

It Takes Two to Tango: Overpayment and Value Destruction in M&A Deals

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Abstract

This study adds to the literature demonstrating the adverse market reaction to acquisitions by overconfident CEOs (e.g., Malmendier and Tate, 2008). In particular, it explores the parallel role played by overconfident *target* firm CEOs in explaining the premium paid, and value destruction in such deals, and, most importantly, the “perfect storm” of the interaction between the two overconfident parties. Our results indicate that overconfident CEOs tend to pay a higher premium in acquisitions than their non-overconfident counterparts. However, the premium paid when both acquiring firm and target firm CEOs are overconfident is between 7% to 9% higher than if neither, or only one, side of the deal manifests such behavioral bias. We also show how the adverse market reaction to deals by overconfident acquirers is augmented when target firm CEOs are similarly prone to this judgmental bias. In particular, we report how when *both* acquiring and target firm CEO overconfidence exist concurrently, the market marks down the acquirer’s share price on bid announcement by around 11% to 12% compared with deals where neither, or only one, party is overconfident. It is the *danse macabre* of overconfident acquirer and target firm CEOs that seems to lead to the greatest overpayment and loss of shareholder value in takeovers. Our results suggest that the interaction between acquirer and target firm overconfidence may provide a possible explanation for the overpayment problem, well rehearsed in the finance literature, and, in particular, help to explain the most value destructive deals.

Keywords: CEO overconfidence, Bid premium, Market reaction, Acquirer, Target

JEL Classification: G14, G34

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1. Introduction

Many firms experience dramatic value destruction during and after M&A transactions. A good example is AT&T's acquisition of NCR for \$7.5 billion in 1991, a business with market value of only \$3.3 billion before the start of the bid process. AT&T's opening offer in November 1990 of \$85 per share, a premium of 80% on NCR's pre-bid stock price of \$47 was quickly rejected. AT&T increased the price to \$90 per share; NCR rejected this again with its CEO, Charles E. (Chuck) Exley Jr., in return demanding a price of \$125.¹ In March 1991, AT&T announced that it would consider raising its offer to \$100 per share if NCR would negotiate a merger agreement. Finally, the following month, AT&T offered \$111 per share, which price NCR accepted.

Although AT&T had already lost more than \$2 billion on its own computer operations in the previous few years (Keller, 1990), Robert Allen, its CEO, nonetheless exuded hubris throughout the bid process (Shefrin, 2002: 229; 233).² However, Chuck Exley also seemed to have a very strong belief in his own abilities both in holding out for \$125, and thereby risking the deal, and believing NCR would be able to remain independent.³ NCR's forecasts of revenues and net income were equally optimistic, despite lackluster 1989 and 1990 results, with respective growth rates of 10% and 16% envisaged each year through to 2000 (Shefrin, 2000: 231-2).⁴ In fact, AT&T shareholders lost between \$3.9 and \$6.5 billion in market value during the negotiations, and upon completion of the transaction AT&T's overpayment for NCR was between \$60 and \$101 per share

¹ "I frankly don't think a deal makes sense at any price, but even though I hate the idea of a merger, I'm obliged to go along at some price. And \$125 a share is that price... And I don't mean \$124.50. I mean \$125." (PR Newswire, 1990)

² Allen publicly acknowledged he knew that no similar high-technology merger had been successful, ' "it's going to be tough" not to repeat history', and the high risk attached to his strategy "Taking the easy, less-risky way is not satisfactory because it won't make us successful" (Lazzareschi, 1991). However, he was "...absolutely confident that together AT&T and NCR will achieve a level of growth and success that we could not achieve separately. Ours will be a future of promises fulfilled..." (PR Newswire, 1991).

³ "The experts say the statistics are about nine-to-one against our being able to (remain an independent company)... I think we're going to be one of the small percentage that succeeds" (Zipper, 1990).

⁴ Revenues in 2000 were forecast to be no less than \$16.8 billion compared with \$6.3 billion in 1990, and net income \$1.6 billion compared with \$370 million.

(Lys and Vincent, 1995). Abnormal returns directly associated with the acquisition were -16% and -120% to AT&T and NCR shareholders respectively (Lys and Vincent, 1995). By the time NCR was “spun off” in December 1996, AT&T had lost a further \$7 billion in running the company (Shefrin, 2002: 233).

The AT&T/NCR case is a good example of where both acquirer and target CEOs manifest a high level of hubris (overconfidence). Exley had a strong belief in his ability to turn around NCR despite its poor recent performance (Keller, 1990), and demanded a very high premium (around 160% of the pre-bid share price) before being prepared to enter into negotiations thereby threatening a deal NCR shareholders very much wanted (Smith, Keller and Wilke, 1990). On the other hand, Allen appeared to have absolute confidence in his ability to extract value from the deal despite the lack of success of similar recent acquisitions, the market’s strong negative reaction, and extensive analyst criticism; in fact he seemed prepared to buy NCR at almost any price. It appears that the joint “overconfidence” of AT&T’s and NCR’s CEOs played a major role in the massive overpayment and value destruction that occurred.

The role managerial overconfidence plays in firm decisions is well addressed in the corporate finance literature. For example, Malmendier and Tate (2005a) show that CEO overconfidence has a significant impact on corporate investment policy in Forbes 500 firms. In particular, their results suggest that overconfident CEOs with abundant internal funds overinvest. Ben-David, Graham and Harvey (2007) also investigate the effect of managerial overconfidence in corporate decision-making, and show that firms with overconfident CFOs are characterized by more investment, higher debt levels (and more long-term than short-term debt), lower discount rate used to value cash flows, lower likelihood of paying dividends, and higher likelihood of repurchasing shares.

Another strand of studies explores the role of CEO overconfidence in a more specific context – M&A decision making. Drawing on Roll’s (1986) hubris hypothesis, Malmendier and Tate (2008) demonstrate how CEOs can overestimate their abilities to create value. In particular, they illustrate how overconfident CEOs are associated with an increased likelihood of conducting M&A transactions, and also poorer deals for their shareholders as measured by bid announcement returns. Related findings are provided by Doukas and Petmezas (2007), who show that announcement returns are lower for mergers or acquisitions conducted by overconfident bidders using a large sample of UK private firm

acquisitions. Similarly, Brown and Sarma (2007) suggest that CEO overconfidence can help explain M&A decision-making using a sample of Australian acquisitions. In sum, overconfidence proves to be an alternative to traditional explanations for M&A activity.^{5, 6}

However, the M&A literature on overconfidence almost exclusively focuses on the key role of the acquiring firm's CEO in the merger process, whereas there are always two parties involved in any deal, the acquirer and the acquiree, as illustrated in the AT&T/NCR case described above. Malmendier and Tate (2003) highlight the need also to explore the potential role of target manager overconfidence in explaining the large premiums in merger deals. Nonetheless, empirical studies on this are seemingly lacking. In addition, research to date into the role CEO overconfidence plays in M&A deals mainly focuses on the adverse impact of acquirer overconfidence on firm value in terms of the negative market reaction to bids by such CEOs.. Empirical studies explicitly examining the impact of CEO overconfidence on the acquisition premium are also limited.⁷ Drawing on a large sample of acquisitions, our paper seeks to extend the literature by formally exploring the role of target firm CEO overconfidence and, most importantly, its interaction with acquirer CEO overconfidence, in explaining the merger terms. In particular, we examine the impact on bid premium, and market reaction to the deal, of the “perfect storm” when *both* parties (acquirer and target) are overconfident concurrently.

Specifically, we explore the link between acquirer and target CEO overconfidence in explaining the large premia observed. As argued by Malmendier and Tate (2008), overconfident CEOs overestimate their abilities to create value, and thus the returns they can generate through acquiring other firms. By the same token, overconfident target firm CEOs similarly overestimate their ability to create value, and consequently believe outside investors undervalue their firms. As such, they consider their firms warrant a large

⁵ Whereas Aktas, de Bodt, Bollaert, and Roll (2010) seek to explore the influence of CEO narcissism on takeover behavior in 136 deals using personal pronoun usage to measure narcissism, their empirical results are mixed. In contrast to Malmendier and Tate (2008) working with CEO overconfidence, for example, they do not find any relationship between acquirer narcissism and deal announcement returns.

⁶ In a parallel study, Schneider and Spalt (2010) argue that value destruction in M&A deals reflects gambling attitudes among managers. They show that offer price premium is higher, and acquiring firm announcement return is lower, in deals involving target firms with lottery features (high return skewness, high volatility, and low price).

⁷ However, Hayward and Hambrick (1997) explore the role of CEO hubris in explaining the size of the premium paid for acquisitions; and report a positive link between acquiring firm CEO hubris, and acquisition premium. Nonetheless, this study only considers acquiring firm CEO hubris. Aktas et al. (2010) seek to explain bid premium in terms of CEO narcissism, but find no relationship in the case of the acquirer/acquirer, although target firm CEO narcissism increases the bid premium..

premium over their market value. On this basis, the price demanded by an overconfident CEO of an acquisition target will be higher than in the case of a more “realistic”/non-overconfident CEO. In response, we would expect an overconfident acquiring firm’s CEO to be more willing to pay above “fair” value than his counterpart who has a less overweening belief in his/her abilities to extract exceptional shareholder value from the acquisition. Based on this argument, we hypothesize that the premium paid in mergers will be increasing in acquirer CEO overconfidence, although not necessarily in the case of target CEO overconfidence where his/her ability to achieve a high price depends on the acquirer’s willingness to be a “dancing partner”. Thus, an important focus of our paper is on the impact of the interaction between acquirer and target firm CEO overconfidence on the bid premium paid. Our empirical results clearly support our predictions.

