Who Makes Acquisitions?

A Test of the Overconfidence Hypothesis *

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Abstract

We analyze whether the volume and returns of merger activities are affected by CEO overconfidence. Overconfident CEOs over-estimate their ability to generate returns and perceive outside finance to be over-priced. As a result, they undertake value-destroying mergers when they have abundant internal funds, and they may forego value-creating merger opportunities when they need to raise external funds. In order to test the overconfidence hypothesis, we employ detailed data on personal portfolio decisions of CEOs in Forbes 500 companies. We identify CEOs who, despite their under-diversification, systematically fail to reduce their personal exposure to company risk by exercising highly in the money stock options. We find that these CEOs do not profit from holding their options relative to an alternative diversification strategy. In addition, we find that such CEOs are more acquisitive on average and particularly prone to undertake diversifying deals. As predicted by the overconfidence hypothesis, the effects are largest in firms with abundant cash and untapped debt capacity. The same results hold for CEOs whom the press describes as "confident" or "optimistic." Moreover, the market reacts significantly more negatively to takeover bids by such CEOs. (JEL G34, G14, G32, D80).

"Many managements apparently were overexposed in impressionable childhood years to the story in which the imprisoned handsome prince is released from a toad's body by a kiss from a beautiful princess. Consequently, they are certain their managerial kiss will do wonders for the pro*fi*tability of Company T[arget]...We've observed many kisses but very few miracles. Nevertheless, many managerial princesses remain serenely con*fi*dent about the future potency of their kisses-even after their corporate backyards are knee-deep in unresponsive toads."

-Warren Buffet, Berkshire Hathaway Inc. Annual Report, 1981[1]

Mergers and acquisitions are among the most significant events to occur in corporations, giving rise to massive reallocation of financial and human capital. The staggering economic magnitude of these deals has inspired a myriad of research on their causes and consequences. Most theories focus on the efficiency gains that motivate takeover activities. The empirical results on returns to mergers, however, are mixed. Mergers appear to have destroyed value on average in the merger wave of the late nineties; but they may have created value during earlier periods.[2] Moreover, even in the case of value-creating mergers, the gains typically do not accrue to the shareholders of the acquiring company. Rather, there is a significant positive gain in target value upon the announcement of a bid, and a significant loss to the acquiror.[3] These findings suggest that mergers are often not in the interest of the shareholders of the acquiring company.

Overconfidence among chief executive officers (CEOs) has long had popular appeal as an explanation for these findings.[4] Overconfident CEOs overestimate their leadership skills and ability to generate returns. As a result they may engage in mergers that are value-destroying for their shareholders. Roll (1986) first formalized this notion, linking it to the winner's curse among bidders.[5] In this paper, we develop a model of CEO overconfidence that accounts for the difference in beliefs between CEOs and the outside market. We then provide empirical evidence that CEOs who systematically overestimate the future returns of their company tend

to do more mergers and mergers that are not likely to generate value, particularly when they have access to abundant internal financing.

The overconfidence hypothesis builds on the psychology literature on self- enhancement, which demonstrates that individuals tend to overestimate their abilities relative to an anonymous benchmark or to their peers.[6] The "better than average effect" also affects the attribution of causality. Because individuals expect their behavior to produce success, they attribute good outcomes to their actions, but bad outcomes to chance (Miller and Ross, 1975). This self-serving attribution of outcomes reinforces individual overconfidence.[7] According to a number of studies, executives appear to be particularly prone to display overconfidence (Kidd, 1970; Larwood and Whittaker, 1977; Moore, 1977; Kahneman and Lovallo, 1993). Baron (2000) surveys related literature on "cognitive factors in entrepreneurship," noting prominently the tendency of entrepreneurs to be overconfident in their own judgements. Subsequent studies have found experimental evidence on overconfidence in market entry decisions (Camerer and Lovallo, 1999) and on the underestimation of cultural conflicts in mergers (Weber and Camerer, 2003).

Merger decisions are an ideal setting to test for the effects of individual overconfidence. First, mergers are among the most significant corporate decisions and, as a result, require the direct oversight of the CEO. Second, while not all decision-making is likely to be affected by overconfidence, merger decisions are exactly the kind of choice psychologists link to overconfidence. Namely, they argue that individuals are especially overconfident about outcomes that they believe are under their control and about outcomes to which they are highly committed (Weinstein, 1980; Weinstein and Klein, 2002). Both scenarios apply to the merger decisions of CEOs. A CEO who conducts a merger is ostensibly replacing the current management of the target firm with himself. Therefore, he is likely to feel the illusion of control over the outcome and to underestimate the likelihood of eventual failure (Langer, 1975; March and

Shapira 1987). Moreover, a successful merger enhances the CEO's professional standing and his future employment prospects. In addition, the typical compensation contract of a CEO ties his personal wealth to the company's stock price and, hence, to the outcomes of his acquisition decisions. Finally, overconfidence is considerably more likely to affect market prices and the wealth of other market participants in the merger context than, for example, in the context of stock trades by individual investors. Arbitrage against an overconfident CEO may requires removal of the CEO from power, which is likely to be difficult and costly. As we will see in Section IV, the market does indeed react more negatively to the merger announcement of CEOs whom we classify as overconfident. However, this rarely stops CEOs from implementing the merger. In other words, while financial markets may adjust prices to reflect the level of value destruction, this does not prevent the CEO from taking the value-destroying action.

Our model of overconfidence builds on the assumption that overconfident CEOs overestimate their ability to select profitable future projects, whether in their current company or in a merged company. They may also overestimate the synergies between their company and a potential target, or underestimate how disruptive a merger will be. As a result, overconfidence may induce mergers that are, on the margin, value-destroying. Whether an overconfident CEO undertakes a merger depends, however, also on the availability of internal financing. Overconfident CEOs view their company as undervalued by outside investors who are less optimistic about the prospects of the firm. This perceived undervaluation makes overconfident CEOs reluctant to issue equity and they may thus forego value-creating merger opportunities when they need to raise external funds to finance the merger.

The trade-off between (perceived) undervaluation and (perceived) high returns from acquisitions leaves the question of whether overconfident CEOs are more likely, on average, to conduct mergers an empirical matter. A positive net effect would underscore the empirical relevance of overconfidence. However, the model makes the unambiguous prediction that overconfident

managers are more likely to conduct value-destroying mergers. Overconfident managers are also more likely to conduct mergers if they have abundant internal resources and do not need to issue "undervalued" equity to finance the deal. Moreover, the lower average quality of mergers undertaken by overconfident CEOs and the tendency of overconfident CEOs to overpay for their acquisitions in the face of competition should be reflected in a (more) negative market reaction to the merger announcement.

We then test empirically whether differences in merger activities can be linked to differences in CEO characteristics and beliefs. Using data on the personal portfolio decisions of CEOs in Forbes 500 companies, we identify CEOs who systematically overinvest in stock of their company. Here, we build on previous literature in corporate finance that shows that CEOs should exercise executive stock options with positive value (beyond a certain threshold) well before expiration due to the suboptimal concentration of their portfolio in company-specific risk.[8] We identify CEOs who display the opposite behavior, i.e. who fail to diversify company-specific risk on their private portfolio and systematically hold on to company stock options, as persistently bullish about their company's future prospects. We then show that this bullishness does not appear to reflect insider knowledge since the hypothetical returns CEOs could have obtained by exercising their options earlier are positive on average. Furthermore, the delay in option exercise is also unlikely to be a 'signal' about the company or merger quality since the returns to mergers of CEOs who overinvest in their company are more negative than those of their colleagues with more diversified private portfolios. We thus interpret the overinvestment of CEO in their own company as an indication that they overestimate the future returns of their company and classify them as overconfident.

We construct several measures of overconfidence following this logic. First, we consider CEOs who hold options all the way to expiration. Provided that the options exceed a benchmark for rational exercise motivated by the Hall and Murphy (2002) model, we classify the CEOs

as "Longholders." While unnecessary to generate our results, the threshold makes it unlikely that the CEOs' decisions to hold were driven by an optimal tradeoff of option value and diversification. Second, we split the Longholder measure into two pieces: "Pre-Longholder" and "Post-Longholder." Post-Longholder identifies only the Longholder CEO years after the first time the CEO held options to expiration. Pre-Longholder captures the remaining Longholder CEO years. Finally, we construct an alternative measure, Holder 67, based on the CEO's exercise decision for options with 5 years remaining duration. We, again, compute an appropriate threshold for rational exercise using a reasonable calibration of the Hall-Murphy model. When a CEO has an option with 5 years remaining duration that is beyond the threshold, but fails to exercise, we set the dummy variable Holder 67 equal to 1 for the remainder of the CEO's tenure. CEOs in the same situation who instead exercise have Holder 67 equal to 0.

Linking CEOs private portfolio strategies to their corporate decision-making, we find that overconfident CEOs are significantly more likely to conduct mergers than rational CEOs at any point in time. The higher acquisitiveness of overconfident CEOs – even "on average" – suggests that overconfidence is an important determinant of merger activity. Further, we find that the heightened merger activities of overconfident CEOs are primarily due to an increased likelihood of conducting diversifying acquisitions. Previous literature suggests that diversifying mergers are unlikely to create value in the acquiring firm.[9] Thus, it is consistent with our theory that overconfident managers are particularly likely to undertake them. Second, we find that the relationship between overconfidence and the likelihood of doing a merger is strongest when CEOs can avoid equity-financing., i.e. in the least equity dependent firms. Overconfident CEOs strongly prefer cash- or debt-financed mergers to stock deals unless their firm appears to be overvalued by the market.

To bolster our portfolio measure of overconfidence, we construct an alternative measure based on how a CEO is characterized in the press. We analyze the difference in merger activity be-

tween CEOs who are portrayed in the business press as "confident" and "optimistic" and CEOs who are portrayed instead as "reliable," "cautious," "conservative," "practical," "frugal," or "steady." Since press coverage during mergers may mechanistically lead to more coverage as "confident" and "optimistic" we employ a hazard-rate type approach and restrict the analysis to CEO-firm years up to the first merger of a CEO (if any). Controlling for the total number of press mentions, we then perform the same empirical analyses as with the portfolio overconfidence measures. All results replicate. Furthermore, the measures are highly correlated.

Finally, we look directly at the market's perception of the merger decisions made by overconfident CEOs. Using standard event study methodology, we show that outside investors react more negatively to the announcement of merger bids by overconfident CEOs. This result holds even controlling for relatedness of the target and acquiror, ownership stake of the acquiring CEO, corporate governance of the acquiror, and method of financing the merger. Our results suggest that, even if overconfident CEOs create firm value along some dimensions[10], mergers and acquisitions are not among them.

