, 341-372.
- Bargeron, L. L., Schlingemann, F. P., Stulz, R. M., Zutter, C. J., 2007. Why do private acquirers pay so little compared to public acquirers? *Journal of Financial Economics*, forthcoming.
- Bouwman, C. H. S., Fuller, K., Nain, A. S., 2007. Market valuation and acquisition quality: empirical evidence. *Review of Financial Studies*, forthcoming.
- Dong, M., Hirshleifer, D., Richardson, S., Teoh, S. H., 2006. Does investor misvaluation drive the takeover market? *Journal of Finance* 61, 725-762.
- Edmans, A., Goldstein, I., Jiang, W., 2008. Takeover activity and target valuation: evidence of feedback in financial markets. Working paper, University of Pennsylvania and Columbia University.
- Fama, E. F., French, K. R., 1997. Industry costs of equity. *Journal of Financial Economics* 43, 153-193.
- Ghosh, A., 2001. Does operating performance really improve following corporate acquisitions? *Journal of Corporate Finance* 7, 151-178.
- Grinstein, Y., Hribar, P., 2004. CEO compensation and incentives: evidence from M&A bonuses. *Journal of Financial Economics* 73, 119-143.
- Gu, F., Lev, B., 2008. Overpriced shares, ill-advised acquisitions, and goodwill impairment. Working paper, SUNY-Buffalo and New York University.
- Harford, J., Li, K., 2007. Decoupling CEO wealth and firm performance: the case of acquiring CEOs. *Journal of Finance* 62, 917-949.
- Healy, P. M., Palepu, K. G., Ruback, R. S., 1992. Does corporate performance improve after mergers? *Journal of Financial Economics* 31, 135-175.
- Hertzel, M. G., Li, Z., 2007. Behavioral and rational explanations of stock price performance around SEOs: evidence from a decomposition of market-to-book ratios. Working paper, Arizona State University.
- Jensen, M. C., 2005. Agency costs of overvalued equity. *Financial Management* 34, 5-19.

- Jensen, M. C., Ruback, R. S., 1983. The market for corporate control: the scientific evidence. *Journal of Financial Economics* 11, 5-50.
- Ma, Q., Whidbee, D. A., Zhang, W., 2008. Value, valuation, and the long-run performance of merged firms. Working paper, Washington State University.
- Masulis, R. W., Wang, C., Xie, F., 2007. Corporate governance and acquirer returns. *Journal of Finance* 62, 1851 – 1889.
- Mitchell, M. L., Stafford, E., 2000. Managerial decisions and long-term stock price performance. *Journal of Business* 73, 287-329.
- Moeller, S. B., Schlingemann, F. P., Stulz, R. M., 2005. Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave. *Journal of Finance* 60, 757-782.
- Rhodes-Kropf, M., Viswanathan, S., 2004. Market valuation and merger waves. *Journal of Finance* 59, 2685-2718.
- Rhodes-Kropf, M., Robinson, D. T., Viswanathan, S., 2005. Valuation waves and merger activity: the empirical evidence. *Journal of Financial Economics* 77, 561-603.
- Schwert, G. W., 1996. Markup pricing in mergers and acquisitions. *Journal of Financial Economics* 41, 153-192.
- Shleifer, A., Vishny, R. W., 2003. Stock market driven acquisitions. *Journal of Financial Economics* 70, 295-311.
- Savor, P., Lu, Q., 2006. Do stock mergers create value for acquirers? Forthcoming, *Journal of Finance*.
- Song, W., 2007. Does overvaluation lead to bad mergers? Working paper, University of Cincinnati.

Table 1: Distribution of mergers and acquisitions: 1985-2006

The sample consists of 1,367 stock-financed, 692 cash-financed, and 990 mixed-financed mergers and acquisitions that are announced and completed during 1985-2006 in the U.S. market. The table presents the sample distribution by the calendar year of acquisition announcement. The following criteria are used to select the sample from the SDC Domestic M&A database: (1) Both the acquirer and target are public firms listed on the NYSE, the AMEX, or the Nasdaq; (2) The deal value is at least \$10 million and at least 1% of the acquirer's market value of equity; (3) The acquirer controls less than 50% of the target's shares prior to the announcement and owns 100% of the target's shares after the transaction; (4) Both the acquirer and the target have positive book value of equity and data items in the Compustat and CRSP merged database to compute the market-to-book ratio of assets at the fiscal year end before the announcement. The relative size of the deal is calculated as the ratio of the deal value to the acquirer's existing market value of equity. The median across all the completed deals in each year is reported.