In parallel, we would expect the market to mark down the value of the acquiring firm on deal announcement, not only if the acquiring firm’s CEO is overconfident, but also now if the target firm CEO is overconfident, although the impact in this case may be less strong. This could possibly reflect his/her weaker bargaining position relative to that of the CEO of the acquirer, and/or the likelihood of longer term value destruction being ameliorated by the likely departure of the overconfident target firm CEO after completion of the deal.⁸ Again, more importantly, we suggest that if both parties overestimate their abilities to manage the assets of the target, then the market reaction will be more negative than if one (or neither) CEO is overconfident about their abilities to generate shareholder value. Again, we find evidence to support these expectations. As such, we conclude that the “St. Vitus’ Dance” between overconfident acquirer CEO and overconfident target CEO, in particular, can be an important factor in explaining value destruction in M&A deals. It does take two to tango!

In particular, using a large sample of 2,130 firms across the full size spectrum from 1993-2005, we seek to answer the following two related research questions: (i) can CEO overconfidence, both in the case of the acquiring firm, and the target, help explain the acquisition premium and, by extension, the well-known overpayment problem (Roll, 1986; Hayward and Hambrick, 1997)?, and (ii) what impact does acquiring firm CEO and target firm CEO overconfidence have on bid announcement returns? Importantly, we explore the

⁸ For example, Martin and McConnell (1991) show that top manager turnover in acquired firms in the two years following their takeover is over 60%.

incremental interaction impact of joint acquirer and target CEO overconfidence on the size of the merger premium, and market reaction to the deal.

First, we provide evidence that overconfident CEOs pay more than non-overconfident ones in merger deals. On the other hand, overconfident target firm CEOs do not appear able to achieve a significantly higher bid premium on average. However, much more interestingly, the joint effect of acquirer and target firm CEO overconfidence is to raise the bid premium greatly. Specifically, we find the premium paid is between 2.3% and 4.3% higher in the case of an overconfident acquirer than with one not similarly biased, although overconfident target CEOs are not associated with size of premium at conventional significance levels. However, much more importantly, the incremental bid premium interaction effect is between 6.9% and 9.1% when both acquirer *and* target are overconfident compared with when neither are, or only the acquirer *or* target CEO is overconfident. Our results thus contribute towards providing a potential explanation for the well-known overpayment problem discussed in the literature.

We also show that not only acquiring firm CEO, as in Malmendier and Tate (2008), but also, now, target firm CEO overconfidence has a significant impact on merger announcement returns. We find that deals conducted by overconfident acquirer CEOs significantly underperform those by non-overconfident CEOs in the 3-day event window around the deal announcement date by between 55 basis points and 120 basis points. In parallel, deals involving overconfident target firm CEOs significantly underperform those without overconfident target firm CEOs by between 5 basis points and 63 basis points. However, again much more importantly, we find the incremental effect, i.e., when *both* acquiring firm and target firm CEO overconfidence exist concurrently, gives rise to an additional mean 3-day event window cumulative abnormal return of between -10.7% and -12.1%. As such, it is the *interaction* between acquirer and acquiree overconfidence that plays an even more important role than that of either party alone in explaining the potential loss of shareholder value in merger deals.

Our paper contributes to the literature in a number of ways. To the best of our knowledge, it is the first empirical study to examine in detail the impact of CEO overconfidence on bid premium. In particular, we show that the premium is (i) increasing in acquirer overconfidence, (ii) not significantly associated with target firm CEO overconfidence, but (iii) dramatically higher in the interaction between the two. On this

basis our results suggest that CEO overconfidence may provide a plausible explanation for the overbidding problem in mergers. Second, our results demonstrate the importance of considering parallel *target* firm CEO overconfidence when exploring the role CEO judgment plays in merger deals and its impact on shareholder value. Specifically, we demonstrate the market reaction to the bid announcement is more adverse with (i) acquirer CEO overconfidence, (ii) *target* CEO overconfidence, and (iii) when both parties are overconfident, in which case the market reaction is very negative. Our study thus also highlights the key role the interaction between acquiring firm and target firm CEO overconfidence can play in explaining potential value destruction in acquisitions. In other words, it is not only the hubris of each party, but also the “dance” between them (overconfident acquirer CEO and overconfident target CEO) that helps explain acquirer losses in such deals. Finally, our results provide new empirical evidence on the impact of acquiring firm CEO overconfidence on firm M&A announcement performance based on a larger sample of firms across the full size spectrum over a recent period, including the 1999-2001 merger wave.

The remainder of this paper is organized as follows. Section 2 develops our research propositions. Section 3 details our two CEO overconfidence measures. Section 4 describes the data and research method. The data subsection details the sample formation process and the data source. The method subsection introduces our regression models and variables. Section 5 provides descriptive statistics. Section 6 presents, and discusses our empirical results. Section 7 concludes.

2. Hypotheses

We study the impact of an important behavioral bias – overconfidence – on merger premia and shareholder returns in M&A deals.. The concept of overconfidence is based on a set of psychological foundations. As Malmendier and Tate (2008) point out, people tend to have too much confidence in their own ability or judgment, and therefore tend to overestimate the chance of achieving desirable results (Langer, 1975). This is especially the case when they tend to compare or compete with others (Weinstein and Klein, 2002). An individual often believes himself/herself to be above average (the better than average effect) and is more likely to attribute successful outcomes to his/her actions, and attribute failures

to other factors (self-attribution bias) which can reinforce the degree of decision-maker overconfidence.⁹ In addition, people tend to be more overconfident about the things they feel they can control (Weinstein and Klein, 2002). In line with this, we define managerial “overconfidence” as an excessive belief in the ability to achieve positive outcomes, and being better than average.¹⁰

2.1. Acquirer and target CEO overconfidence and acquisition premium

A rich strand in the literature suggests that acquiring firm CEO overconfidence plays an important role in the context of mergers and acquisitions. For example, Roll (1986) proposes a “hubris hypothesis” for takeovers, to provide another possible explanation for M&A activity complementary to such conventional arguments as synergy, market expansion, and industry shock, etc. He argues that the hubris of individual decision makers in bidding firms may lead to overbidding. Fanto (2001), in his psychologically-oriented empirical study of recent mega-mergers, reports strong managerial over-optimism in acquiring firms in 11 deals.¹¹ He proposes that the manager may overestimate the value of a potential merger because he/she believes that his/her leadership or management skills are “better than average”.

Indeed, many studies show that acquiring firms pay high acquisition premiums. For example, the average acquisition premium paid is as high as 30% to 50% of target firm market value in the United States (e.g., Walkling and Edmister, 1985; Varaiya and Ferris, 1987; Hayward and Hambrick, 1997). The extant literature in both strategic management and finance provides a number of potential explanations. One argument is that the acquiring firm is willing to pay a high premium because of the expected synergy arising from the deal. However, studies generally fail to detect real synergies that could justify the high premiums often paid (e.g., Nielsen and Melicher, 1973). Another competing explanation is the conflict-of-interest hypothesis. This argues that acquiring firms overpay because their

⁹ Billett and Qian (2008) provide evidence directly consistent with self-attribution bias leading to overconfidence in their study of CEO M&A deal sequences; Soukas and Petmezas (2007) similarly suggest self-attribution induces managerial overconfidence in their study of multiple acquirers of private firms in the UK.

¹⁰ Shefrin (2006:6) defines overconfidence as: “People make mistakes more frequently than they believe and view themselves as better than average.”

¹¹ Banc One/FC (1998), Daimler/Chrysler (1998), NationsBank/BA (1998), Norwest/Wells Fargo (1998), Travelers/Citicorp (1998), MCI/Sprint (1999), Qwest/US West (1999), AOL/Time Warner (2000), Chase/J.P. Morgan (2000), Chevron/Texaco (2000), and Firststar/U.S. Bancorp (2000).

CEOs want to extract personal benefits from non-value-maximizing acquisitions (Shleifer and Vishny, 1988). Datta, Iskandar-Datta, and Raman (2001) provide supporting evidence for this argument, finding that managers with low equity-based compensation are more likely to overpay for targets than those with high equity-based compensation. However, Seyhun (1990) argues that the conflict-of-interest hypothesis implies that executives of bidding firms will knowingly overpay for target firms. However, he finds no empirical evidence for this in his study of the stock transactions of top managers of bidder firms for their personal accounts. Seyhun's results, in fact, show that these managers increase their personal shareholdings in their firms prior to merger announcements, which is inconsistent with the conflict-of-interest hypothesis. Interestingly, this finding suggests that, overall, bidding managers unknowingly pay too much for target firms, which is consistent with an overconfidence explanation. Managers prone to overconfidence may intend to maximize value, but actually overestimate their abilities, and thus the value of the target firm to them. As a result they overpay (Roll, 1986). Hayward and Hambrick (1997) also propose that "hubris impairs a CEO's judgment, causing overpayment for the acquisition." Our first hypothesis is thus:

Hypothesis 1. Overconfident CEOs pay higher premiums for target firms than their non-overconfident counterparts.