Our theory of managerial overconfidence provides a natural complement to standard agency theory. Both "empire-building preferences" and overconfidence predict heightened managerial acquisitiveness – especially given abundant internal resources – and, as shown in Malmendier and Tate (2003), a heightened sensitivity of corporate investment to cash flow. Unlike empire-builders, however, overconfident CEOs, believe that they are acting in the interest of the shareholders. Thus, overconfidence, cast as an agency problem, challenges the effectiveness of stock and option grants to top executives as an incentive mechanism. On the other hand, it provides additional underpinning for models of debt overhang. High leverage may effectively counterbalance an overconfident CEO's eagerness to invest and acquire, given his reluctance to issue equity he perceives as undervalued. In addition, the failure of traditional incentives to mitigate overconfidence underscores the importance of an independent board of directors.

This paper contributes to the growing literature in behavioral corporate finance which seeks to understand the implications of biased decision making in the context of organizations. One approach has been to analyze how managers exploit biases among investors, resulting in inefficiencies in the capital market.[11] More recently, researchers have started to analyze biases that affect corporate decision-makers themselves, such as overconfidence or sunk-cost fallacy.[12] The promise of the latter approach is that we have more precise knowledge about the types of biases affecting high-level executives than about the biases relevant for a broad mass of individual investors. Moreover, the argument for limited arbitrage is particularly simple and salient in this context.

The paper is organized as follows. In Section I we present a simple model of managerial overconfidence. In Section II we introduce the data. Section III introduces our empirical measures of overconfidence, based on option-holding and press-coverage, and discusses alternative interpretations. We then describe the empirical strategy and provide evidence that overconfidence can explain managerial acquisitiveness. In Section IV, we study the market reaction to mergers by overconfident CEOs. Section V concludes and provides some broad directions for future research.

I Theory

We construct a simple model that demonstrates the effects of managerial overconfidence on merger decisions in an otherwise frictionless market. In particular, we assume symmetric information between corporate insiders and outside investors. Moreover, management acts in the interests of current shareholders. We consider first a world with a single bidder for the target company and assume that the acquiror can extract the full surplus. We then show how variations in the relative bargaining power of target and acquiror, for example due to

competition among bidders, affect the potential over-payment by overconfident acquirors.

A Single Acquiror with Full Bargaining Power

Denote the market value of Acquiror A and Target T as V_A and V_T respectively. The CEO of A chooses whether or not to acquire T. He has access to an amount $\bar{c}$ of internal resources (cash and riskless debt). We denote the amount paid to the target shareholders as part of the merger financing as c, with $c \leq \bar{c}$. $V(c)$ is the market value of the combination of A and T, $\widehat{V}(c)$ the A manager's valuation of the combination of A and T, and $\widehat{V}_A$ his perception of his own company's value if he does not pursue the merger. An overconfident CEO overestimates the returns he will generate and thus overvalues his own company, $\widehat{V}_A > V_A$, as well as the merger, $\widehat{V}(c) - V(c) > \widehat{V}_A - V_A$ for some c.

Since the acquiror has all bargaining power, the manager of A must pay V_T for the target, independent of his degree of overconfidence. If the A manager offers an amount $c < V_T$ of cash financing (or other non-diluting assets), target shareholders demand a share s of the merged company such that $sV(c) = V_T - c$.

If the A CEO is rational, he chooses to conduct the takeover if and only if $V(c) - (V_T - c) > V_A$. Denoting the merger synergies as $e \in R$, we can decompose $V(c)$ into

$$V(c) = V_A + V_T + e - c \tag{1}$$

Not surprisingly, the rational CEO makes the first best acquisition decision and decides to acquire whenever $e > 0$. Moreover, his decision is independent of c. Since the capital market is fully efficient, there is no extra cost of raising external capital to finance the merger and the CEO is indifferent among cash, equity, or a combination.

An overconfident CEO overestimates the returns to mergers. Since $\widehat{V}(c) > V(c)$, the acquiring CEO also believes that (partial) equity financing entails a loss to current shareholders of $(\frac{V - c}{V(c)} -$

$\frac{V\ -c}{\widehat{V}(c)})\widehat{\mathsf{V}}\,(\mathsf{c})$.[13] He undertakes the merger despite this perceived cost if he believes the value of the diluted shares in the merged company to A's current shareholders is greater than the value of A forsaking the merger. That is, he undertakes the merger if and only if $(1-\mathsf{s})\widehat{\mathsf{V}}\,(\mathsf{c}) > \widehat{\mathsf{V}}_A$ for some $\mathsf{c} \leq \bar{\mathsf{c}}$. Substituting for s, he acquires T iff $\widehat{\mathsf{V}}\,(\mathsf{c}) - (\mathsf{V}_T - \mathsf{c}) - \frac{\left[\widehat{V}(c)-V(c)\right](V\ -c)}{V(c)} > \widehat{\mathsf{V}}_A$ for some c. Denoting the "perceived" additional merger synergies as $\hat{\mathsf{e}} \in \mathsf{R}_{++}$,[14] we can decompose $\widehat{\mathsf{V}}\,(\mathsf{c})$ into

$$\widehat{\mathsf{V}}\,(\mathsf{c}) = \widehat{\mathsf{V}}_A + \mathsf{V}_T + \mathsf{e} + \hat{\mathsf{e}} - \mathsf{c} \tag{2}$$

Then, using (1) and (2), the overconfident manager's decision rule is to merge whenever $\mathsf{e}+\hat{\mathsf{e}} > \frac{(\widehat{V}\ -V\ +\hat{e})(V\ -c)}{V(c)}$. That is, he merges whenever total perceived merger synergies exceed the perceived loss due to dilution. Combining these results with the results of the prior section yields the following lemma and propositions.

Lemma 1 An overconfident CEO exhausts his supply of internal (non-diluting) assets before issuing equity to finance a merger.

Proof. An overconfident CEO perceives the post-acquisition value of the firm to current shareholders as $\mathsf{G} = (1-\mathsf{s})\widehat{\mathsf{V}}\,(\mathsf{c}) = \frac{V(c)-V\ +c}{V(c)}\widehat{\mathsf{V}}\,(\mathsf{c}) = \frac{(V\ +e)\left(\widehat{V}\ +V\ +e+\hat{e}-c\right)}{V\ +V\ +e-c}$, where the last equality uses (1) and (2). Then $\frac{\partial G}{\partial c} = \frac{(V\ +e)\left(\widehat{V}\ -V\ +\hat{e}\right)}{(V(c))^2} > 0$ (as $\widehat{\mathsf{V}}_A > \mathsf{V}_A$ and $\hat{\mathsf{e}} > 0$ by assumption). Post-merger value is maximized on $\mathsf{c} \in [0, \mathsf{V}_T]$ by setting c as high as possible. Q.E.D.

Proposition 1 A rational CEO never conducts a value-destroying merger. An overconfident CEO conducts a value-destroying merger if the perceived synergies $\hat{\mathsf{e}}$ are sufficiently large relative to the perceived undervaluation $(\widehat{\mathsf{V}}_A - \mathsf{V}_A)$ and the portion of the deal financed by equity $\frac{V\ -c}{V}$.

Proof. The first-best decision rule of a rational CEO immediately implies that he does not conduct a value-destroying merger. An overconfident CEO conducts a merger whenever $\mathsf{e}+\hat{\mathsf{e}} >$

$\frac{(\widehat{V}_A - V_A + \hat{e})(V - c)}{V(c)}$. Thus, if $e \leq 0$, he still conducts the merger as long as $\hat{e} > |e|$ and $\widehat{V}_A - V_A$ and $\frac{V-c}{V(c)}$ are sufficiently small. Q.E.D.

Proposition 2 (i) If $\tau \geq V_T$, an overconfident CEO conducts any merger a rational CEO would conduct and some mergers a rational CEO would not conduct. (ii) If $\tau < V_T$, an overconfident CEO does some (value-destroying) mergers a rational CEO would not and a rational CEO does some (value-creating) mergers that the overconfident CEO would not.

Proof. If $\tau \geq V_T$, the overconfident manager sets $c = V_T$ by Lemma 1 and $\hat{e} > 0$. The resulting condition for conducting the merger is $e + \hat{e} > 0$. Since the rational CEO merges whenever $e > 0$, the first part of Proposition 2 follows. For $\tau < V_T$, the first statement follows from Proposition 1. To show the second statement in (ii), suppose $e > 0$. Then, the rational CEO always does the merger. The overconfident CEO will not do the merger if and only if $e + \hat{e} < \frac{(\widehat{V}_A - V_A + \hat{e})(V - c)}{V(c)}$, i.e. if $\hat{e}$ is sufficiently small and $\widehat{V}_A - V_A$ or $\frac{V-c}{V(c)}$ are sufficiently large. **Q.E.D.**

B Competing Acquirors

We now consider the implications of reduced bargaining strength and less surplus extraction of the acquiror. Note that, in a standard two-player bargaining framework, the differences in beliefs between an overconfident A manager and a rational T manager about the size of the surplus from merging would require assumptions not only about relative bargaining power but also about higher-order beliefs regarding the parties' perception of surplus and the interaction of these beliefs with the parties' relative bargaining strength. For simplicity, we will thus endogenize variations in the amount of surplus A can extract by introducing competition among potential acquirors in a bidding framework.

Suppose that there are I potential acquirors A_i, $i = 1, ..., I$. Denote by W_i the A_i man-

ager's maximal willingness to pay for T. W_i is simply the market value of the target plus the (perceived) surplus to A_i's current shareholders as a result of the merger, i. e.

1. $W_i = V_T + e_i$ if the A_i manager is rational;
2. $W_i = V_T + e_i + \hat{e}_i - 1_{\{\bar{c} < W_i\}} \frac{(\hat{V}_i - V_i + \hat{e}_i)(W_i - \bar{c})}{V_i + V_T + e_i - \bar{c}}$ if the A_i manager is overconfident.

In English auction among bidders with $\max W_i \geq V_T$ the equilibrium outcome is as follows[15]:

1. The winning bidder is A_{i^*}, where $i^* = \arg\max_i W_i$.
2. The winning bid is $b^* = \max\{(\max_{i \neq i^*} W_i), V_T\}$.

Note that, contrary to Roll's theory, an overconfident bidder does not always bid higher than a rational bidder, even if the actual synergies of the merger are smaller for the rational bidder. In particular, an overconfident bidder who is considerably more overconfident about the value of his own company than about the merger may lose the takeover contest. Most importantly, heterogeneity in the merger synergies can increase the transfer to target shareholders and, when interacted with overconfidence, can lead to over-payment. Denoting the company that wins the takeover contest as A_{i^*} and defining 'overpayment' as a transfer from A_{i^*} to T that is higher than the sum of target value and synergies, $V_T + e_{i^*}$, we have the following proposition.