Year	N	Stock	Cash	Mixed	Relative Size
1985	80	26	34	20	0.38
1986	91	15	51	25	0.31
1987	83	23	33	27	0.27
1988	84	21	41	22	0.20
1989	60	19	23	18	0.38
1990	37	16	9	12	0.24
1991	51	28	4	19	0.38
1992	48	28	6	14	0.25
1993	67	31	17	19	0.29
1994	165	96	35	34	0.17
1995	211	131	39	41	0.26
1996	217	110	33	74	0.29
1997	307	174	41	92	0.26
1998	305	177	40	88	0.29
1999	278	130	48	100	0.21
2000	223	104	38	81	0.23
2001	177	82	24	71	0.22
2002	94	27	27	40	0.15
2003	143	46	34	63	0.23
2004	149	45	45	59	0.23
2005	108	25	30	53	0.21
2006	71	13	40	18	0.23
Total	3,049	1,367	692	990	0.24

Table 2: Acquirer and target firm characteristics before the merger

The sample consists of 1,367 stock acquisitions and 692 cash acquisitions during 1985-2006. This table reports the median of the following firm characteristic and performance variables at the fiscal yearend before the merger announcement: assets (Compustat data item 6), sales (data12), market-to-book value of assets $((\text{data24} * \text{data25} + \text{data6} - \text{data60}) / \text{data6})$, price-to-earning ratio $(\text{data24} / \text{data58})$, book leverage $((\text{data9} + \text{data34}) / \text{data6})$, operating ROA $(\text{data13} / \text{average total assets of fiscal year } t-1)$, asset turnover $(\text{data13} / \text{data12})$, sales growth from fiscal year t-2 to fiscal year t-1, and the market-adjusted 12-month stock return (the buy-and-hold return during the 12 months prior to the announcement divided by the contemporaneous CRSP valued-weighted market return). Assets and Sales are adjusted by CPI index to dollars of 2006.

Variables	Stock Acquisitions		Cash Acquisitions	
	Bidder	Target	Bidder	Target
Assets (\$ million)	1,898	327	2,239	185
Sales (\$ million)	668	105	1,545	155
M/B assets	1.40	1.22	1.41	1.25
P/E ratio	16.3	13.5	15.0	12.2
Book leverage	0.16	0.11	0.19	0.13
Operating ROA	0.11	0.11	0.14	0.12
Asset turnover	0.49	0.56	0.84	1.08
Sales growth	0.14	0.10	0.09	0.06
Market-adjusted 12-month return	0.08	-0.02	-0.01	-0.02

Table 3: Overvaluation of merging firms before the announcement

This table presents two measures of overvaluation for the merging firms during the period of 1985-2006. The first one is derived under the method proposed by Rhodes-Kropf, Robinson, and Viswanathan (2005). The market-to-book equity ratio is decomposed into two components: misvaluation and long-run investment opportunities, $Ln(M/B) = Ln(M/V) + Ln(V/B)$. The second measure, the industry-median-adjusted overvaluation, is calculated as $Ind-adj\ OV = ((M/B)_{it} - (M/B)_{jt}) / (M/B)_{it}$, where $(M/B)_{it}$ is the market-to-book equity ratio of stock i at t , and $(M/B)_{jt}$ is the median market-to-book equity ratio of industry j , to which stock i belongs at t . A positive value suggests overvaluation and a negative value suggests undervaluation. The sample consists of 1,339 stock mergers and 664 cash mergers. The table reports the mean values for $Ln(M/B)$, $Ln(M/V)$ and $Ln(V/B)$ and the median for $Ind-adj\ OV$ due to its significant skewness. The last three columns report the differences in valuation ratios between groups. Statistical significance is tested by t -test for the difference in means and by Wilcoxon sign rank test for the difference in medians. A statistical significance at the 1% level is marked by *.

Valuation component	Bidders	Stock bidders	Cash bidders	Targets	Targets of stock bidders	Targets of cash bidders	Stock bidders – Cash bidders	Stock bidders – Stock targets	Cash bidders – Cash targets
$Ln(M/B)$	1.03	1.17	0.78	0.75	0.83	0.60	0.39*	0.34*	0.18*
$Ln(M/V)$	0.49	0.58	0.32	0.14	0.19	0.05	0.26*	0.39*	0.27*
$Ln(V/B)$	0.54	0.59	0.46	0.61	0.64	0.56	0.13*	-0.05*	-0.10*
$Ind-adj\ OV$	0.30	0.36	0.18	0.10	0.15	-0.02	0.18*	0.19*	0.20*

Table 4: Relative overvaluation of stock-financed merging firms

This table presents the relative overvaluation between the bidder and the target one month before the merger announcement and on the date of merger completion. It also shows the change in valuation ratios during the acquisition process for the two merging firms. Median values are reported in Panel B due to the skewness of *Ind-adj OV*.