A particular contribution of this study is to explore the impact of target CEO overconfidence on bid premium, something we believe is novel to the literature. *A priori*, we expect that overconfident *target* firm CEOs require a higher price in bid negotiations as they are overconfident about their ability to generate value. On this basis, target firm CEO overconfidence might also be an important determinant of the bid premium. On the other hand, the price paid in merger deals depends on the acquirer and his/her willingness to meet the target's demands. If the price sought is too high the acquirer CEO may walk away from the putative deal leaving it unconsummated.¹² As such, we do not have an expectation about the relation between target firm CEO overconfidence, and bid premium. Nonetheless, following Malmendier and Tate (2003, section 2.4.3) who speculate on, but do not

¹² All our data relates to completed deals so we cannot test for an overconfidence explanation for failed mergers.

empirically test for an association between target CEO overconfidence and bid premium, our second hypothesis follows:

Hypothesis 2. Target firm CEO overconfidence has a positive impact on bid premium.

Building on the above arguments, and more importantly, we expect that not only the overconfidence of each party to the deal (acquiring firm and target firm), but, in particular, the interaction between them two counterparties, will impact the size of the bid premium. If the acquirer CEO is overconfident about his/her abilities to generate value, and facing the demand for an unrealistic price from an overconfident target firm CEO, he/she may be more likely to accept this price than a non-overconfident CEO. This is because he/she will overestimate their ability to recoup the high premium demanded, and also likely feel entitled to be successful in completing the deal, as illustrated in the AT&T/NCR case above. In this sense, we would expect the most serious overpayment problem to occur when *both* acquirer and target CEOs are overconfident. Hypothesis 3 is then:

Hypothesis 3. The positive relation between CEO overconfidence and bid premium is strongest when acquiring firm and target firm CEO overconfidence coexist.

2.2. Acquirer and target firm CEO overconfidence and market reaction

Many studies suggest that CEO overconfidence plays an important role in helping to explain M&A decision-making and the market reaction to merger deals. Malmendier and Tate (2008) provide evidence that a strong relationship exists between level of CEO overconfidence and the probability of undertaking mergers, which suggests that acquiring firm CEO overconfidence can be one of the drivers of the merger decision, consistent with Roll (1986). Importantly, their results also show that the market prefers the bids of less overconfident managers; cumulative abnormal returns around the bid announcement date are roughly 75 basis points lower on average in the case of overconfident managers. Doukas and Petmezas (2007) also provide evidence consistent with Malmendier and Tate (2008), using a sample of UK private firm acquisitions with multiple acquisitions proxying for managerial overconfidence. Since CEO overconfidence implies a distorted perception of reality, and an unrealistic assessment of their ability to extract value from the acquisition,

the market reaction to a bid announcement by such an acquirer will be negative (if capital markets are efficient). Thus, in line with previous work which suggests that mergers conducted by overconfident CEOs will perform worse on average than mergers conducted by non-overconfident CEOs, our fourth hypothesis is:

Hypothesis 4. Acquiring firm CEO overconfidence has a negative impact on bid announcement returns.

However, the extant literature only focuses on acquiring firm CEO overconfidence. The potentially equally important role of *target* firm CEO overconfidence in explaining the market reaction to merger deals has been largely neglected to date. Even though there are two parties involved in every acquisition – the acquiring firm and the target firm, to the best of our knowledge, there has been no similar formal empirical study of the impact of target firm CEO overconfidence on the market reaction to the bid announcement event in the extant literature. We believe that target firm CEO overconfidence also plays an important role in explaining firm M&A performance. In fact, based on the general wisdom that CEO overconfidence plays a destructive role in terms of shareholder value, we might suppose that firms managed by overconfident CEOs are more likely to perform poorly, and thus become acquisition targets. Therefore, we should expect to observe many overconfident CEOs in target firms and, in this sense, study of the role of target firm CEO overconfidence in M&A activity is also important.

A key argument in this paper is that overconfident target firm CEOs are likely to overestimate the value of their firms to a bidder, and consequently seek to push up the bid premium. On this basis, it is reasonable to expect that acquirers might have to pay more for targets with overconfident CEOs as discussed in section 2.1 above, and the resulting potential overpayment will have a negative impact on acquiring firm bid announcement returns. Therefore, we predict that target firm CEO overconfidence may also negatively impact M&A deal announcement returns. Hypothesis 5 follows:

Hypothesis 5. Target firm CEO overconfidence has a negative impact on acquiring firm bid announcement returns.

Last, we speculate that not only the overconfidence of the CEOs of both parties (acquiring firm and target firm), but, in particular, their interaction will impact in a major way on bid announcement returns. As discussed above in the establishment of hypothesis 3, we expect that if the market is efficient, it will recognize the potential for increased value destruction when both CEOs are overconfident, with each overestimating their ability to generate a positive return from managing the assets of the target firm. Thus, the market reaction to the deal announcement will be more negative when *both* the acquirer CEO and the target CEO are overconfident, compared to when either one or neither party is overconfident. Our sixth, and final, hypothesis is thus:

Hypothesis 6. The negative impact of CEO overconfidence on bid announcement returns is strongest when *both* acquiring firm and target firm CEOs are overconfident..

3. Measurement of CEO overconfidence

We use the same two proxy variables to measure CEO overconfidence as in Malmendier and Tate (2003; 2005b; 2008) which have clear construct validity: Holder67, an option exercise measure, and media portrayal, a measure based on media comments on the CEO's general attitudes.

Holder67: This is based on CEO option exercise timing behavior, and is used as a measure of the CEO's belief about his/her abilities to generate superior returns. We would expect an overconfident CEO's elevated self-image to lead to his/her expectation that the firm's stock price will continue to increase under his/her leadership more than is objectively justified. Therefore, as a result, overconfident CEOs will tend to postpone option exercise to benefit personally from the future gains they see themselves as generating, even if the amount in-the-money is beyond an economically rational benchmark.

There is some debate in the literature about whether this measure is necessarily a clean one in that CEOs may hold their deep in-the-money options for other reasons. One possible reason is insider information. If CEOs have, or think they have, information which makes them believe that their firm's stock price will rise in the future they will choose to hold their option longer even if deep in-the-money to profit from this. Thus, as Malmendier and Tate (2008) argue, if insider information drives CEO late option exercise, the return

from holding the options should be positive. However, their evidence shows that CEOs do not profit from delay in option exercise, which helps rule out this explanation. Another issue relating to the use of Holder67 is that CEO option exercise behavior could also relate to prior firm returns. Good recent stock performance may lead CEOs to expect that their firm will continue to perform well in the future, leading to non-exercise of deep in-the-money options so they will benefit from the expected further increase in share price. To control for this potential explanation, we include a 1-year lagged return variable in our cross-sectional regression analyses.

In addition, some academics argue that CEOs may not exercise their in-the-money options not because they are overconfident, but because they want to increase their ownership stake in the firm. However, we believe this explanation is unlikely as the extant literature (e.g., Ofek and Yermack, 2000; Bartov and Mohanram, 2004) documents evidence that executives tend to sell nearly all of their shares acquired through option exercise, rather than retain them.

Malmendier and Tate (2008) use the Hall and Liebman (1998), and Yermack (1995) data set from which their Holder67 measure is obtained directly. However, this data set only includes 394 large firms for the period of 1980 to 1994, leading to potential problems in generalizing results to smaller size firms and, importantly, recent periods including that of the technology bubble. To deal with these issues, we estimate our Holder67 measure directly using ExecuComp data following the procedure of Sudarsanam and Huang (2006). The option exercise behavior of each of our sample CEOs is used to classify CEOs into two categories: overconfident CEOs and non-overconfident CEOs. Based on Hall and Murphy (2002), and following Malmendier and Tate (2008), we use 67% in-the-money as the threshold.¹³

The construction of our Holder67 variable requires three steps. First, the average exercise price of each CEO's option package in a particular firm year is calculated based on the available CEO option information in the ExecuComp database. The percentage in-the-money of each CEO's option portfolio in a particular firm year is then derived. Finally, a CEO is classified as an overconfident CEO if the CEO failed to exercise his/her vested

¹³ For robustness checks, we also use 50% in-the-money, and 80% in-the-money as alternative thresholds to construct our option exercise behavior-based measures of CEO overconfidence. Our results remain unchanged.

options which are more than 67% in-the-money at least twice during the sample period. Otherwise, a CEO is deemed a non-overconfident CEO.

Media portrayal: We use third party media portrayal as our second proxy for CEO overconfidence. This variable classifies CEOs as overconfident or non-overconfident based upon how the media portrays each individual CEO, or, in other words, how they are viewed in the financial press. The main strength of this proxy is that it can capture outsiders' (or the market's) perception of CEO overconfidence. To construct this measure, we conduct a systematic search for articles and news items about each of our sample firm CEOs in a wide range of media sources using Factiva. We use the same set of keywords as Brown and Sarma (2007), and Malmendier and Tate (2008). However, considering the potential endogeneity problem that CEOs may change their tenor to send positive signals during M&A bids, we restrict our article coverage to those published in the period before the actual bid itself is announced. We tabulate the number of articles that describe the CEO as: (1) "optimistic" (including "optimism"); (2) "confident" (including "confidence"), and (3) "reliable", "cautious", "conservative", "steady", "practical", "frugal", "disciplined", "conscientious", "not confident", "not optimistic". $N(1)$, $N(2)$, and $N(3)$ represent the number of articles describing the CEO under these three categories of words respectively. If $N(1)+N(2)>N(3)$, the CEO is classified as an overconfident CEO. If $N(1)+N(2)<N(3)$, the CEO is classified as a non-overconfident CEO. We exclude any observation where $N(1)+N(2)=N(3)$, as it is impossible to classify a CEO as overconfident or non-overconfident in this case.