Proposition 3 If the manager of the winning acquiror A_{i^*} is overconfident, he will over-pay if $\max_{i \neq i^*} W_i \in (V_T + e_{i^*}, W_{i^*})$.

C Extensions

Before turning to the empirical predictions of the model, we briefly discuss two important extensions. First, overconfident CEOs might not only overvalue their potential leadership in other companies, but also the returns from their internal investment projects (Malmendier and Tate, 2003). This effect could counteract their increased acquisitiveness if resources are scarce. An extended model of corporate decision-making would include the menus of both potential

acquisitions and internal projects. When new resources become available to the CEO, he would initiate the next project on either or both menus. While relative returns would determine which project is chosen first, we would expect overconfidence affect to increase the number and type of projects of both types over time.[16]

Second, we have focused exclusively on overconfidence in acquiring managers. Indeed, overconfidence may be an important force in distinguishing acquirors from targets. However, target managers could be overconfident as well. While overconfidence of target managers will not change the qualitative predictions of our model, it yields many interesting comparative statics. For example, acquisitions of target firms with overconfident management are more likely to be hostile takeovers. The overconfident target management might believe they can create at least as much value as the potential acquirors and, hence, reject shareholder-value increasing bids as too low. Similarly, we would expect acquirors to pay a higher premium for targets with overconfident managers, even in friendly deals. As a result, the acquirors of firms with overconfident managers are likely to be among the most overconfident managers. In both cases, overconfidence on the side of the target management can be beneficial to the target shareholders. Unfortunately, we cannot test any of these implications due to data limitations.[17]

D Empirical Predictions

In the remainder of the paper, we test the empirical implications of our model. To facilitate the translation of the model into predictions about a cross-section of CEOs, we suppose that e is drawn independently from the same distribution for all potential mergers. That is, overconfident and rational CEOs do not have systematically different merger opportunities.

The first quantity of interest is the difference in the average probability of conducting a merger between overconfident and rational CEOs. As noted above, overconfidence implies both over-

estimation of merger returns and reluctance to raise outside financing to implement a merger. The net effect of overconfidence on merger frequency is thus ambiguous. However, whether or not overconfident CEOs are more acquisitive is a key indicator of the importance of overconfidence as a general explanation of observed merger activity. Moreover, the model delivers three testable predictions. Proposition 1 and Proposition 2 imply (respectively):

Prediction 1. Overconfident CEOs are more likely to conduct mergers that ex ante have a high probability of failure (and negative expected return).

Prediction 2. Among CEOs with abundant internal resources (e.g. large cash reserves and low leverage), overconfident CEOs are more likely to conduct acquisitions.

Finally, Proposition 1 and Proposition 2 together imply that mergers conducted by overconfident CEOs will be worse on average than mergers conducted by rational CEOs. In addition, Proposition 3 shows that overconfident managers are prone to overpay for their acquisitions. Since we have maintained the assumption that the market is efficient, all information about the quality and terms of the deal will be incorporated at the announcement date and we have the following prediction.

Prediction 3. The difference between the average stock price reaction to the announcement of a merger bid by an overconfident CEO and the average stock price reaction for a rational CEO is negative.

Note that the assumption of symmetric information implies that the merger announcement does not convey any information about the fundamentals of the acquiring company. In practice, information revelation will have an impact on the announcement effect (e. g. in Hietala et al., 2002). For simplicity, we assume that the average effect of such information revelation is the same among overconfident and rational CEOs.

II Data

We analyze a sample of 477 large publicly-traded United States firms from the years 1980 to 1994. The core of the data set is described in detail in Hall and Liebman (1998) and Yermack (1995). To be included in the sample, a firm must appear at least four times on one of the lists of largest US companies compiled by Forbes magazine in the period from 1984 to 1994.[18] The virtue of this data is that it provides us with detailed information on the stock ownership and set of option packages – including exercise price, remaining duration, and number of underlying shares – for the CEO of each company in each year. From this data we obtain a fairly detailed picture of the CEO's portfolio rebalancing over his tenure.

We also collect data on how the press portrays each of the CEOs during the sample period. We search for articles referring to the CEOs in The New York Times, Business Week, Financial Times, and The Economist using LexisNexis and for articles in the The Wall Street Journal using Factiva.com. For each CEO and sample year, we record four statistics: the total number of articles; the number of articles containing the words "confident" or "confidence;" the number of articles containing the words "optimistic" or "optimism;" and the number of articles containing the words "reliable," "cautious," "conservative," "practical," "frugal," or "steady." We hand-check each article to be sure that the terms are used to describe the CEO in question. In the process of scanning the search output, we separate out any articles specifically describing the CEO as "not confident" or "not optimistic."

We supplement this CEO-level data with mergers data from the SDC and CRSP merger databases. Both data sets give us the announcement date and means of financing for mergers conducted by our sample of firms. The CRSP data set covers only mergers with CRSP-listed target firms. We use the SDC data to supplement the set of mergers with acquisitions of private firms, large subsidiaries, and foreign companies.[19] We require that the acquiring company

acquire at least 51% of the shares of the target (and, hence, control) in the transaction. Similarly, we omit acquisitions of companies where the acquiror already holds at least 51% of the shares. Finally, following Morck et al., (1990), we omit mergers in which the value of the target is less than five percent of the value of the acquiror.[20] For most of the paper, we consider only completed merger bids; however, when we consider market reaction, we include all merger bids in the estimations.

We supplement the data with various items from the COMPUSTAT database. We measure firm size as the natural logarithm of assets (item 6) at the beginning of the year. We measure investment as capital expenditures (item 128), cash flow as earnings before extraordinary items (item 18) plus depreciation (item 14), and capital as property, plants and equipment (item 8). We normalize investment and cash flow with beginning of the year capital. Given that our sample is not limited to manufacturing firms (though it mainly consists of large, nonfinancial firms), we check the robustness of our results to normalization by assets (item 6). We measure Q as the ratio of market value of assets to book value of assets. Market value of assets is defined as total assets (item6) plus market equity minus book equity. Market equity is defined as common shares outstanding (item 25) times fiscal year closing price (item 199). Book equity is calculated as stockholders' equity (item 216) [or the first available of common equity (item 60) plus preferred stock par value (item 130) or total assets (item 6) minus total liabilities (item 181)] minus preferred stock liquidating value (item 10) [or the first available of redemption value (item 56) or par value (item 130)] plus balance sheet deferred taxes and investment tax credit (item 35) when available minus post retirement assets (item 336) when available. Book value of assets is total assets (item 6).[21] Further, we use fiscal year closing prices (item 199) adjusted for stock splits (item 27) to calculate annual stock returns. We also use CRSP to gather stock prices and 2 and 4 digit SIC codes for the companies in our sample and the target firms in CRSP acquisitions. Missing accounting data (largely from financial firms) leaves us

with a final sample of 394 firms. As in Malmendier and Tate (2003), we trim cash flow at the 1% level to ensure that our results are not driven by several extreme outliers. However, all results of the paper can be replicated with the full data set. The outliers only influence the estimates at all in the regressions on quintiles of the data set in Subsection F and only in the (interior) quintiles of lesser interest.

In addition, we collected personal information about the CEOs in our sample using Dun and Bradstreet and Who's Who in Finance and Industry. We broadly classify a CEO's professional background as financial, engineering or miscellaneous. We classify CEOs as having a finance background if they previously worked in a financial institution or as CFO, treasurer, accountant or in another finance related position. CEOs have an engineering background if they are individual patent-holder or previously worked as engineer, in the natural sciences, or in another technically-oriented position.

Table 1 presents summary statistics of the data. Panel A presents firm-specific variables and Panel B CEO-specific variables, both for the full set of CEOs and for the subset of CEOs whom we classify as overconfident based on their option-exercise behavior (Longholder; see the next section). The mean, median and standard deviation of all variables are remarkably similar for overconfident and non-overconfident CEOs; only the number of vested options that have not been exercised is considerably higher among overconfident CEOs. This difference could stem from overconfidence, as we will see later, but, regardless, we will control for the level of vested options in all of our regressions. Panel C presents the summary statistics of the CEOs' press coverage. While the mean and median number of press mentions in any of the selected business press outlays are very high (91.8 and 39 respectively), the average number of mentions with the attributes "confident" or "optimistic" or any of "reliable, cautious, conservative, practical, steady, frugal" is below 1 and the median is zero. In our empirical analysis we will thus consider not only the (lagged) number of mentions but also a form of "moving average" (in indicator

form) of mentions of each kind over the sample tenure up to the previous year for each CEO. Panel D presents summary statistics of the mergers undertaken by CEOs in our sample.

III The Impact of Overconfidence on Acquisitiveness

A Measures of Overconfidence

We first analyze private portfolio decisions of CEOs to identify overestimation of future returns. In particular, we exploit the panel data information on the timing of executive option exercises. Compensation contracts often grant stock options to the CEO. These options are non-tradeable and give the executive the right to purchase shares of company stock, usually at the stock price on the grant date. Most executive options have a ten year life span and are exercisable after (at most) a four-year vesting period. Upon exercise, the CEO receives shares of company stock; however, these shares are almost always immediately sold (Ofek and Yermack 2000). Thus, at exercise the executive receives for each option the value in cash given by the current stock price minus the strike price (i.e. the stock price on the grant date for options granted "at the money").

Black and Scholes (1973) argue that investors should value traded options as if they were risk-neutral, since they can offset the idiosyncratic risk of any particular company by diversifying their portfolio. So, since an option is always worth more alive than dead (as option value is non-negative), they should never exercise options early. This logic, however, does not apply to executive options. These options cannot be traded and CEOs cannot hedge (legally) the risk of their holdings by short-selling company stock. Moreover, CEO compensation contracts typically grant not only stock options, but also large quantities of company stock to the executive. As a result, their personal portfolios are likely to be insufficiently diversified. Moreover, their human capital is invested in their firm, further increasing their exposure to company-specific

risk. Thus, a CEO must trade-off the option-value of holding stock options against the costs of underdiversification. Though the optimal option exercise schedule depends on individual wealth, diversification, and risk-aversion, a risk-averse CEO should generally exercise options early given a sufficiently high stock price (Lambert et al., 1991; Hall and Murphy, 2002).

We translate this logic into several measures of overconfidence below. By holding on to exercisable company stock options even when the stock price has exceeded theoretically calibrated thresholds for exercise, the CEO indicates his belief that the stock price will continue to rise in the future under his leadership and that this future appreciation will be enough to offset the benefits of diversifying his holdings. After defining the measures, we explore potential alternative explanations for the persistent failure to offset company-specific risk, including inside information.