Panel A: RKRK's measure of overvaluation – $Ln(M/V)$

	Bidder	Target	Diff (Bidder – Target) (<i>p</i> -value)
Before the merger announcement	0.58	0.19	0.39 (<0.001)
On the date of merger completion	0.54	0.48	0.06 (0.033)
Diff (After – Before) (<i>p</i> -value)	-0.04 (<0.001)	0.29 (<0.001)	

Panel B: Industry-adjusted measure of overvaluation – *Ind-adj OV*

	Bidder	Target	Diff (Bidder – Target) (<i>p</i> -value)
Before the merger announcement	0.36	0.15	0.19 (<0.001)
On the date of merger completion	0.35	0.37	0.02 (0.036)
Diff (After – Before) (<i>p</i> -value)	-0.01 (0.004)	0.17 (<0.001)	

Table 5: Announcement period returns for acquirers and acquisition premium

This table presents acquiring firms' three-day [-1, +1] and full-period [-20, close], and target firms' [-42, close] cumulative abnormal returns (in %) relative to the acquisition announcement day. Target firms' CAR [-42, close] is interpreted as acquisition premium according to Schwert (1996). Close date is the completion date of the merger. Expected returns are estimated by the two-parameter market model where the CRSP valued-weighted index is regarded as the market portfolio. The parameters are estimated based on daily stock returns from trading days -253 to -45. The p -values in parentheses for the mean and median CARs are generated by the t -test and the Wilcoxon signed rank test respectively. Differences in mean and median CARs between groups are tested respectively by the two-sample t -test and Wilcoxon-Mann-Whitney test. The sample includes 446 stock mergers driven by stock overvaluation (OV), 446 stock mergers not driven by stock overvaluation (NOV), and 664 cash mergers during 1985-2006. The classification of acquisition groups are based on the relative overvaluation measures derived from the RKR method for Panel A and the industry-adjusted OV for Panel B.

Panel A: Acquisition group classification based on the RKR measure

	OV	NOV	Cash mergers	Diff (OV – NOV)	Diff (OV– Cash mergers)
<i>Three-day announcement abnormal returns [-1, +1]</i>					
Mean (p -value)	-3.81 (<0.001)	-2.47 (<0.001)	0.60 (0.023)	-1.34 (0.029)	-4.41 (<0.001)
Median (p -value)	-3.36 (<0.001)	-2.22 (<0.001)	0.22 (0.129)	-1.14 (0.045)	-3.58 (<0.001)
<i>Full-period abnormal returns [-20, close]</i>					
Mean (p -value)	-16.99 (<0.001)	-6.15 (0.005)	0.04 (0.970)	-10.84 (0.001)	-17.03 (<0.001)
Median (p -value)	-11.03 (<0.001)	-3.79 (<0.001)	-1.13 (0.619)	-7.24 (<0.001)	-9.90 (<0.001)
<i>Acquisition premium [-42, close]</i>					
Mean (p -value)	35.33 (<0.001)	19.87 (<0.001)	38.08 (<0.001)	15.46 (0.001)	-2.75 (0.398)
Median (p -value)	30.06 (<0.001)	17.12 (<0.001)	33.74 (<0.001)	12.94 (<0.001)	-3.68 (0.316)

Panel B: Acquisition group classification based on industry-adjusted OV

	OV	NOV	Cash mergers	Diff (OV – NOV)	Diff (OV – Cash mergers)
<i>Three-day announcement abnormal returns [-1, +1]</i>					
Mean (<i>p</i> -value)	-3.53 (<0.001)	-2.25 (<0.001)	0.59 (0.021)	-1.28 (0.033)	-4.12 (<0.001)
Median (<i>p</i> -value)	-3.20 (<0.001)	-2.03 (<0.001)	0.22 (0.156)	-1.17 (0.034)	-3.42 (<0.001)
<i>Full-period abnormal returns [-20, close]</i>					
Mean (<i>p</i> -value)	-14.55 (<0.001)	-6.69 (0.003)	0.20 (0.845)	-7.86 (0.009)	-14.75 (<0.001)
Median (<i>p</i> -value)	-11.06 (<0.001)	-2.62 (0.005)	-1.10 (0.654)	-8.44 (<0.001)	-9.96 (<0.001)
<i>Acquisition premium [-42, close]</i>					
Mean (<i>p</i> -value)	41.70 (<0.001)	15.38 (<0.001)	37.63 (0.521)	26.32 (0.001)	4.07 (0.194)
Median (<i>p</i> -value)	33.89 (<0.001)	15.45 (<0.001)	33.15 (0.307)	18.44 (<0.001)	0.74 (0.542)

Table 6: Can target and deal characteristics explain the higher premium paid by overvalued acquirers?