4. Data and Method

4.1. Data source and sampling criteria

We work with a sample of 3,162 CEOs for 2,129 publicly-traded US firms, and 1,888 M&A deals from January 1, 1993 to December 31, 2005. Data collection consists of five steps. First, CEOs at any time during the period 1993-2005 who meet our selection criteria are identified, and their compensation and other relevant data extracted from the

ExecuComp database.¹⁴ At the same time, firms' CUSIP codes and tickers corresponding to these selected CEOs are also identified. Financial and utility firms are then excluded.¹⁵ Second, the Thomson Reuters One Banker SDC database is used to search for the M&A deals conducted by the selected CEOs during their tenures. Deal announcement date, SDC deal number, target firm, deal value, and other relevant characteristics are also obtained in this step. Third, we obtain the necessary stock return data from the CRSP database for event study purposes. Fourth, we then match various financial (accounting) items from COMPUSTAT with our CEO dataset, M&A deals data set, and CRSP data. Finally, the media coverage data required for constructing the alternative CEO overconfidence measure, media portrayal, is extracted from 37 media sources in the Factiva database through systematic keyword searches.¹⁶

Three groups of data are used in this study: (1) CEO data and firm data; (2) M&A deal data, and (3) other supplementary data. The data sources and sample selection criteria are detailed respectively in the following sections.

4.1.1. CEO data and firm data

To construct our Holder67 CEO overconfidence measure, we collect CEO stock option holding data from Standard & Poor's ExecuComp database. We also use the database to obtain data on CEO personal characteristics, tenure, and stock ownership.

To ensure we can construct our Holder67 variable appropriately, we only include acquirer and target CEOs in our sample who meet necessary data availability requirements, in particular, if and only if, they meet the following two criteria:

¹⁴ Standard & Poor's ExecuComp database provides data on top executives' salary, bonus, and stock option data since 1992. The database also has company-specific financial statement information to supplement the compensation data. ExecuComp covers firms in the S&P 500, S&P Midcap 400, and S&P Smallcap 600, and some other firms.

¹⁵ We treat firms with SIC codes outside the ranges 4900–4949 and 6000–6999 as financial and utility companies.

¹⁶ We augment Malmendier and Tate's list of 5 principal business publications with 32 others. The complete set we use includes: *The Atlanta Journal-Constitution*, *The Baltimore Sun*, *Barron's*, *The Boston Globe*, *Business Week*, *Charlotte Observer (N.C.)*, *Chicago Sun-Times*, *Chicago Tribune*, *Daily News (New York)*, *The Dallas Morning News*, *Detroit Free Press*, *Denver Post*, *Dow Jones Business News*, *Dow Jones News Service*, *Forbes*, *Fortune*, *Los Angeles Times*, *The Miami Herald*, *The New York Times*, *Newsday (New York)*, *Newsweek*, *Orlando Sentinel (Fla.)*, *The Philadelphia Inquirer*, *Pittsburgh Post-Gazette*, *San Antonio Express-News*, *San Jose Mercury News*, *Seattle Post-Intelligencer*, *South Florida Sun-Sentinel*, *St. Louis Post-Dispatch*, *St. Petersburg Times (Fla.)*, *Time*, *Times-Picayune*, *USA Today*, *The Wall Street Journal*, *The Washington Post*, *The Financial Times*, and *The Economist*.

Criterion 1: The CEO has at least 2 years' compensation data in ExecuComp, and
Criterion 2: In at least 2 years, the CEO holds some options that are in-the-money and exercisable.

Criterion 1 is to ensure that we have enough data to construct the CEO overconfidence measure Holder67. Since we classify a CEO as overconfident if he/she fails to exercise his/her vested options when these are more than 67% in-the-money at least twice during the sample period, we need at least two years of compensation data for a particular CEO to examine their option exercise behavior. Criterion 2 also needs to hold in constructing our overconfidence measure since it helps rule out the possibility that the CEO fails to exercise his/her options not for reasons of overconfidence, but because the option is out-of-the-money, or cannot be exercised.

The ExecuComp database contains data on 4,988 CEOs, 2,754 firms, and has a total of 29,464 observations from January 1992 to December 2005, where each observation represents a data serial for a particular CEO of a particular firm in a particular year. Excluding the observations not meeting our two CEO selection criteria, financial and utility firms, and those firms not covered by the Thomson Reuters One Banker SDC database, leaves a total of 3,162 CEOs, 2,129 companies, and 22,103 observations in our final sample. Table 1 provides the details of our sample selection process.

4.1.2. M&A deal data

Based on the CEO-firm sample obtained using the ExecuComp database, M&A deals conducted by our sample CEOs during their tenures and announced at any time during the 13 year period between January 1 1993 and December 31 2005 are extracted from the Thomson Reuters One Banker SDC database. Date of deal follows the Thomson

Reuters One Banker SDC “date announced” definition.¹⁷ Three types of transaction are included in our sample: merger, acquisition of majority interest, and acquisition of assets.¹⁸

We need both acquirer and target to be public firms for data purposes. We also require the deal value to be at least \$1 million (Moeller, Schlingemann, and Stulz, 2004) and, following Morck, Shleifer, and Vishny (1990), we only consider deals in which the value of the target is greater than 5% of the value of the acquirer. This is because small acquisitions or units of another company may not require direct input from the acquirer’s CEO.

4.1.3. Other data

To measure the market reaction to the deal announcement, we employ an event study approach to measure firm (stock) performance in the three-day event window centered on the bid announcement date using stock data obtained from CRSP. To calculate firm cash flow and Tobin’s Q, we extract the following financial (accounting) data items from COMPUSTAT: total assets, earnings before extraordinary, depreciation, capital (property, plant and equipment), common shares outstanding, fiscal year closing price, total liabilities, preferred stock, deferred taxes, and convertible debt. In addition, we use the comprehensive G-index as the proxy for quality of corporate governance. Index values are obtained from Andrew Metrick’s website.¹⁹

*4.2. Models and variables*²⁰

¹⁷ Thomson Reuters One Banker SDC defines “date announced” as “The date one or more parties involved in the transaction makes the first public disclosure of common or unilateral intent to pursue the transaction (no formal agreement is required). Among other things, Date Announced is determined by the disclosure of discussions between parties, the disclosure of a unilateral approach made by a potential bidder, and the disclosure of a signed Memorandum of Understanding (MOU) or other agreement.”

¹⁸ We follow the SDC definitions of these three types of transactions as follows: Merger: “A combination of business takes place or 100% of the stock of a public or private company is acquired.”; Acquisition of majority interest: “the acquirer must have held less than 50% and be seeking to acquire 50% or more, but less than 100% of the target company’s stock.”; Acquisition of assets: “deals in which the assets of a company, subsidiary, division, or branch are acquired. This code is used in all transactions when a company is being acquired and the consideration sought is not given.”

¹⁹ The G-index, constructed by Gompers, Ishii, and Metrick (2003), is issued by the IRRC (Investor Responsibility Research Center) (<http://finance.wharton.upenn.edu/~metrick/data.htm>). It is an integral part of the IRRC Governance database (also known as IRRC Takeover Defence database). This index is constructed based upon 24 anti-takeover provisions.

²⁰ Table 2 provides a summary of our variable definitions.

To test the propositions developed in section 2, multiple regression analysis is conducted with year fixed effects.²¹ Our first regression model is employed to examine the relationship between acquisition premium, and CEO overconfidence (both acquiring firm and target firm):

$$PR = \alpha_0 + \gamma_1 OC_A + \gamma_2 OC_T + \gamma_3 CG + \gamma_4 SO + \gamma_5 VO + \gamma_6 Payment + \gamma_7 Relatedness + \gamma_8 RSize + \gamma_9 Size + \gamma_{10} High_tech_dummy + \gamma_{11} OC_A * OC_T + \gamma_{12} OC_A * Payment + \gamma_{13} OC_A * Size + \varepsilon \quad (1)$$

The dependent variable *PR* is the acquisition premium defined as the percentage difference between the highest price paid per share, and the target's share price four weeks prior to the M&A deal announcement date. The main variables of interest are *OC_A* and *OC_T*. *OC_A* is the binary measure of acquiring firm CEO overconfidence, which is 1 for overconfident CEOs, and 0 otherwise, using each of our two proxy variables (Holder67; media portrayal) separately. *OC_T* is the parallel binary measure of target firm CEO overconfidence. We also include the interaction term *OC_A*OC_T* to test the impact of concurrent acquiror, and target CEO overconfidence on acquisition premium.