Longholder. Our first portfolio measure has two criteria. First, a CEO must at least once during his tenure as CEO hold an option until the year of expiration. Second, the option held until expiration must be sufficiently in the money entering its final year to make it unlikely that the (diminished) option value from holding would exceed the benefits of diversification achievable through exercise. We use the rational option exercise model of Hall and Murphy (2002) to guide our choice for this threshold. We use a constant relative risk aversion coefficient of 3 and 67% of wealth in company stock as parameters in their model to deduce that a CEO should not continue to hold an option with one year remaining duration if the stock price is at least 40% higher than the strike price of the option.[22] In most cases the option has already exceeded the threshold for rational exercise for many years (the median percentage in the money entering the final year for options held to expiration is 253%); however, this assumption assures that there is at least one point in time at which the CEO's failure to exercise is difficult to reconcile with his strong incentive to diversify.[23] It also assures that we do not contaminate our measure by including CEOs who held "underwater" options that

could never have been profitably exercised. The particular choice of parameter values is not important for our results: any assumption from no threshold at all to a threshold of 100% in the money would yield similar results. Thus, it is CEOs who hold options that are highly in the money (where option value is relatively small) who drive the results. Holding an option until its final year, even when it is highly in the money, indicates that the CEO has been consistently "bullish" about the company's prospects. Most of the options in our sample have 10 year durations and are fully exercisable after year 4. Thus, for at least 6 years the CEO decided to hold the options, betting his personal wealth on the company's future returns, rather than taking the current value of the option and investing in a diversified portfolio.[24]

The first version of the Longholder measure captures a managerial fixed effect. We attempt to capture an inherent personality feature, which makes certain predictions for behavior on the CEO's personal and corporate accounts. To test the overconfidence theory, we first show that this portfolio strategy induces losses and then examine whether the CEOs who engage in the behavior predicted by overconfidence on their personal account (failure to diversify) are also the CEOs who engage in the behavior predicted by overconfidence on their corporate account (excess acquisitiveness). One way to think about the results, then, is as a potential explanation for the managerial fixed effects on corporate policy identified by Bertrand and Schoar (2003). If, however, CEOs may become overconfident during their tenures, then the empirical approach might incorrectly classify earlier years of their tenure among the overconfident CEO years.

Pre-Longholder / Post-Longholder. To address this possibility, we split the Longholder indicator into two separate variables: Post-Longholder is a dummy variable equal to 1 only after the CEO for the first time holds an option until expiration (provided it exceeds the 40% threshold). Pre-Longholder is equal to 1 for the rest of the CEO years where Longholder is equal to 1. With Post-Longholder, we can identify the effect of overconfidence on acquisitiveness using only CEO years after the CEO has demonstrated overconfidence on his personal account. However, only

42% of the observations where Longholder is 1 fall into the Post-Longholder category. Since there are relatively few completed mergers in the CEO years with Post-Longholder equal to 1 (41), the loss of power is too great to perform tests that require us to subdivide mergers into finer categories (i.e. cash mergers vs. stock mergers or diversifying mergers vs. intra-industry mergers).

Holder 67. As an alternative to the Post-Longholder measure, then, we construct Holder 67.[25] Here we relax the extreme requirement that CEOs choose to hold their options at every point in time until expiration. Instead, we consider all option packages with 5 years remaining to expiration.[26] We then ask for each package whether the stock price is sufficiently low (and hence the option value sufficiently high) to justify continuing to hold the option given risk aversion and extreme under-diversification. As above, we use the Hall and Murphy framework as a theoretical guide in choosing a reasonable value for this threshold percentage in the money. Maintaining the assumed parameter values from the Longholder measure (constant relative risk aversion coefficient of 3 and 67% of wealth in company stock), the appropriate threshold is 67% in the money. If the CEO fails to exercise options with 5 years remaining duration when the potential proceeds from exercise during the preceding year have exceeded the 67% threshold, we set Holder 67 equal to 1. As above, the results are robust to variation in the value of the threshold.

We also impose a sample restriction whenever we use this measure. We consider only CEO years after the CEO for the first time has an option with 5 years remaining duration that is at least 67% in the money. Thus, we compare CEOs who, faced with highly in-the-money options, choose to bet on the future stock performance of their company only to (less confident) CEOs who, faced with the same exercise decision, choose to diversify. Once a CEO enters the sample, he does not exit unless he leaves the company and once a CEO is classified as overconfident, he retains that label for the remainder of his sample years. It is possible, however, for a CEO

(who has multiple option packages reach the 67% threshold with 5 years remaining duration during his tenure) to enter the sample in the comparison group, but later become overconfident under the Holder 67 measure. Overall, the sample restriction leaves 1795 of our original 3911 observations.

Because of the less stringent requirements under the Holder 67 measure, we have more overconfident CEO years and more completed mergers (154) in those CEO years than under the Post-Longholder measure. Thus, this measure is more appropriate to test predictions that require us to partition the mergers into smaller groups. The sample restriction ensures that we are nevertheless comparing our overconfident CEOs to a less confident set of peers. However, when we quintile the sample to test financing predictions in Section F, sample size becomes a limiting issue.

B Discussion

In Panel B of Table 1, we show CEO summary statistics for subsamples of firm years with and without an overconfident CEO. In Table 2, we report the pairwise correlations between overconfidence and firm and CEO characteristics. For brevity, we use only Longholder in these comparisons. The patterns are similar for the other overconfidence measures.

There is little correlation of our overconfidence measures with firm and CEO characteristics. The only two variables with a correlation higher than 0.1 with Longholder are CEO tenure and vested options. These correlations arise mechanistically. Since classification as a Longholder requires the CEO to hold an option (typically for ten years) to expiration, CEOs with short tenure are less likely to be classified as overconfident.[27] This correlation, however, does not arise with the Holder 67 measure. The (untabulated) correlation between Holder 67 and tenure is -0.012. Similarly, classification as overconfident under either measure requires the CEO to

excessively hold stock options. This failure to exercise naturally can aggregate into a higher level of option holdings among overconfident CEOs (the correlation between Holder 67 and vested options is also 0.19). Regardless of the explanation for these correlations, we control for both tenure and the level of vested options in our estimations.

The correlation between our overconfidence measures and the level of vested options suggests that we might also be able to measure overconfidence effects simply using the level of stock and option holdings. Following our logic from the previous section, CEOs who fail to divest company risk should have higher holdings of stock and options. These potential measures of overconfidence, however, are less precise and harder to interpret. The CEO cannot fully control the level of his stock and option holdings due to the influence of the board of directors and his compensation contract. Thus, our measures of overconfidence focus on changes in the portfolio that are directly under the CEO's control. Further, boards grant stock and options to the CEO primarily to confer incentives. Thus, the effect of vested option levels on acquisitiveness would confound the overconfidence effect with incentive effects. And, to the extent that mergers are undesirable, these two effects may go in opposite directions.

We also consider the correlation between the Longholder and Holder 67 measures. Imposing the Holder 67 sample restriction, we find that the correlation between these two measures is 0.47. Though the Holder 67 measure appears less conservative than Longholder (100 out of 747 of CEOs are classified as overconfident under Longholder; 244 out of 408 under Holder 67), this strong positive correlation suggests that the measures indeed capture the same effect.

Before turning to the effects of our overconfidence measures on investment, we consider alternative interpretations of the systematic failure to divest company risk.

1. Inside information. Another important reason a CEO may fail to decrease exposure to company risk is inside information. CEOs may delay the exercise of vested options beyond

the rational benchmark when they have positive inside information about the prospects of their company. In order to explain repeated delay of option-exercise over a multi-year horizon, this inside information must be persistently positive over time. Then, one argument against the information story is that we typically think of the arrival of new information as random (i.e. sometimes good news and sometimes bad) and it may be implausible for a single piece of positive information to elude the market for more than six years. The most direct way to distinguish overconfidence from inside information, however, is to compare the returns CEOs obtained holding on to their options to the returns they could have obtained through timely diversification. In Panel A of Table 4, we calculate the hypothetical returns that Longholder CEOs could have realized had they exercised their options even one year before expiration and invested the proceeds in the S&P 500. We assume that both the hypothetical exercise and actual exercise occur at the maximum stock price during the fiscal year. We find that, on average, Longholder CEOs did not profit by holding until expiration compared to this alternative strategy. Indeed, the average return to exercising a year earlier is positive, though statistically insignificant. We also replicate these results assuming hypothetical exercise $2, 3, 4,$ and 5 years before expiration.[28] The average CEO would have done better under all four alternative strategies than by holding to expiration. We also make a similar calculation for the Holder 67 measure. We find, again, no evidence that CEOs have positive information about future stock prices. In this case, we compute the returns from exercising in year 5 when the option has passed the 67% threshold and investing the proceeds in the S&P 500. We then compare those returns to the returns the CEO actually obtains by holding the options until the next date on which he exercises any options in the package. The mean difference in returns is -0.0053 with a standard deviation of 0.2882. Thus, there is no evidence that CEOs who hold in-the-money stock options earn abnormal returns, even over the S&P 500 index. The CEO's belief that the firm is undervalued is not correct.

Moreover, to be a viable alternative explanation of our results, inside information must explain not only failure to diversify on the personal portfolio, but also the differences in merger decisions we observe among these CEOs (see Sections III.D-F and IV). To explain heightened acquisitiveness, positive inside information must be related to upcoming or recently completed mergers. However, existing empirical evidence suggests no abnormal insider trading around merger announcements (Boehmer and Netter, 1997). In our empirical work, the Post-Longholder measure allows us to isolate increased acquisitiveness after the CEO has held an option to expiration and demonstrated overconfidence on his personal portfolio. Since this extra acquisitiveness occurs after the options expire, the timing is difficult to reconcile with the information story.

2. Signalling. Another possible rationale for holding stock options beyond rational benchmarks for exercise, given informational asymmetry between the CEO and the market about merger bids, is signalling. Holding exercisable stock options that are highly in the money may signal to the market that an impending merger bid is high quality. First, existing evidence on insider trading around merger announcements casts doubt on managers' ability to signal merger quality by their trading decisions (Boehmer and Netter, 1997). We also find increased acquisitiveness among CEOs who excessively hold options not just while they are holding the options, but also after the options have expired. Most importantly, we show in Section IV that the market reacts significantly more negatively to the merger bids of CEOs who fail to exercise highly in-the-money stock options than to the bids of other CEOs. Thus, holding options does not appear to convey positive information about the merger to the market.