The dependent variable is the acquisition premium (target firms' CAR[-42, close]). OV is a dummy variable that equals one if the acquisition is in the OV group and zero otherwise. The market value of equity (MVE) is from CRSP calculated as the CPI-adjusted 2006 dollars price of the stock times the number of shares outstanding 63 days prior to the announcement date. Debt-to-assets (DEBT) is calculated as the book value of debt divided by the sum of the book value of debt and the market value of equity. Tobin's q (Q) is defined as the firm market value divided by the book value of assets. Operating cash flow (OCF) is defined as operating income divided by book value of assets. ARET_12 is the market-adjusted buy-and-hold return from 17 months to 6 months before announcement. STDEV is defined as the standard deviation of the raw returns from trading day -253 to trading day -80 relative to the announcement date. STOCKLIQ is the measure of stock illiquidity of Amihud (2002). TENDER, TOEHOLD, HOSTILE, BIDLOCK, and TARTERM are indicator variables that equal one if the deal respectively is a tender offer, involves a bidder that holds 0.5% or more of the target stock prior to the announcement, is hostile, includes bidder lockup provisions, includes target termination fees. COMPETE is an indicator variable equal to one if more than one firm bid for the target. The first regression examines only stock mergers and the second regression includes both stock and cash mergers.

Variable	Stock mergers		Stock and cash mergers	
	Parameter Estimate	Pr > t	Parameter Estimate	Pr > t
OV	0.1537	<.0001	0.1226	<.0001
Ln(MVE)	-0.0596	<.0001	-0.0522	<.0001
Q	0.0055	0.5748	0.0001	0.9842
DEBT	0.0623	0.4663	-0.0309	0.5806
OCF	0.1351	0.0723	0.0622	0.2973
ARET_12	-0.1337	<.0001	-0.1526	<.0001
HOSTILE	0.5134	0.0408	0.1652	0.0495
COMPETE	-0.0307	0.7634	0.0285	0.5977
TENDER	0.0871	0.6179	0.1506	<.0001
TARTERM	0.0691	0.0593	0.0557	0.0265
TOEHOLD	-0.1832	0.0425	-0.0286	0.5571
STDEV	-0.6133	0.5597	-0.1242	0.8689
BIDLOCK	-0.0105	0.7898	-0.0240	0.4064
STOCKLIQ	-0.0023	0.2536	-0.0026	0.1180
No. of Obs.	892		1555	
Adj. R ²	0.131		0.134	

Table 7: Acquisition synergies derived from stock returns

Synergies are calculated as the sum of acquirer and target's market value of equity prior to the announcement times their respective full-period CAR divided by the market value of equity of the merged firm at the month end of merger completion. To remove the effects of outliers, the value of synergies is trimmed at 1% and 99% for each group of mergers. The classification of acquisition groups are based on the relative overvaluation measures derived from the RKR method. The last row shows the percentage of diversifying mergers for each acquisition group. A merger is classified as a diversifying deal if the bidder and the target have different two-digit SIC codes. Chi-square test is used to test the difference in percentage.

Acquisition Synergies	OV	NOV	Cash mergers	Diff (OV – NOV)	Diff (OV– Cash mergers)
Mean (<i>p</i> -value)	-19.5 (<0.001)	-10.8 (<0.001)	2.8 (0.008)	-8.7 (0.026)	-22.3 (0.010)
Median (<i>p</i> -value)	-5.7 (<0.001)	-0.1 (0.042)	2.5 (<0.001)	-5.6 (<0.005)	-8.2 (<0.001)
Diversifying deals (%) (<i>p</i> -value)	35.0	28.3	43.5	6.7 (0.031)	-8.5 (0.004)