To control for other factors that might impact on acquisition premium, a set of control variables is also included in equation (1). Specifically, *CG* (G-index) (Gompers, Ishii, and Metrick, 2003) is used to control for corporate governance quality. Most previous studies only use a single corporate governance variable such as the number of board members (Malmendier and Tate, 2008) or CEO tenure (Sudarsanam and Huang, 2006), which lead to weak proxies for the overall corporate governance regime. To avoid this problem, we use the G-index to capture an important dimension of corporate governance for our purposes, the market for corporate control.²² In particular, Gompers, Ishii, and Metrick (2003) suggest that antitakeover provisions can result in high agency cost and, therefore, are associated with poor corporate governance. *SO* is the fraction of company stock owned by the acquirer CEO at the end of the last fiscal year before the deal announcement year. *VO* is the acquirer CEO's holdings of vested options, as a fraction of

²¹ This is to control for the impact of merger market intensity on acquisition premium, and acquirer stock return, as well as other deal characteristics (e.g., Chidambaran, John, Shangguan, and Vasudevan, 2010; Alexandridis, Mavrovitis, and Travlos, 2010).

²² See footnote 19 above.

common shares outstanding. *Payment* is a binary variable, where 1 signifies that the method of deal payment is cash, 0 otherwise. *Relatedness* is a binary variable, where 1 signifies that the first two digits of the SIC code of the acquirer and target are the same, 0 otherwise. *RSize* represents the relative size of the target firm, defined as the ratio of acquirer market capitalization to target market capitalization at the end of the last fiscal year before the deal announcement year. *Size* is the natural logarithm of acquirer market capitalization at the end of the last fiscal year before the deal announcement year. *High_tech_dummy* is a binary variable where 1 signifies that the acquiring firm is classified as high-tech by Thomson Reuters One Banker, 0 otherwise. Two further interaction terms are also included in the regression model. $OC_A * Size$ is used to examine if CEO overconfidence in large firms has the same (or same degree of) impact on acquisition premium as that in small firms. $OC_A * Payment$ is employed to consider the potential interaction effect of CEO overconfidence and payment method.

Our second regression model with year fixed effects is employed to test the impact of acquiring and target firm CEO overconfidence on acquiring firm M&A short-run (announcement) return, as well as for evaluating proposition 6 relating to the joint impact of concurrent acquiring and target firm CEO overconfidence:

$$CAR = \alpha_0 + \gamma_1 OC_A + \gamma_2 OC_T + \gamma_3 CG + \gamma_4 SO + \gamma_5 VO + \gamma_6 Attitude + \gamma_7 Payment + \gamma_8 Relatedness + \gamma_9 RSize + \gamma_{10} Target_Q + \gamma_{11} Size + \gamma_{12} High_tech_dummy + \gamma_{13} OC_A * OC_T + \gamma_{14} OC_A * Payment + \gamma_{15} OC_A * Size + \varepsilon \quad (2)$$

The dependent variable in this regression, *CAR*, represents acquirer short-term return (3-day event window [-1, 1] cumulative abnormal return) centered on the event day, $t=0$. The market model is used to calculate abnormal returns. Model parameters are estimated from firm return data for a minimum estimation period of (-90, -46) days, and a maximum estimation period of (-301, -46) days using OLS, and with the CRSP value weighted index as the market index. *Attitude* is a binary variable, where 1 signifies that the deal attitude is classified as “hostile” in the SDC database, and 0 signifies “friendly” or “neutral”.²³ *Target_Q* is the target firm’s market/book (M/B) ratio proxying for firm growth options. All other independent variables are as in equation (1).

²³ We follow the Thomson Reuters One Banker definitions for deal attitude: “Friendly” indicates the target

5. Descriptive analysis

Table 3 presents deal descriptive statistics for our sample of 1,888 mergers and acquisitions conducted during the period January 1, 1993 to December 31, 2005. It shows that there is no significant time clustering problem in our sample of deals. The number of deals increases steadily from 22 in 1993, peaking in 1999 with 191 deals. Mean deal value increases from \$271.6 million in 1994, and peaks at \$1,608 million in 1999, before falling until 2004. Median deal value also increases gradually, from \$121.5 million in 1994 to a peak of \$289.3 million in 1999. These statistics illustrate that our sample well captures, *inter alia*, the impact of the 1998-2001 merger wave well-documented in the literature (e.g., Moeller, Schlingemann, and Stulz, 2005).²⁴ Our sample of M&A deals also shows a good balance between merger transactions (48% of deal sample), and acquisitions, including of majority interests and assets (52%).

Table 4 provides descriptive statistics for our sample firms and their CEO characteristics. Panel A presents the statistics for acquiring firms. It shows that the average acquiring firm has total assets of \$2,900 million, and a market value of \$4,150 million. Median total assets and market value, however, are much lower at \$970 million and \$1,180 million respectively, showing that there are some very large firms in our sample; mean acquiring firm Tobin's Q is 2.04. The average acquirer CEO owns around 3% of his/her firm's shares, and holds exercisable options representing approximately 1% of common stock outstanding. Although the absolute value of this holding is large, such CEOs hold a relatively small portion of their firm's equity on average. The average acquiring firm CEO has been in this position for 6.2 years, and is 57.2 years old. Panel B presents parallel target firm statistics. It shows that the average (median) target firm has total assets of \$996 (\$485) million, and a market value of \$1,600 (\$375) million, all figures much lower than for our acquirers. Table 4 also shows that mean target firm Q is 1.87, again significantly lower than

firm's board recommends the offer; "Hostile", that the target firm's board officially rejects the offer but the acquirer persists with the takeover; and "Neutral", that the target firm's board has nothing to do with the transaction.

²⁴ Although we do not report the relation between CEO overconfidence and hot and cold markets in this paper, we do find that both acquisition premium, and market reaction are higher, and that CEO overconfidence has a greater effect, between 1998 and 2001 (Chidambaram, John, Shangquan, and Vasudevan, 2010; Alexandridis, Mavrovitis, and Travlos, 2010).

that in panel A. This result is consistent with the Q-theory of mergers (Servaes, 1991) – firms with high Q value often acquire those with low Q value. The table also shows that, on average, target firm cash flow, CEO stock holding, CEO vested option holding, and CEO tenure and age are all significantly lower than those for acquirers.

6. Results

This section reports and discusses the results of formal tests of our hypotheses. For each regression model parameter estimates, t-statistic and F-test results are reported.

6.1. The impact of acquiring firm and target firm CEO overconfidence, and their interaction, on bid premium

To explore the potential overpayment problem, an important channel by which CEO overconfidence might lead to value destruction, we examine the relation (if any) between acquisition premium, and CEO overconfidence (in both acquiring firm and target firm) using equation 1, and restricted forms of equation 1. Results are presented in Table 5. The dependent variable is the premium paid to acquiree shareholders. Models 1 and 2 are used to examine the relation between acquiring firm CEO overconfidence and acquisition premium, models 3 and 4 to examine the relation between target firm CEO overconfidence and acquisition premium, and models 5 and 6 are employed to explore the effect of the interaction between acquiring and target firm CEO overconfidence on acquisition premium. Values of OC_A and OC_T are derived using the Holder67 measure in models 1, 3 and 5, and the media portrayal measure in models 2, 4 and 6.

A. The impact of acquiring firm CEO overconfidence on bid premium

We find that the coefficient on OC_A , the acquirer CEO overconfidence variable, is significantly positive (at the 5% level) in both models 1 (Holder67) and 2 (media portrayal) (0.023 in model 1, 0.038 in model 2). It appears that overconfident CEOs, on average, pay a 2.3% to 3.8% higher acquisition premium than non-overconfident CEOs, controlling for other variables that might affect the size of the premium, which supports hypothesis 1. As a

higher premium is often regarded as an indicator of overpayment, our finding provides evidence that acquiring firm CEO overconfidence could be one among other important factors that lead to overpayment. This result is supportive of Roll's "hubris hypothesis" (Roll, 1986).

B. The impact of target firm CEO overconfidence on bid premium

In contrast to acquirer overconfidence, in the case of OC_T , the target overconfidence variable, although its coefficients (0.054 and 0.068) in models 3 (Holder67) and 4 (media portrayal) are not small, they are not significant at conventional levels ($t=1.13$ and 1.42 respectively). As such, we do not have evidence to support hypothesis 2. Our results thus suggest that target firm CEO overconfidence alone does not have significant impact on acquisition premium. We speculate that this may reflect the relative lack of bargaining power of the target firm CEO in the case of a non-overconfident acquiring firm CEO who may also be prepared to walk away from an overpriced deal.