3. Board Pressure. A related story is that CEOs do not exercise highly in-the-money options because of board pressure. One obvious weakness of this story is the existence of a mechanism by which the board can compel the CEO not to exercise: they can simply grant options with longer vesting periods. However, we see almost no cases of vesting periods longer than four

years in the data. And, more than half of the option packages are fully exercisable within a year or less of the grant date. Moreover, to obtain excess acquisitiveness among the CEOs facing this board pressure, the most natural story would be that the firm plans to do one or more mergers and fears the market would interpret exercise as a bad signal about those mergers. But, in order for this pressure to be rational, the market should then prefer the merger deals of option-holders to exercisers. Again, we see in Section IV that the opposite is the case. Then, either the board pressure is irrational or the market would punish these firms even more for merger bids if the CEO did not signal (despite the fact that other firms in which the CEO exercises options are not punished when they make merger bids). We cannot completely rule out this convoluted version, but we do the best we can to control for the effects of board composition and governance on acquisitiveness. We include firm fixed effects in our regressions so we can identify differences in acquisitiveness between CEOs who hold and do not hold options within the same firm and, likely, facing a similar board. We also include controls for board size or, in untabulated results, the number of outside CEOs on the board in the regressions.

3. Risk Tolerance. Another alternative explanation for our measure is that we have overestimated the importance of CEO risk aversion. CEOs might hold options until expiration if they are risk neutral or even risk-loving, or if they manage to perfectly hedge the risk of their options despite the prohibition of trading and short sales. However, shareholders should prefer an (effectively) risk neutral CEO over a risk-averse CEO since they are not prevented from diversifying their portfolios. So, if risk aversion dampens the willingness of the CEO to take risks on the corporate account and our overconfidence measures capture risk proneness or risk neutrality (or a greater ability to offset risk), the market should react positively to the extra bids of option holders. In Section IV, we show that, instead, the market reacts more negatively to the bids of CEOs who fail to exercise in-the-money options than to the bids of

other acquirors.

4. Taxes. Taxes may provide an alternative reason to postpone option exercise. Specifically, the CEO may fail to exercise to postpone the payment of taxes on his profits. Personal income tax deferral, however, would not predict heightened acquisitiveness among holders. Thus, taxes cannot explain our results.

5. Procrastination. Finally, CEOs might fail to exercise in-the-money options if they are "inertial" in the sense of O'Donoghue and Rabin (2001). We find, however, that more than 68% of the CEOs classified as overconfident under the Longholder measure (which is most susceptible to the procrastination critique) conduct other transactions on their personal portfolios in the two years prior to the year their "longheld" option expires. In addition, "inertia" is less pertinent for Holder 67 since most CEOs who hold beyond the benchmark in the fifth year nevertheless exercise before the option reaches its final year. Regardless, it is difficult to explain why holders would be significantly more acquisitive than exercisers, if procrastination explains late exercise. We might more naturally expect CEOs who procrastinate on their personal account to also enjoy the "quiet life" on the corporate account.

As a final way to separate the overconfidence interpretation from these other interpretations of the failure to divest company-specific risk, we construct an alternative measure of overconfidence. Rather than using the CEO's decisions on his personal account, we use market perception of the CEO (as revealed in the business press) to identify overconfidence. The results using this alternative measure, which side-steps many of these issues, are in Section G.

We also briefly address some additional alternative stories in Section D. We investigate these stories (e.g. stock price bubbles) using additional controls in our logit specification and, thus, they are best deferred until after we present the logit results.

C Empirical Specification

To test the effect of managerial overconfidence on acquisitiveness, we use the following general regression specification:

$$\Pr\{Y_{it} = 1 | O_{it}, X_{it}\} = G(\beta_1 + \beta_2 O_{it} + X'_{it} B) \tag{3}$$

O is the overconfidence measure. The set of controls X includes Tobin's Q, cash flow, size, a measure of corporate governance, ownership, unexercised vested options (normalized by total number of shares outstanding) and year fixed effects. Y is a binary variable that, unless otherwise specified, takes the value 1 if the CEO made at least one successful merger bid in a particular firm year. Throughout the paper, we assume that G is the logistic distribution.[29] The null hypothesis is that β_2, the coefficient on overconfidence, is equal to zero.

There are two kinds of variation we can use to identify the effect of overconfidence on acquisitiveness, cross-sectional and within-company variation. As an example for the first type, consider the case of Wayne Huizenga, CEO of Blockbuster Entertainment Group for all 7 years the firm appears in our data. Since he holds some options until the year of expiration, we classify him as overconfident. He also, during those 7 years, conducts 6 acquisitions. Similarly, David Farrell is CEO of May Department Stores – the holding company of Lord & Taylor, Filene's, and Robinsons-May, among others – for the 15 years it appears in our sample and is classified as overconfident. He conducts 5 mergers during those 15 years. By contrast, J. Willard Marriott of Marriott International is CEO of his company for all 15 years of our sample, but never holds an option until expiration. He also never conducts an acquisition. By comparing these two types of CEOs, we can identify a cross-sectional effect of overconfidence on acquisitiveness. As an example of within-company variation, consider Colgate Palmolive. For the first 4 years, the CEO is Keith Crane. Crane never holds an option until expiration and he never conducts an acquisition. Reuben Mark succeeds him as CEO in 1984. Over

the next 11 years, he holds some options until the year of expiration and he also conducts 4 acquisitions. So, by comparing overconfident and rational CEOs within the same firm, we might also identify a positive effect of overconfidence on acquisitiveness.

We estimate Equation (3) using three estimation procedures. The first specification, a logit regression, makes use of both types of variation. The second, a logit regression with random effects, also makes use of both types of variation. But, it explicitly models the effect of the firm, rather than the CEO, on acquisitiveness. Note that if the estimated effects of overconfidence in the logit specification were due to firm effects, we would expect to see a decline in our estimates when we include random effects. Finally, we estimate Equation (3) using a logit regression with fixed effects. This specification makes use only of the second type of variation. That is, we estimate the effect of overconfidence on acquisitiveness using only variation between overconfident and rational CEOs within a particular firm. To estimate the fixed effects model consistently, we use conditional logit. Conditioning the likelihood on the number of successes in each panel, we avoid estimating the coefficients of the fixed effects themselves and obtain consistent estimates of the remaining coefficients. The fixed effects approach eliminates any time-invariant firm effect on average acquisitiveness. The disadvantage of the procedure is that it induces sample-selection bias. Only firms that conduct at least one merger during the sample period and that had at least one overconfident and one non-overconfident CEO are included in the fixed-effects estimation. In Table 3, for example, the number of observations drops from 3911 to 2568 and the number of firms from 394 to 225 when we move from the logit to the fixed effects logit specification. To show that neither cross-sectional variation nor sample selection are biasing our results, we present the results of all three specifications.

D Overall Impact of Overconfidence

We first estimate Equation (3) on our entire sample of firm years. A positive effect of overconfidence on average is not necessary to confirm the predictions of our overconfidence model (see Section I). However, such a finding would indicate that overconfidence explains a significant amount of observed merger activity.

Running a baseline logit with only overconfidence as a regressor (and no controls), we already find a strong and significant impact of overconfidence on acquisitiveness. Using Longholder as the overconfidence measure, the odds of an overconfident CEO making an acquisition are 1.65 times the odds of other CEOs. More specifically, the odds of a non-overconfident CEO making an acquisition are 0.118 while the odds for a Longholder CEO are 0.195. Similarly, when we split Longholder into the Pre-Longholder and Post-Longholder components, we find an odds ratio of 1.48 on Post-Longholder. And, using Holder 67 as the overconfidence measure, we find an odds ratio of 1.78. The Longholder and Holder 67 effects are significant at the 1% level and the Post-Longholder effect is significant at 10%, where standard errors are clustered by firm.

Table 3 contains the results of estimating Equation (3) using the logit, random effects logit, and conditional logit specifications and each of the proxies for overconfidence, respectively. Standard errors in the logit specification are clustered by firm. In the conditional logit specification, standard errors are not clustered at the firm level. However, in a traditional logit specification with firm dummies, the errors with firm-level clustering are actually slightly smaller than the errors from the conditional logit specification.

We include the logarithm of assets at the beginning of the year as a control for firm size, Tobin's Q at the beginning of the year as a control for investment opportunities, an indicator for efficient board size as a measure of corporate governance[30], and cash flow as a measure of internal resources. We also include two controls for the incentive effects of holding company

stock and options: the percent of company equity held by the CEO at the beginning of the year and the number of options exercisable within six months of the beginning of the year, normalized by total shares outstanding. Finally, we include year effects to control for time trends in the likelihood of conducting a merger. The most consistent effects across specifications are for cash flow and Q. We find that firms with lower values of Tobin's Q are more likely to conduct mergers, suggesting that acquisitions may be a substitute for profitable investment opportunities.[31] More cash flow, on the other hand, leads to more acquisition activity, as expected if cash eases financing constraints. Among the other controls, the between and within firm effects appear to go in opposite directions and most estimated coefficients are insignificant. Notably, size appears to have a mechanical relationship with acquisitiveness within firm. That is, the assets of a firm are necessarily larger after a merger. We re-run the regressions without size to verify that this undesirable effect does not interact with the overconfidence estimates.

The effects of these controls appear to be largely orthogonal to the effect of overconfidence. CEOs who persistently hold options are still significantly more acquisitive on average, regardless of the specification. The effect of overconfidence on acquisitiveness is strong and significant even when we include firm fixed effects and identify overconfidence only using variation across CEOs in the same firm.[32] We also estimate an untabulated specification that includes industry fixed effects and the interaction of industry effects with the year effects to the regression.[33] Industries are defined as the 48 Fama and French industry groups.[34] This specification allows us to control for the possibility that mergers cluster within industries over time, as argued by Andrade et al., (2001). There is only a negligible impact on the results. Thus, overconfidence appears to be an explanation of merger activity that generalizes across merger waves.

Including year and firm effects already address any alternative explanation of the results that relies on market-wide or firm cross-sectional variation. However, there are possible alternative stories that rely on time-series variation within firms. Here we consider additional controls

that can help rule out relevant time-varying firm effects.

First, we consider the possibility that CEOs exploit stock price bubbles and trade their overvalued equity for the assets of the target company (Shleifer and Vishny, 2002; Dong et al., 2002). This story can incorporate the observed failure to exercise options if managers want to reap the benefits of the bubble or to avoid "popping" it with a negative signal. To address this possibility, we must check whether the probability of doing a merger moves with the stock price of a particular firm and whether controlling for this effect ameliorates the estimated coefficient of overconfidence. So, we estimate Equation (3) adding five lags of stock returns to our set of controls. We find that our estimates of the effect of longholder on acquisitiveness are unaffected (Table 5), though the lag of returns does appear to increase acquisitiveness.

Second, we investigate whether CEOs hold options longer than their peers because their companies' stocks are more volatile. High volatility of the underlying asset increases option value and the threshold for exercise. We can link this behavior to increased acquisitiveness if these CEOs conduct mergers to diversify the corporate account (Amihud and Lev, 1981). Indeed, we will show in Section E that much of the acquisitiveness of overconfident CEOs is due to diversifying mergers. We estimate Equation (3) including our usual controls and adding the volatility of returns over the prior year as an additional control. We find that volatility has no explanatory power for the time series of merger activity within a firm and our estimate of the overconfidence effect is virtually unchanged.