Table 8: Operating performance of mergers

Panel A reports the median operating performance of merging firms from fiscal year -3 to +5, where year 0 is the fiscal year that the merger is completed. Operating ROA is calculated as operating income before depreciation (Compustat data item 13) scaled by the market value of assets at the beginning of the fiscal year. The market value of assets is defined as the market value of equity, plus book values of preferred stock and debt net of cash. The operating performance before the merger is a weighted-average performance of the bidder and the target, with the weights being their relative market value of assets at the beginning of the fiscal year. Asset turnover is calculated as sales divided by the market value of assets. The classification of acquisition groups are based on the relative overvaluation measures derived from the RKR method. Panel B reports abnormal changes in operating performance after mergers, respectively based on Healy, Palepu, and Ruback's (1992) method and the size and pre-merger performance match method suggested by Barber and Lyon (1996). Using the Healy, Palepu, and Ruback (1992) method, we match the operating performance of merging firms to their weighted-average industry median performance and calculate the abnormal performance. We then run a cross-sectional regression of the median post-merger abnormal performance on the median pre-merger abnormal performance. The regression intercept is estimated as the change in abnormal performance due to the mergers. Using the Barber and Lyon (1996) method, each merging firm is matched to a control firm that has total assets of 50%-150% and the closest operating ROA of the merging firm in the year before the merger. Control firms exist for at least three years and do not conduct SEOs or acquisitions in the following five years. The benchmark performance for the merging firm is the weighted-average performance of the control firms.

Panel A: Median operating performance

Year relative to merger	OV		NOV		Cash mergers	
	Operating ROA	Asset Turnover	Operating ROA	Asset Turnover	Operating ROA	Asset Turnover
-3	11.81	63.97	14.56	66.00	15.35	116.60
-2	11.14	57.98	13.43	61.91	15.22	109.78
-1	9.93	46.89	11.58	55.72	15.03	104.57
0	9.70	44.75	12.86	59.34	16.29	117.99
1	8.24	39.50	9.79	47.76	13.84	95.20
2	7.85	38.42	9.55	42.99	12.85	97.43
3	8.39	37.41	9.44	43.83	12.73	93.70
4	9.07	41.62	8.75	39.87	12.34	89.78
5	8.94	43.00	9.46	36.02	12.76	94.76

Panel B: Abnormal change in operating performance after mergers

	OV	NOV	Cash mergers
<i>Healy, Palepu, and Ruback (1992)</i>			
Operating ROA	-0.65 (0.037)	-0.08 (0.860)	1.36 (<0.001)
Asset Turnover	-10.35 (<0.001)	-2.61 (0.385)	-0.09 (0.980)
<i>Barber and Lyon (1996)</i>			
Operating ROA	-1.73 (0.004)	-0.77 (0.037)	0.63 (0.610)
Asset Turnover	-10.25 (0.003)	-7.52 (0.002)	-1.93 (0.662)

Table 9: Changes in CEO compensation and wealth after acquisitions

The sample consists of 164 OV acquisitions, 122 NOV acquisitions and 198 cash acquisitions with available CEO compensation data from Compustat's ExecuComp. We require that CEOs be the same between the fiscal year before the acquisition announcement (ayr-1) and the fiscal year after the merger completion (cyr+1). Cash payment is the annual salary and bonus compensation. Grants are the total value of all restricted stock and options granted during the fiscal year. Cumulative grants are the value of grants from year ayr to year cyr+1. Portfolio value of equity is the market value of the CEO's existing holding of stocks and options at the fiscal year end. The last rows present the changes of value deflated by the acquisition deal value. Median values are reported. Dollar values are adjusted to 2006 dollars and are in thousands.

	OV	NOV	Cash mergers
<i>Year ayr-1</i>			
Cash payment	1,432	1,392	1,620
Grants	2,565	1,566	2,488
Portfolio value of equity	12,574	9,752	7,260
<i>Year cyr+1</i>			
Cash payment	1,626	1,544	1,805
Grants	4,371	3,172	2,831
Portfolio value of equity	15,123	11,500	10,894
<i>Change from year ayr-1 to cyr+1</i>			
Change in cash payment	281	271	276
Change in grants	956	676	25
Change in portfolio value	2,698	1,873	2,471
Cumulative grants	10,912	7,633	5,842
Change in portfolio value net of cumulative grants	-4,419	-1,686	-2,158
<i>Deflate changes of value by deal value (in %)</i>			
Change in cash payment	0.05	0.02	0.07
Change in grants	0.22	0.05	0.003
Change in portfolio value	0.25	0.15	0.36
Cumulative grants	2.36	0.68	1.89
Change in portfolio value net of cumulative grants	-0.71	-0.20	-0.42