C. The impact of the interaction between acquiring firm and target firm CEO overconfidence on bid premium

In support of the above explanation for the lack of formal statistical significance of OC_T on its own in models 3 or 4, the coefficient on the interaction term OC_A*OC_T is 0.091 (significant at the 5% level) in model 5 (Holder67), and 0.069 (again significant at the 5% level) in model 6 (media portrayal). This finding is consistent with the highest acquisition premium, between 6.9% and 9.1%, being paid when both acquirer and target firm CEOs are overconfident.²⁵ This consequence of the "dance" between the overconfident acquiring firm CEO, and the overconfident target firm CEO, might be interpreted by considering the following three scenarios. First, if the acquirer CEO is overconfident but the target CEO is

²⁵ The number of cases in models 3 and 4 are 342 and 1,316 respectively, significantly lower than the number of cases in model 1 and 2. This is because model 5 requires Holder67 values for both acquiring and target CEOs, and this limits our sample to the small number of cases in which one of our sample firms acquires another of our sample firms. In other words, we only have 342 such acquiror-target-paired cases in our data, when using the Holder67 measure. Similarly, in model 6, we can only construct our media portrayal measure for 1,316 acquiror-target-paired cases.

non-overconfident (not likely to require an unrealistically high bid premium), the acquiring firm CEO may still overpay, but at least the overpayment problem will not be exacerbated. In this case, then, we can expect that the negative impact of CEO overconfidence will be less than the case when both parties are overconfident. Second, if the putative acquiring firm CEO is not overconfident but the target firm CEO is (i.e., likely to demand an “excessive” price for his/her firm’s shares), we would expect the former to make an economically “rational” decision by not pursuing the acquisition or by negotiating for a “reasonable” price to complete the deal. Here, we would also expect CEO overconfidence to cause less harm. Finally, however, if both acquiring and target firm CEOs are overconfident, as in the AT&T/NCR case, the overconfident target firm CEO is likely to require a higher premium during the bidding process. However, at the same time, the overconfident acquirer is more likely to be prepared to pay this higher premium than his/her non-overconfident counterpart, as he/she overestimates their ability to extract value from the deal. It is worth, however, stressing that we are only dealing with completed deals in this study. If we were to look at non-consummated deals, the effect of target firm CEO overconfidence might be even more strongly demonstrated, and the high premium story more pronounced, as presumably overconfident target CEOs may tend to demand such a high premium that the deal is not completed.

These findings support hypothesis 3. In particular, they are consistent with our conjecture that overconfident target firm CEOs may value their firms too highly, reflecting their *belief* in their own abilities and, at the same time, overconfident acquirers are willing to pay the larger premiums demanded, as they likewise overestimate their own ability to generate value from the acquisition. Therefore, the most severe overpayment problem will occur when acquiring firm and target firm CEO overconfidence coexist. However, interestingly, although we find a significant result on the interaction term $OC_A * OC_T$, again, as above, the coefficient on OC_T alone is not significant. However, this result supports the main argument in this paper that it is the *interaction* between acquiring and target firm CEO overconfidence that plays a far more important role in explaining the overpayment problem than CEO overconfidence in the case of the acquirer or target firm alone.

Table 5 also shows that, as might be expected, premium paid is a function of method of payment. The coefficient on variable *Payment* (1=cash, 0=other) varies between -0.19 and -0.39 (significant in all models at better than the 5% level), i.e., the premium paid

is between 20-40% higher in non-cash (mainly stock-financed) deals. Interestingly, although acquirer size alone does not impact premium paid, the interaction term $OC_A * Size$ is significant in both model 5 (at the 10% level), and model 6 (at the 5% level). CEO overconfidence has a greater impact on acquisition premium in larger firms than smaller firms. A possible explanation for this size effect from an overconfidence perspective is that CEOs of large firms usually receive higher rewards, and more attention than those of smaller firms, making them more likely to be overconfident, or further reinforcing their existing levels of self-confidence. Consequently, driven by their greater propensity to overconfidence bias, CEOs of large firms are more likely to conduct value-destroying deals than those of smaller firms.

6.2. The impact of acquiring firm, and target firm CEO overconfidence, and their interaction, on bid announcement returns

We conduct our second set of regression analyses (equation 2 and associated reduced forms) to explore the impact of CEO overconfidence, particularly target firm CEO overconfidence, and the joint effect of acquirer and target CEO overconfidence, on short-run M&A announcement performance. Results are presented in Table 6. The dependent variable is the 3-day (-1, 1) event window CAR.²⁶ Models 1 and 2 are used to measure the market reaction to a takeover bid by an overconfident acquiring firm CEO. Models 3 and 4 are employed to explore the parallel effect of target firm CEO overconfidence on bid announcement returns. Model 5 and 6 measure the market consequences when overconfident CEOs lead both parties in merger deals. OC_A and OC_T are derived using the Holder67 measure in models 1, 3 and 5, and the media portrayal measure in models 2, 4 and 6.

A. The impact of acquiring firm CEO overconfidence on bid announcement returns

Columns 2 and 3 of table 6 report the results of tests of hypothesis 4 relating to the market impact of acquiring firm CEO overconfidence alone, using the reduced form of equation 2.

²⁶ 5-day (-2, 2), and 11-day (-5.5) event window CARs are also used as the dependent variable for robustness check purposes. Results are unchanged.

Model 1 (Holder67) shows a significant (at the 5% level) negative coefficient of -122 basis points on variable OC_A , and model 2 (media portrayal) an equivalent coefficient on OC_A of -76 basis points (significant at the 10% level). These results suggest that an overconfident acquiring firm CEO has a significant negative impact on M&A deal announcement abnormal returns, on average, of between -0.8%, and -1.2%. It seems that the market is able to identify M&A deals conducted by overconfident acquirers, and responds negatively. This result is consistent with the findings of Malmendier and Tate (2008) who report an adverse market reaction of 78 basis points to bid announcements in the case of overconfident acquiring firm CEOs, and supports hypothesis 4. Whereas Malmendier and Tate's (2008) sample consists of 394 Forbes 500 firms, and 3,900 firm-year observations over the period 1980-1994, our study covers the years 1993-2005, and draws on 2,130 firms across the full size spectrum representing 22,100 firm-year observations. As such, our results serve to confirm that the original findings of Malmendier and Tate (2008) are robust, and not only hold for large firms up to the mid 1990s, but also in the recent time period and across different-sized firms. We additionally report a significant (at the 5% level) negative coefficient on variable CG (quality of corporate governance) in both models. This is consistent with quality of corporate governance having the expected effect: better corporate governance (lower CG) is associated with better short-term (announcement) performance. Good corporate governance appears to enhance firm value and, in particular, may potentially serve to inhibit, *inter alia*, value destructive behaviors of overconfident CEOs. Among other control variables we also find, as in table 5, *Payment* (payment method of the deal) is significant (at the 1% level) with positive coefficients of 0.013 (model 1), and 0.014 (model 2). The short term market reaction to firms conducting cash payment deals is around 1.3% greater compared with those conducting non-cash payment (mainly stock financing) deals, consistent with most previous M&A literature (e.g., Asquith, Bruner, and Mullins, 1987). In addition, we find the market reacts more negatively with acquirer size, a relationship significant at the 5% level in both models, consistent with Moeller, Schlingemann, and Stulz (2004).²⁷

B. The impact of target firm CEO overconfidence on bid announcement returns

²⁷ These authors find that acquirer announcement return is roughly two percentage points higher for small acquirers than large acquirers, irrespective of the form of financing.

Columns 4 and 5 of table 6 test hypothesis 5 relating to the impact of target firm CEO overconfidence on acquirer bid announcement returns, using regression equation 2. We report a significant difference of -57 basis points in model 3 (Holder67) (significant at the 10% level), and -39 basis points in model 4 (media portrayal) (significant at the 5% level) between merger deals with overconfident target firm CEOs involved, and the remaining cases. These results support hypothesis 5, and show the market reacts negatively when overconfident target firm CEOs are involved in merger deals. As we argued in section 6.1 above, overconfident target firm CEOs are likely to have an inflated idea of their own self-worth and abilities, and believe that they can perform at least as well as, or even better than, the putative takeover management. The market may well be picking up the implications of this on acquirer firm value. These regression results thus highlight the potential role of target firm CEO overconfidence in explaining the market reaction to a bid announcement, and provide empirical evidence supportive of the original implicit prediction made by Malmendier and Tate (2003), but not empirically tested by them. As in models 1 and 2, *Payment* (payment method) is again highly significant (at the 1% level) with coefficients of 0.017 (model 3), and 0.015 (model 4), as is *Size* in model 3 (at the 10% level) and model 4 (5% level). *CG* is not significant at conventional levels in model 3, but significant at the 10% level in model 4. This compares with its importance as an explanatory variable in models 1 and 2 which explore the impact of acquirer CEO overconfidence on bid announcement returns, where the firm's corporate governance regime will likely have the most impact.

C. The impact of the interaction between acquiring firm and target firm CEO overconfidence on bid announcement returns

Based on our findings regarding the impact of acquiring firm and target firm CEO overconfidence on the market's reaction to the bid announcement when considered separately, we finally address the case where CEO overconfidence is manifested in both acquirer and target concurrently. How does the market react when the CEOs on both sides of the deal are overconfident? Both models 5 (Holder67) and 6 (media portrayal) report significant negative coefficients on $OC_A * OC_T$: -0.107 (significant at the 5% level) in the

case of model 5, and -0.121 (significant at the 1% level) in model 6. These results highlight a more than 10% negative announcement abnormal return associated with takeovers where both acquiring firm CEO and target firm CEO are overconfident, compared with cases when neither CEO is overconfident, or only one is. The negative impact of CEO overconfidence on bid announcement returns is strongest when both acquiring firm and target firm CEO overconfidence exist concurrently, consistent with hypothesis 6. The market appears to be able to identify the potential for increased value destruction in acquisitions when both parties to the deal are overconfident, and consequently marks the acquiring firm's share price down significantly. Our results clearly show that the coefficient on the interaction term $OC_A * OC_T$ is more negative, and more significant than (or at least as significant as) that on OC_A or OC_T alone. Finally, we report significant negative coefficients on the interaction term $OC_A * Size$ in models 5 and 6. Consistent with section 6.1 above relating to the acquisition premium paid, this shows that the market responds more negatively to merger deals by overconfident CEOs in larger acquirers compared with smaller firms, which again suggests that the larger the stage on which the overconfident CEO struts, the more opportunity there is for greater value destruction. Again, *Payment* (payment method) is significant in both models 5 and 6, at the 1% level as well as acquirer size on its own in model 5 (significant at the 10% level) and model 6 (significant at the 5% level). However, *CG* is only significant in model 6 (at the 10% level).