Third, we test for effects of dividend policy on the results. CEOs in firms that do not pay dividends have less incentive to exercise options (option holders do not receive the dividends from the underlying stock unless they exercise). If firms engaging in mergers and acquisitions are less likely to pay dividends, then time series variation in dividend payments might explain our results. To test this story, we re-estimate Equation (3) adding the dividend rate per share as an additional control. The results are unchanged.

Fourth, we test whether other observable personal characteristics might drive both sub-optimal option exercise decisions and excess acquisitiveness. Specifically, we consider educational background, age, and CEO tenure. We also consider the effect of awarding the additional titles of President and Chairman of the Board to the CEO. Tenure is a particularly important control given the correlation with Longholder reported in Table 2. We find that finance education has a positive impact on acquisitiveness, but the effect is orthogonal to overconfidence. The other CEO characteristics (being president and chairman, age, tenure) do not impact the estimated effect of overconfidence on acquisitiveness (and are not individually significant). Thus, it is unlikely that our option-holding measures capture an observable CEO characteristic other than overconfidence.

Finally, as a last test of the information hypothesis, we split the Longholder measure using the return calculations from Panel A of Table 4. Specifically, we categorize Longholder CEOs into the group "Did OK" if more often than not when they held an option to expiration they earned positive profits over the S&P 500. The remaining Longholder CEOs ("should have exercised") more often than not would have done better by diversifying their portfolio. We then re-estimate equation (3) replacing Longholder with these two component variables. We find that the increased acquisitiveness explained by Longholder is not concentrated among the CEOs who earn positive profits by holding their options to expiration relative to diversifying their portfolio (Table 4, Panel B).

Thus, all of the regressions confirm that overconfidence is an important determinant of merger activity, even on average, and is distinct from other plausible theories of excess acquisitiveness and option exercise.

E Overconfidence and Diversifying Mergers

We have found that overconfident managers, on average, are more likely to make a successful merger bid than their rational peers. The empirical results suggest that exuberance about potential merger synergies dominates the countervailing effect of perceived undervaluation, even on average. We now test the specific predictions of our model of overconfidence.

According to our model, overconfident managers are more likely than rational managers to undertake a merger project that, ex ante, is unlikely to increase value (Prediction 1). To test this prediction, we attempt to identify a subset of mergers that, ex ante, is unlikely to create value. We hypothesize that diversifying mergers are such a subset. Not only is there ample support in the academic literature for this assumption, but the market also seems to recognize in advance that many diversifying bids are unwise. Morck et al., (1990) document a negative market reaction when a firm announces a diversifying deal, an effect we confirm in our data in Section IV.[35]

Using diversification as a proxy for mergers with negative expected value, we estimate Equation (3) with a dependent variable that indicates a successful diversifying bid in a particular firm year. Bids are defined as diversifying if the acquiror and target firms are not members of the same Fama-French 48 industry group. We also estimate Equation (3) with a dependent variable that indicates a successful intra-industry bid. As noted in Section A, the Post-Longholder measure is not appropriate for tests that require us to partition the mergers into smaller categories. However, we present the results for both the Longholder and Holder 67 measures.

Table 6 shows that overconfident managers are far more likely to do diversifying mergers than rational managers, under either measure. In the fixed effects logit specification, the odds ratio on the Longholder measure of overconfidence is 2.05. The effect of Longholder on the likelihood of making a related bid is positive (1.44), but insignificant. Similarly, for the Holder 67 measure

we obtain an odds ratio of 2.29 for doing a diversifying merger in the fixed effects specification, but only 1.23 for within-industry mergers.

To gauge the significance of these differences, we re-estimate the regressions using a linear probability specification within a seemingly unrelated regressions model. We choose this approach, rather than specifying a multinomial logit, to allow us to estimate the fixed effects specification. We find that the differences in the effect of overconfidence on the probability of doing a diversifying or within-industry merger, both with and without fixed effects, are statistically significant at the 10% level for the Longholder measure. With the Holder 67 measure, the difference without fixed effects is significant at 5%, but the difference with fixed effects is not statistically significant (the p-value is 0.1776).

Thus, the economically large and statistically significant effect of overconfidence on acquisitiveness is due mainly to overconfident managers conducting more destructive mergers. This finding confirms Prediction 1 of our model.

F Overconfidence and Internal Resources

Our second prediction is that overconfidence matters most in firms with abundant internal resources. If a firm can finance an acquisition without issuing equity, perceived undervaluation by the capital market will have less of an effect on the CEO's enthusiasm for the merger. Cash and safe debt allow the CEO and current shareholders to remain the residual claimants on all of the merger's future value. Furthermore, an overconfident CEO might prefer risky debt to equity. While he may disagree with the market about the probability of bankruptcy and, thus, view debt as too expensive, he retains more rights to the (perceived) upside with risky debt than with equity. Thus, we predict that the effect of overconfidence on acquisition decisions is most pronounced in firms with large cash resources and untapped debt capacity.

To test this prediction, we employ the Kaplan-Zingales index. Kaplan and Zingales (1997) use information from annual reports and company executives to measure financing constraints directly. They then estimate an ordered logit of this classification on five accounting ratios related to financial constraints. These variables are cash flow to total capital, Q, debt to total capital, dividends to total capital, and cash holdings to capital. Recent research (Baker et al. (2001), Lamont et al., (2001), Malmendier and Tate (2003)) uses the estimates to construct an index of financial constraints (or equity dependence) as follows:

$$\begin{aligned} KZ_{it} &= -1.001909 * \frac{CF_{it}}{K_{it-1}} + 0.2826389 * Q_{it} + 3.139193 * Leverage_{it} \\ &\quad -39.3678 * \frac{Dividend_{it}}{K_{it-1}} - 1.314759 * \frac{C_{it}}{K_{it-1}} \end{aligned}$$

Higher values of the linear combination of the five ratios implies a higher degree of equity dependence[36]. Prediction 2 would be confirmed if the effect of overconfidence is strongest for the subsample of firms that have the lowest values of the Kaplan-Zingales index.

We divide our sample into quintiles of the Kaplan-Zingales index and estimate random effects logit regressions of Equation (3) separately on each quintile.[37] Since the capital structure of a firm may change endogenously in anticipation of (or preparation for) a merger, we use the value of the index at the beginning of the year preceding the merger. The results of our estimation are in Table 7.[38] The dependent variable indicates that the firm made at least one successful bid in a particular firm year. We find, as predicted, a positive and significant effect of overconfidence in the "least constrained" quintile (the odds ratio on overconfidence is 2.03) and no significant effect in the "most constrained" quintile (the odds ratio is 1.07). The large difference is not due to a lack of sufficient mergers to identify the effect in the most constrained quintile: the number of successful bids is actually larger in the bottom quintile (72 versus 91).

To test the significance of the difference between the most constrained and least constrained quintiles, we re-estimate the effects within a single regression using dummy variables for the

five quintiles and interacting those dummies with Longholder and the controls (other than the year effects). The interactions with the control variables allow the coefficients to differ with financial constraint, as they appear to in Table 9. The difference turns out to not quite be statistically significant. However, our prediction is on the difference between overconfident and non-overconfident CEOs given the degree of financial constraint. So, this failure does not affect our conclusions.

The data confirms Prediction 2 of our model: the effects of overconfidence on acquisitiveness are strongest for managers with abundant internal resources. The data also confirms the financing implications of our model. We find that overconfident CEOs are more likely, conditional on conducting a merger, to finance it using cash and debt (Panel A, Table 8). Here we use both the Longholder and Holder 67 measures to conduct our tests. The odds ratio of using cash versus any mixture of risky securities with cash is strongest using Holder 67 (1.38), but is also positive using Longholder (1.10). We also examine the effect in a regression framework with controls. In particular, we control for the effects of market over- and undervaluation. We also control for Tobin's Q, stock and vested option ownership, merger size, financial constraints and year effects in various combinations. We find that overconfident CEOs are far more likely than rational managers to conduct a cash acquisition when the firm is unlikely to be overvalued by the market, as captured by Tobin's Q being less than the (within-sample) industry average. Again, we use the Fama and French 48 industry definitions. The interaction of undervaluation and overconfidence is strongest with the Longholder measure (and significant across specifications). With Holder 67, the interaction is always positive, though never significant. However, the level effect of overconfidence remains reliably positive, despite controlling for the interaction with market valuation. Interestingly, CEOs do fewer cash deals when they are overvalued by the market, though the effect is subsumed by financing constraints when we include them as additional controls in the regression. These result confirm that overconfident managers

are particularly sensitive to (perceived) market undervaluation and are also consistent with the view that investor sentiment affects merger financing decisions, as in Shleifer and Vishny (2002).

G Overconfidence and the Press

So far, we have used CEOs' personal portfolio decisions to identify differences in beliefs between managers and outsiders about the firms' future prospects. We now assume the perspective of corporate outsiders – rather than the managerial side – and ask which CEOs the market perceives as "confident" and "optimistic." Our proxy for market perception uses press coverage in leading business publications: The Wall Street Journal, The New York Times, Business Week, Financial Times, and The Economist. Using the press data described in Section II, we record year by year the number of articles from Factiva.com and LexisNexis searches that refer to the CEO using the terms (a) "confident" or "confidence," (b) "optimistic" or "optimism," (c) "not confident," (d) "not optimistic," and (e) "reliable," "cautious," "conservative," "practical," "frugal," or "steady." We then compare, for each year, the number of articles that portray a CEO as confident and optimistic to the number of articles that portray him as not confident, not optimistic, reliable, cautious, conservative, practical, frugal, or steady. That is, we construct the following indicator:

$$TOTALconfident = \begin{cases} 1 \text{ if } a + b > c + d + e \\ 0 \text{ otherwise} \end{cases}$$

We then relate the TOTALindicator to merger frequency and type of mergers by substituting the portfolio measures of overconfidence in the previous regressions in two ways. First, we use the lagged value of TOTALconfindent. Second, we calculate TOTALconfident using all sample years of a CEO up to (and including) the previous year. In both cases, we control for the total number of press mentions over the same period and we restrict the analysis to observations up to

(and including) the first merger of a CEO. Note that removing coverage frequency is important both because some CEOs are mentioned more often in the press than others and because a high number of mentions implies a higher number of mentions as "confident" or "optimistic," potentially due to press bias. Using the lagged or cumulative past value of TOTALconfident and restricting the data set to at most one merger per se deals with the concern that managers might try to convey confidence and optimism to the press.during a merger. Or, the press may simply be more likely to perceive a CEO who conducts a mergers as confident and optimistic. Finally, to make sure that we capture all mergers and press mentions of an executive (in his role as CEO) we drop executives who became CEO before the beginning of the sample period.