7. Summary and conclusions

We analyze empirically the impact of CEO overconfidence, especially target firm CEO overconfidence, and the interaction between the existence of such behavioral bias in both parties (acquirer and target) on acquisition premium, and acquiring firm M&A announcement performance, using a large sample of 3,160 CEOs, and 1,890 M&A deals from 1993 to 2005.

First, we demonstrate how acquiring firm CEO overconfidence is associated with an increase in the acquisition premium paid. Specifically, we find, *ceteris paribus*, that overconfident CEOs pay between a 2% and 4% higher premium than their non-overconfident counterparts in merger deals. However, we find no parallel evidence that overconfident target firm CEOs on their own are able successfully to demand higher bid

premium, which, we speculate, may reflect their relative lack of bargaining power. More importantly, we report the amount paid is between 7% and 9% higher when both the acquiring firm CEO and target firm CEO are overconfident than if only one or neither party is overconfident. One possible explanation for our results could be the overpayment problem. Overconfident target firm CEOs might believe that they can perform at least as well as, if not better than, the putative takeover management, and are also likely to have an inflated sense of self-worth and value. As such, they are likely to require an “excessive” price during the bidding process. This can lead overconfident acquiring firm CEOs to overpay because of their unrealistic beliefs about their ability to generate the necessary return from the acquisition to justify the overpayment.

We then examine how the market reacts to announcements of bids involving overconfident CEOs in both acquiring and target firms. We find that bids by overconfident CEOs are associated with a more adverse market response of between -0.8% and -1.2% compared with those by non-overconfident CEOs. We also report that deals with overconfident target firm CEOs involved significantly underperform those with more “realistic” CEOs by -0.4% to -0.6%. This suggests that not only acquiring firm CEO overconfidence has a significant negative impact on M&A deal announcement abnormal return, as already well documented in the literature, but *target firm* CEO overconfidence also plays an important role in helping to explain acquirer losses in such deals. Most importantly, we find that, *ceteris paribus*, the acquiring firm’s market price falls on average by no less than 10% to 12% more on deal announcement when *both* acquiring firm and target firm CEO overconfidence coexist, than when only one side to the deal, or neither, is overconfident. Not only the overconfidence of each of the two CEOs (acquirer and target), but crucially the interaction between them, plays an important role in explaining value destruction in merger deals. The dance steps of these two overconfident dancing partners lead to a “perfect storm” as the potential overpayment problem, and presumably longer-term value destruction, will be even more severe when both parties are overconfident than if only one party, or neither party is so prone.

The contribution of our study is fourfold. First, we examine empirically the impact of *target firm* CEO overconfidence in M&A deals; prior studies generally only focus on acquiring firm CEO overconfidence, failing to take potential target firm CEO overconfidence into account. Second, we explore the link between acquisition premium,

and CEO overconfidence on both sides of the deal (acquirer and target). Our results provide evidence that CEO overconfidence could be a potential explanation for the well-documented overpayment problem. Third, our results highlight the impact of the interaction between acquiring firm and target firm CEO overconfidence in takeovers, and show the dramatic acquirer value destruction associated with such a “St Vitus” dance by the two dance partners. This is both in terms of size of acquisition premium, as well as deal-related negative market return. Finally, our study reports further empirical evidence on the impact of acquiring firm CEO overconfidence on firm M&A announcement performance for a much more recent time period (1993-2005) than Malmendier and Tate (2008), and with a much larger and more disparate sample of firms. We are able to confirm these authors’ results for overconfident acquiring firm CEOs, based on Forbes 500 firms for the time period 1980-1994, are also robust for recent years and for smaller firms as well.

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Table 1 Sample selection process – CEOs and firms

The ExecuComp database contains data on 4,988 CEOs, 2,754 US firms, and a total of 29,464 observations from January 1992 to December 2005, where each observation represents a data serial for a particular CEO of a particular company in a particular year. Excluding observations not meeting our two CEO selection criteria, and those firms not covered by the Thomson One Banker SDC database, leaves a total of 3,162 CEOs, 2,129 firms, and 22,103 observations in our final sample. (Our two CEO selection criteria are 1: the CEO has at least 2 years' compensation data in ExecuComp, and 2: in at least 2 years, the CEO has some options that are in-the-money and exercisable.)

Procedure	Number of CEOs	Number of firms	Observations
Available in Execucomp database by December 2005 (starting from 1992)	4,988	2,754	29,464
Less CEOs not meeting criterion 1	<u>906</u>	<u>192</u>	
CEOs with a minimum of 2 years compensation data in Execucomp	4,082	2,562	
Less CEOs not meeting criterion 2	<u>665</u>	<u>214</u>	
CEOs meeting our two selection criteria	3,417	2,348	
Less the firms with tickers or CUSIP codes not recognized by Thomson Reuters One Banker SDC database	<u>21</u>	<u>14</u>	
Less Financial and utility firms	<u>234</u>	<u>205</u>	
Total	3,162	2,129	22,103

Table 2 Variable definitions

Variable	Definition
OC_A	A binary variable proxying for acquiring firm CEO overconfidence, which is 1 for overconfident CEOs, and 0 otherwise. This variable is separately derived using two alternative measures of CEO overconfidence – Holder67, based on CEO option exercise timing behavior, and media portrayal of the CEO.
OC_T	A binary variable proxying for target firm CEO overconfidence, which is 1 for overconfident CEOs, and 0 otherwise. The variable is separately derived using two alternative measures of CEO overconfidence – Holder67, based on CEO option exercise timing behavior, and CEO media portrayal.
PR	The acquisition premium, defined as the percentage difference between the highest price paid per share, and the target share price four weeks prior to the M&A deal announcement date.
CAR	The 3-day event window (-1, 1) cumulative abnormal return on the acquirer's stock around the event day $t=0$. 5-day and 11-day CARs are also calculated for robustness check purposes.
$Size$	The natural logarithm of acquirer market capitalization as at the end of the last fiscal year before the deal announcement year.
SO	The fraction of company stock owned by the acquirer CEO as at the end of the last fiscal year before the deal announcement year.
VO	Acquirer CEO's holdings of vested options as a fraction of common shares outstanding.
CF	The ratio of normalized firm cash flow, defined as earnings before extraordinary items plus depreciation, divided by beginning of year capital, where capital is measured as property, plant and equipment.
CG	G-index: a number based on 24 different governance provisions providing a comprehensive measurement of the quality of the firm's corporate governance mechanism (Gompers, Ishii, and Metrick, 2003). The G-index is constructed in such a way that the higher the G-index, the poorer is corporate governance quality.
$RSize$	The relative size of the target firm, defined as the ratio of acquirer market capitalization to target market capitalization as at the end of the last fiscal year before the deal announcement year.
$Relatedness$	A binary variable where 1 signifies that the first two digits of the SIC code of the acquirer, and those of the target are the same, 0 otherwise.
$Target_Q$	The target firm's market/book (M/B) ratio.
$Attitude$	A binary variable where 1 signifies that the deal attitude is classified as "hostile" in the SDC database, and 0 signifies "friendly" or "neutral".
$Payment$	A binary variable where 1 signifies that deal payment method is cash, 0 otherwise.
$High_tech_dummy$	A binary variable where 1 signifies that the acquiring firm is classified as high-tech by Thomson Reuters One Banker, 0 otherwise.

Table 3 M&A Deal Distribution Statistics

Our sample consists of 1,888 completed M&A deals during the period January 1, 1993 to December 31, 2005. Three types of transaction are included in our sample: merger, acquisition of majority interest, and acquisition of assets. We follow the Thomson One Banker and SDC platinum definitions of these three types of transactions as follows: merger - a combination of businesses takes place or 100% of the stock of a public or private company is acquired, acquisition of majority interest - the acquirer must have held less than 50% and be seeking to acquire 50% or more, but less than 100% of the target company's stock, and acquisition of assets - deals in which the assets of a company, subsidiary, division, or branch are acquired. Both acquirer and target are public firms and the deal value is at least \$1 million. The value of the target is greater than 5% of the value of the acquirer.

Year	Number of deals	Mean deal value (\$m)	Median deal value (\$m)
1993	22	683.5	296.8
1994	89	271.6	121.5
1995	139	634.9	130.0
1996	158	449.2	158.0
1997	152	520.2	165.5
1998	175	1,040.8	272.0
1999	191	1,608.0	289.3
2000	170	1,529.4	281.3
2001	171	800.2	177.0
2002	156	626.9	109.5
2003	155	458.2	142.5
2004	171	800.9	161.0
2005	139	1,596.6	230.0

Table 4 Summary firm and CEO characteristics

Total assets = book value of assets. Cash Flow is the ratio of normalized firm cash flow to beginning of year capital, where the numerator is defined as earnings before extraordinary items plus depreciation, and the denominator as property, plant and equipment. Q represents Tobin's Q, defined as market value of assets/ book value of assets, where book value of assets = total assets, and market value of assets = total assets + market equity - book equity. Market equity = common shares outstanding x fiscal year end closing price, and book equity = total assets - total liabilities - preferred stock + deferred taxes. MV is acquirer's market value 4 weeks prior to deal announcement. SO is defined as the fraction of company stock owned by the acquirer's CEO at the end of the last fiscal year before the deal announcement year. VO is the acquirer CEO's holdings of vested options, expressed as a fraction of common shares outstanding. CEO tenure represents the number of years the CEO has been at the helm as at the end of the fiscal year just before the deal announcement year.