We also attempt to address the concern that personal characteristics other than overconfidence itself may be driving differential press coverage. As mentioned in Section II, we collected additional background information for each of the CEOs in the sample. Our hand-collected information allows us to control for the professional background, age, tenure, and additional positions of the CEO (chairman, president). Here, finance background is a dummy variable equal to 1 if the CEO previously worked in a financial institution or as a CFO, treasurer, accountant or in another finance related position. CEO with engineering background is a dummy variable equal to 1 if the CEO is an individual patent-holder, or previously worked as an engineer, in the natural sciences, or in another technically-oriented position. We include these CEO-level controls on top of the usual firm and ownership controls in each regression.

Table 9 displays the correlations of the press measures and various firm and CEO characteristics. Panel A reports a positive correlation between TOTALconfident and the Longholder measure. Both the correlation of the lagged and the correlation of the cumulative version are statistically significant at the 1% level. The TOTALmention controls display instead insignificant (zero or negative) correlations. Panels B, C, and D display the correlations of both versions of the press-based measure with various firm and CEO characteristics.

Our press measure of overconfidence not only positively correlates with the longholder measure of overconfidence, but also performs remarkably similarly in the acquisitiveness regressions. First, we can replicate the overall acquisitiveness regressions of Table 3, using TOTALconfident as our proxy for O and the total number of mentions in the press as an additional control (Table 10, Panel A). In the random effects specification, for example, we find odds ratios of 2.8 for the lagged measure and 2.5 for the cumulative measure, which are significant at the 5% level. (See columns (5) and (6).) We can also replicate the test of Prediction 1 from Section E, using diversification as a proxy for negative expected value. Table 10 presents the results. TOTALconfident, like longholder, predicts a heightened probability of conducting diversifying deals but not intra-industry mergers. The odds ratios in the random effects specification are 3.4 (lagged measure) and 4.2 (cumulative measure) for diversifying mergers, both significant at the 5% level, but insignificant for within-industry mergers. Using the same methodology as in Subsection E, we find that the coefficients of TOTALconfident for diversifying and for within-industry mergers are significantly different at the 1% level.

We also re-measure the effect of overconfidence conditioning on internal resources (Prediction 2). Estimating Equation (3) separately on quintiles of the Kaplan-Zingales index requires us, however, to split the already drastically reduced press data set into subsets of about 110 firm-years. We still find that the odds ratios decrease with increasing financial constraints but fail to find statistical significance. On the other hand, considering the two highest and the two lowest KZ quintiles jointly, we replicate the results of Section F.

Finally, we note that press coverage as "optimistic" and "confident" not only predicts acquisitiveness, but also strongly predicts increased sensitivity of corporate investment to cash flow, particularly among the most equity dependent firms. Malmendier and Tate (2003) employ similar portfolio measures of overconfidence and replicate all results with a simplified version of the TOTALconfident measure (calculated only once for the full sample period per CEO).

These results support the overconfidence story in several ways. First, they show that, whether we measure differences in beliefs between the manager and the market using managerial portfolio decisions or market perception (as reflected in press coverage), the effect on merger activities is the same. The additional findings thus strengthen the interpretation of our portfolio-based measure as overconfidence. Second, our theory assumes that outside financiers are less optimistic about the firm's future performance and will not provide capital at the rates the CEO believes are appropriate. Our press results confirm that the market recognizes managerial overconfidence. Finally, the press results corroborate the view that our overconfidence measures capture aspects of the CEOs' personalities rather than an omitted firm effect. While we have addressed this possibility for the portfolio measures using controls and firm fixed effects, the press measure provides direct evidence: the searches are for executive personality features. Framed differently, the press results provide a crucial insight into the type of executive captured by our portfolio measures of overconfidence.

IV Market Reaction to Overconfidence

Studying mergers and acquisitions provides the opportunity to identify the market's reaction to the announcement of the deal. Because many other corporate decisions, like investment, must be studied in aggregate due to data limitations, we cannot deduce the reaction of the market to any particular project. With mergers, we know the exact date of announcement. This allows us to measure market response using daily stock returns.

Our theory predicts that the market will react more negatively to the announced bids of overconfident CEOs than to the bids of other CEOs (Prediction 3). The negative impact of overconfidence reflects that overconfident CEOs do some value-destroying mergers and that they forego some value-creating ones when perceived financing costs are too high. Further,

competition can induce overconfident CEOs to overpay for their mergers.

We apply event study methodology (Brown and Warner, 1980 and 1985, and MacKinlay, 1997) to measure the effect of overconfidence on announcement returns. Here we include all merger bids, both successful and unsuccessful, in the estimation. The event window is the three days surrounding the announcement of the bid, starting at day -1 and ending on day $+1$ where day 0 is the day of the announcement.[39] We calculate the cumulative abnormal return to the acquiring firm's stock over this window. Following Fuller et al., (2002), we use market returns as our proxy for expected returns. This approach is appropriate since our sample consists of large U.S. companies that compose a substantial portion of market returns. Moreover, we avoid having to drop overlapping events (as is common in alternative event study methodologies using estimation periods). In fact, rapid succession of multiple acquisitions may indicate a particularly high level of overconfidence. Since merging companies is often highly disruptive – labor forces must be consolidated, corporate cultures must be adapted, etc. – it may be the height of hubris to juggle several such projects at once.[40] So, assuming that $\alpha = 0$ and $\beta = 1$ for the firms in our sample, abnormal returns are given by

$$\mathsf{AR}_{it} = \mathsf{r}_{it} - \mathsf{r}_t^m$$

where r_{it} is firm i's return on day t of the event window and r_t^m is the return on the S&P 500 index that day. Cumulative abnormal returns are

$$\mathsf{CAR}_i = \sum_t \mathsf{AR}_{it}$$

To test whether overconfidence has a negative contribution to the mean cumulative abnormal return during the event window, we run the following cross-sectional regression:

$$\mathsf{CAR}_i = \gamma_1 + \gamma_2 \mathsf{O}_i + \mathsf{X}_i' \mathsf{G} + \varepsilon_i \tag{4}$$

where O indicates an overconfident manager and X is the set of controls. The null hypothesis is $\gamma_2 < 0$. Table 11 presents the results. We tabulate three main specifications of the regression.

First, we compute the baseline difference in CARs for overconfident CEOs relative to other CEOs, including no controls in the regression. Second, we add controls for the effects of stock and option ownership (incentives), relatedness of the acquisition (an indicator equal to 1 if the acquiror and target share the same Fama-French industry group), corporate governance (efficient board size), and cash financing. Third, we add year effects to control for time trends in the average market reaction to merger bids.

We also include an additional specification that interacts overconfidence with cash financing for the Holder 67 and Longholder measures. It is interesting from a governance perspective to see whether limiting free cash flow might root out the worst merger bids by overconfident CEOs. There is no clear prediction from the model, however, that overconfident cash mergers must be the worst deals.

The control variables in the regressions all have the expected signs. The two consistently significant controls are for cash financing (cash deals – on average – are viewed more favorably by the market) and vested options. We find that the effect of vested option holdings on cumulative abnormal returns is decidedly non-linear. We, therefore, include a quadratic term in vested options as an additional control. The positive incentive effects of vested options appear maximal in the lower range of vested option holdings. A negative effect – perhaps due to entrenchment or other negative aspects of excessive CEO power – apply at very high values.

Most importantly, we find strong evidence that the market reacts more negatively to the merger bids of CEOs who fail to exercise in the money stock options. In the Longholder regressions, we see a discount of roughly 70 to 100 basis points for overconfident bids, depending on the specification. Given a baseline negative announcement effect of 40 basis points (see Table 1, Panel D), the additional discount for mergers of overconfident CEOs is large.

Though we found in the logits of Section D that the effect of Longholder comes from both

the Pre-Longholder and Post-Longholder components (with insignificant differences between the estimated coefficients of the two variables), the same is not true here. Overconfidence appears to be a fixed effect on managerial acquisitiveness; however, the market only strongly discounts the bids of overconfident CEOs after they have revealed their overconfidence (at least partially) through their portfolio decisions. That is, only Post-Longholder has a significant negative impact on the cumulative abnormal returns to merger bids.

The evidence with the Holder 67 measure is more mixed. We do not find a significant negative impact of Holder 67 on the cumulative abnormal returns to merger bids on average (though the effect is negative). However, we do find that the cash deals of overconfident CEOs are significantly worse, both than the stock deals of overconfident CEOs and than the cash deals of non-overconfident CEOs. In the Longholder regressions, we also find some evidence that overconfident cash mergers are the worst deals, though the result is not significant. However, what is striking is that the total negative impact to an overconfident cash deal is nearly identical in the Longholder and Holder 67 specifications (roughly 130 basis points). Thus, the difference in the average impact of overconfidence on cumulative abnormal returns using the two measures appears to be due to different conclusions about the quality of overconfident stock deals.

Finally, we note that in untabulated regressions we include additional controls for CEO age and the consolidation of the titles CEO, Chairman of the Board, and President. Both of these variables appear to negatively impact the cumulative abnormal return to merger bids, but are orthogonal to the overconfidence effect. We also estimate a specification including the interaction of industry effects (48 Fama-French industry groups) and year effects as controls. These additional variables should control for the possibility that the market reacts differently, on average, to merger bids during a merger wave. But, again, the overconfidence estimates are unaffected.

V Conclusion

The goal of this paper is twofold. First, we show in a simple theoretical framework that the effect of overconfidence on the baseline frequency of merger activities is ambiguous. Overconfident CEOs are more eager to make acquisitions, but perceived financing constraints can prevent them from doing so. However, overconfident CEOs are unambiguously more likely than rational CEOs to undertake value-destroying acquisitions. And they are more likely to make acquisitions when their firm has abundant internal resources. Because they do lower quality deals, on average, and tend to overpay, the market discounts their acquisitions relative to other CEOs.

We test these predictions using data on a sample of Forbes 500 firms. We classify CEOs as overconfident if they overinvest in their company with their private funds, and we find that these CEOs undertake a higher number of takeovers on average, despite the mitigating impact of cash constraints. Further, as predicted by the overconfidence theory, overconfident CEOs undertake more diversifying mergers, which are unlikely to create value. In addition, overconfidence has a strong positive impact on the probability of conducting mergers (and particularly of diversifying mergers) among the least equity dependent firms and no effect among the most equity dependent firms. These results also hold for CEOs whom the press describes as "confident" or "optimistic" prior to their merger activities. Finally, the market penalizes overconfident CEOs for their merger bids: cumulative abnormal returns around overconfident bids are roughly 100 basis points lower on average than for bids of their non-overconfident colleagues..