	Acquiring firms			Target firms			
	Mean	Median	Standard deviation	Mean	Median	Standard deviation	Difference
Total assets (\$m)	2,896	971	8,083	996	485	2,493	1,900***
Cash Flow	0.21	0.32	0.13	0.13	0.20	0.09	0.08***
Q	2.04	1.49	0.97	1.87	1.36	0.89	0.17***
MV (\$m)	4,151	1,168	11,594	1,602	379	4,801	2,549***
SO	0.031	0.014	0.093	0.020	0.009	0.068	0.011***
VO	0.009	0.005	0.010	0.007	0.004	0.007	0.002***
CEO tenure (years)	6.23	6	2.76	5.14	4	2.28	1.09***
CEO age (years)	57.21	57	6.69	55.98	54	6.35	1.23***

*Significant at 10%; ** significant at 5%; ***significant at 1%

Table 5 Acquisition premium and acquiring firm and target firm CEO overconfidence

The dependent variable is PR, the acquisition premium, defined as the percentage difference between the highest price paid per share, and the target share price four weeks prior to the M&A deal announcement date. OC_A is a binary variable proxying for acquiring firm CEO overconfidence, which is 1 for overconfident CEOs, and 0 otherwise. OC_T is the equivalent for the target firm. OC_A and OC_T are derived using the Holder67 option exercise measure in models 1, 3 and 5, and CEO media portrayal in models 2, 4 and 6. CG is the GIM G index, a proxy for corporate governance quality. SO is the fraction of company stock owned by the acquirer's CEO as at the end of the last fiscal year before the deal announcement year. VO is the acquirer CEO's holdings of vested options, as a fraction of common shares outstanding. Payment is a binary variable, where 1 signifies that the method of deal payment is cash, 0 otherwise. Relatedness is a binary variable, where 1 signifies that the first two digits of the SIC code of the acquirer, and target are the same, 0 otherwise. RSize is the relative size of the target firm, defined as the ratio of acquirer market capitalization to target market capitalization as at the end of its last fiscal year before the deal announcement year. Size is the natural logarithm of acquirer market capitalization as at the end of the last fiscal year before the deal announcement year. High_tech_dummy is a binary variable where 1 signifies that the acquiring firm is classified as high-tech by Thomson Reuters One Banker, 0 otherwise. t-statistics are given in parentheses.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC_A	0.023 (2.21)**	0.038 (2.37)**			0.030 (2.18)**	0.041 (2.63)**
OC_T			0.054 (1.13)	0.068 (1.42)	0.056 (1.15)	0.074 (1.49)
CG	0.03 (0.68)	0.08 (0.39)	0.02 (0.55)	0.05 (0.30)	0.02 (0.57)	0.06 (0.32)
SO	-5.96 (-0.27)	-8.85 (-0.51)	-7.17 (-0.32)	-9.37 (-0.60)	-7.22 (-0.36)	-9.42 (-0.65)
VO	8.98 (0.53)	10.20 (0.85)	9.62 (0.60)	12.16 (0.94)	9.74 (0.66)	12.83 (1.00)
Payment	-0.19 (-2.26)**	-0.29 (-2.21)**	-0.32 (-2.95)***	-0.41 (-2.40)**	-0.31 (-2.90)***	-0.39 (-2.32)**
Relatedness	-0.20 (-0.66)	-0.37 (-0.75)	-0.15 (-0.83)	-0.27 (-0.52)	-0.17 (-0.87)	-0.29 (-0.58)
RSize	-0.002 (-0.27)	-0.003 (-0.38)	-0.003 (-0.37)	-0.003 (-0.29)	-0.003 (-0.38)	-0.002 (-0.21)
Size	0.118 (0.86)	0.129 (1.06)	0.105 (0.79)	0.150 (1.31)	0.103 (0.75)	0.144 (1.22)
High_tech_dummy	-0.12 (-0.54)	-0.19 (-0.87)	-0.15 (-0.84)	-0.27 (-1.00)	-0.14 (-0.77)	-0.25 (-0.98)
$OC_A * OC_T$					0.091 (2.26)**	0.069 (2.53)**
$OC_A * \text{Payment}$					0.089 (0.69)	0.068 (0.77)

OC _A *Size					0.035 (1.88)*	0.061 (2.35)**
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.08	0.07	0.07	0.06	0.10	0.09
F- test	10.98***	12.71***	11.26***	13.07***	11.59***	10.36***
Observations	1,888	1,722	342	1,316	342	1,316

*Significant at 10%; ** significant at 5%; ***significant at 1%.

**Table 6 Impact of target firm CEO overconfidence on acquiring firm
M&A announcement performance**

The dependent variable is acquirer 3-day (-1, 1) event window cumulative abnormal return (CAR). OC_A is a binary variable proxying for acquiring firm CEO overconfidence, which is 1 for overconfident CEOs, and 0 otherwise. OC_T is the equivalent for the target firm. OC_A and OC_T are derived using the Holder67 option exercise measure in models 1, 3 and 5, and CEO media portrayal in models 2, 4 and 6. CG is the GIM G index, a proxy for corporate governance quality. SO is the fraction of company stock owned by the acquirer's CEO as at the end of the last fiscal year before the deal announcement year. VO is the acquirer CEO's holdings of vested options, as a fraction of common shares outstanding. Attitude is a binary variable, where 1 signifies that the deal attitude is classified as "hostile" in the SDC database, and 0 signifies "friendly" or "neutral". Payment is a binary variable, where 1 signifies that the method of deal payment is cash, otherwise 0. Relatedness is a binary variable, where 1 signifies that the first two digits of the SIC code of the acquirer, and target are the same, 0 otherwise. RSize is the relative size of the target firm, defined as the ratio of acquirer market capitalization to target market capitalization at the end of the last fiscal year before the deal announcement year. Target_Q is the target firm's market/book (M/B) ratio proxying for firm growth options. Size is the natural logarithm of acquirer market capitalization as at the end of the last fiscal year before the deal announcement year. High_tech_dummy is a binary variable where 1 signifies that the acquiring firm is classified as high-tech firms by Thomson Reuters One Banker, 0 otherwise. t-statistics are given in parentheses.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
OC_A	-0.0122 (-2.37)**	-0.0076 (-1.94)*			-0.0055 (-2.23)**	-0.0096 (-2.32)**
OC_T			-0.0057 (-1.82)*	-0.0039 (-2.38)**	-0.0063 (-1.90)*	-0.0044 (-2.45)**
CG	-0.0327 (-2.22)**	-0.035 (-2.28)**	-0.029 (-1.27)	-0.032 (-1.84)*	-0.025 (-1.30)	-0.0307 (-1.82)*
SO	0.074 (1.17)	0.093 (1.20)	0.021 (1.13)	0.051 (1.29)	0.023 (1.16)	0.055 (1.34)
VO	0.112 (1.10)	0.106 (1.25)	0.050 (0.89)	0.068 (0.52)	0.0532 (0.93)	0.071 (0.56)
Attitude	-0.0012 (-0.22)	-0.002 (-0.20)	-0.0031 (-0.12)	-0.0039 (-0.24)	-0.0034 (-0.14)	-0.0042 (-0.27)
Payment	0.013 (3.02)***	0.014 (3.18)***	0.017 (2.84)***	0.015 (3.02)***	0.020 (2.90)***	0.016 (3.10)***
Relatedness	0.008 (0.97)	0.007 (0.94)	0.009 (1.29)	0.006 (1.20)	0.010 (1.39)	0.005 (1.16)
RSize	0.138 (0.16)	0.142 (0.14)	0.162 (0.010)	0.147 (0.28)	0.169 (0.12)	0.143 (0.23)
Target_Q	0.108 (0.27)	0.119 (0.20)	0.152 (0.17)	0.120 (0.32)	0.147 (0.15)	0.119 (0.30)
Size	-0.186 (-2.38)**	-0.176 (-2.21)**	-0.129 (-1.88)*	-0.159 (-2.22)**	-0.132 (-1.92)*	-0.164 (-2.27)**
High_tech_dummy	0.010 (1.47)	0.013 (1.71)*	0.003 (1.16)	0.009 (1.72)*	0.002 (1.14)	0.008 (1.70)*
$OC_A * OC_T$					-0.107 (-2.37)**	-0.121 (-2.91)***
$OC_A * \text{Payment}$					-0.1069	-0.1127

OC _A *Size					(-1.12)	(-1.25)
					-0.0228	-0.0365
					(-2.45)**	(-2.71)***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.07	0.08	0.07	0.08	0.08	0.11
F- test	10.29***	10.11***	10.48***	11.95	10.84***	12.98***
Observations	1,888	1,722	342	1,316	342	1,316

*Significant at 10%; ** significant at 5%; ***significant at 1%