Our results have important implications for contracting practices and organizational design. Overconfidence provides an alternative explanation for certain agency problems in firms and for the origin of private benefits. Differently from empire-building preferences, under which CEOs

are perpetually and consciously disregarding the interests of the shareholders, overconfident CEOs believe they are maximizing value. Thus, standard incentives are unlikely to correct their suboptimal decisions. However, overconfident CEOs do respond to financing constraints. Overconfidence therefore further motivates the constraining role of capital structure. In addition, independent directors may need to play a more active role in project assessment and selection to counterbalance CEO overconfidence.

References

[1] **Alicke, Mark D; Klotz, M. L; Breitenbecher, David L; Yurak, Tricia J; et al.** "Personal contact, individuation, and the better-than-average effect." Journal of Personality & Social Psychology, May 1995, 68(5), pp. 804-825.

[2] **Alpert, Marc and Raiffa, Howard.** "A progress report on the training of probability assessors." In: D. Kahneman, P. Slovic, and A. Tversky, Judgement Under Uncertainty: Heuristics and Biases, Cambridge 1982, pp. 294-305.

[3] **Amihud, Yakov and Lev, Baruch.** "Risk reduction as a managerial motive for conglomerate mergers." Bell Journal of Economics, 1981, 12, pp. 605-617.

[4] **Andrade, Gregor; Mitchell, Mark and Stafford, Erik.** "New evidence and perspectives on mergers?" Journal of Economic Perspectives, Spring 2001, 15(2), pp. 103-120.

[5] **Asquith, P.** "Merger bids, uncertainty, and stockholder returns." Journal of Financial Economics, April 1983, 11, pp. 51-83.

[6] **Baker, Malcolm; Stein, Jeremy C. and Wurgler, Jeffrey**. "When does the market matter? Stock prices and the investment of equity-dependent firms." Working Paper, Harvard University, October 2001.

[7] **Baron, Robert A.** "Psychological perspectives on entrepreneurship: cognitive and social factors in entrepreneurs' success." Current Directions in Psychological Science, February 2000, 9(1), pp. 15-18.

[8] **Bazerman, Max H.** Judgment in Managerial Decision Making (5th Edition), Hoboken, NJ: John Wiley & Sons,Inc., 2002.

[9] **Berger, Philip G. and Ofek, Eli.** "Diversification's effect on firm value." Journal of Financial Economics, 1995, 37, pp. 39-66.

[10] **Bernardo, Antonio E. and Welch, Ivo.** "On the evolution of overconfidence and entrepreneurs." Journal of Economics and Management Strategy, 2001, 10(3), pp. 301-330.

[11] **Bertrand, Marianne and Schoar, Antoinette.** "Managing With Style: the Effects of Managers on Firm Policies." Quarterly Journal of Economics, 2003, 118(4), pp. 1169-2009.

[12] **Black, Fischer and Scholes, Myron.** "The pricing of options and corporate liabilities." Journal of Political Economy, May-June 1973, 81(3), pp. 637-654.

[13] **Boehmer, Ekkehart and Netter, Jeffrey M.** "Management optimism and corporate acquisitions: evidence from insider trading." Managerial & Decision Economics, November-December 1997, 18(7-8), pp. 693-708.

[14] **Bradley, M.; Desai, A. and Kim, E. H.** "The rationale behind interfirm tender offers: information or synergy?" Journal of Financial Economics, April 1983, 11, pp. 183-206.

[15] **Brown, Stephen J. and Warner, Jerold B.** "Measuring security price performance." Journal of Financial Economics, 1980, 8, pp. 205-258.

[16] **Brown, Stephen J. and Warner, Jerold B.** "Using daily stock returns: the case of event studies." Journal of Financial Economics, 1985, 14, pp. 3-31.

[17] **Camerer, Colin and Lovallo, Dan.** "Overconfidence and excess entry: an experimental approach." American Economic Review, March 1999, 89(1), pp. 306-318.

[18] **Camerer, Colin and Malmendier, Ulrike.** "Behavioral Economics of Organizations." Forthcoming in: Economic Institutions and Behavioral Economics, Yrjö Jahnsson Foundation.

[19] **Dodd, P.** "Merger proposals, managerial discretion and stockholder wealth." Journal of Financial Economics, June 1980, 8, pp. 105-138.

[20] **Dong, Ming; Hirshleifer, David; Richardson, Scott and Teoh, Siew Hong.** "Does investor misvaluation drive the takeover market?" Working Paper, 2002.

[21] Dun & Bradstreet Reference Book of Corporate Managements. Bethlehem PA, Dun & Bradstreet, Inc. 1997.

[22] **Fama, Eugene F. and French, Kenneth R.** "Industry costs of equity." Journal of Financial Economics, 1997, 43, pp. 153-193.

[23] **Fama, Eugene F. and French, Kenneth R.** "Testing tradeoff and pecking order predictions about dividends and debt." Review of Financial Studies, Spring 2002, 15(1), p 1-33.

[24] **Feather, N. T. and Simon, J. G.** "Attribution of responsibility and valence of outcome in relation to initial confidence and success and failure of self and other." Journal of Personality & Social Psychology, May 1971, 18(2), pp. 173-188.

[25] **Firth, M.** "Takeovers, Shareholder Returns and the Theory of the Firm." Journal of Economics, March 1980, pp. 235-260.

[26] **Fischhoff, Baruch; Slovic, Paul and Lichtenstein, Sarah.** "Knowing with certainty." Journal of Experimental Psychology: Human Perception and Performance, 1977, 3, pp. 552-564.

[27] **Fuller, Kathleen; Netter, Jeffrey and Stegemoller, Mike.** "What do returns to acquiring firms tell us? Evidence from firms that make many acquisitions." Journal of Finance, August 2002, 57(4), pp. 1763-1793.

[28] **Goel, Anand Mohan and Thakor, Anjan.** "Rationality, overconfidence and leadership." University of Michigan Business School Faculty Working Paper No. 00-022, 2000.

[29] **Hall, Brian J. and Liebman, Jeffrey B.** "Are CEOs really paid like bureaucrats?" Quarterly Journal of Economics, August 1998, 113(3), pp. 653-691.

[30] **Hall, Brian J. and Murphy, Kevin J.** "Stock options for undiversified executives." Journal of Accounting and Economics, February 2002, 33(1), pp. 3-42.

[31] **Hayward, Mathew L. A. and Hambrick, Donald D.** "Explaining the premiums paid for large acquisitions: evidence of CEO hubris." Administrative Science Quarterly, 1997, 42, pp. 103-127.

[32] **Hey, John D.** "The economics of optimism and pessimism." Kyklos, 1984, 37(2), pp. 181-205.

[33] **Hietala, Pekka; Kaplan, Steven N. and Robinson, David T.** "What is the price of hubris? Using takeover battles to infer overpayments and synergies." NBER Working Paper 9264, 2002.

[34] **Jensen, M. C. and Ruback, R. S.** "The market for corporate control." Journal of Financial Economics, April 1983, 11, pp. 5-50.

[35] **Kahneman, Daniel and Lovallo, Dan.** "Timid choices and bold forecasts: a cognitive perspective on risk taking." Management Science, 39(1), pp. 17-31.

Kaplan, Steven N. and Luigi

[38] **Lambert, Richard A.; Larcker, David F. and Verrecchia, Robert E.** "Portfolio Considerations in Valuing Executive Compensation," Journal of Accounting Research, 1991, 29(1), pp. 129-149.

[39] **Lamont, Owen and Polk, Christopher.** "Does diversification destroy value? Evidence from industry shocks." Journal of Financial Economics, January 2002, 63(1), pp. 57-77.

[40] **Lamont, Owen; Polk, Christopher and Saá-Requejo, Jesus**. "Financial constraints and stock returns." Review of Financial Studies, 2001, 14, pp. 529-554.

[41] **Lang, Larry and Stulz, René.** "Tobin's Q, corporate diversification, and firm performance." Journal of Political Economy, 1994, 102, pp. 1248-1280.

[42] **Langer, Ellen J.** "The illusion of control." Journal of Personality and Social Psychology, 1975, 32, pp. 311-328.

[43] **Larwood, Laurie and Whittaker, William.** "Managerial myopia: self-serving biases in organizational planning." Journal of Applied Psychology, 1977, 62, pp. 194-198.

[44] **Lys, Thomas and Vincent, Linda.** "An analysis of value destruction in AT&T's acquisition of NCR." Journal of Financial Economics, 1995, 39, pp. 353-378.

[45] **MacKinlay, A. Craig.** "Event studies in economics and finance." Journal of Economic Literature, 1997, 35, pp. 13-39.

[46] **Malmendier, Ulrike and Tate, Geoffrey A.** "CEO overconfidence and corporate investment." Working Paper, 2003.

[47] **March, J. G. and Shapira, Z.** "Managerial perspectives on risk and risk taking." Management Science, 1987, 33, pp. 1404-18.

[48] **Milburn, Michael A.** "Sources of bias in the prediction of future events." Organizational Behavior and Human Performance, 1978, 21, pp. 17-26.

[49] **Miller, Dale T. and Ross, Michael.** "Self-serving biases in the attribution of causality: Fact or fiction?" Psychological Bulletin, 1975, 82(2), pp. 213-225.

[50] **Moeller, Sara B., Schlingemann, Frederick P. and Stulz, Rene M.** "Wealth destruction on a massive scale? A study of acquiring-firm returns in the recent merger wave." Journal of Finance, forthcoming.

[51] **Moore, P. G.** "The manager's struggle with uncertainty." Journal of The Royal Statistical Society Series A, 1977, 149, pp. 129-165.

[52] **Morck, Randall; Shleifer, Andrei and Vishny, Robert W.** "Do managerial objectives drive bad acquisitions?" Journal of Finance, March 1990, 45(1), pp. 31-48.

[53] **O'Donoghue, Ted and Rabin, Matthew**. "Choice and Procrastination" Quarterly Journal of Economics, 2001, 116, pp. 121-61.

[54] **Ofek, Eli and Yermack, David.** "Taking stock: equity-based compensation and the evolution of managerial ownership." Journal of Finance, June 2000, 55(3), pp. 1367-1384.

[55] **Roll, Richard. "**The hubris hypothesis of corporate takeovers." Journal of Business, April 1986, 59(2), part 1, pp. 197-216.

[56] **Ruback, R. S. and Mikkelson, W. H.** "Corporate investments in common stock." Proceedings of the Seminar on the Analysis of Security Prices November 1984, 29(2), pp. 179-209.

[57] **Schelling, Thomas.** The Strategy of Con*fl*ict. Cambridge MA: Harvard University Press 1960.

[58] **Servaes, Henri.** "The value of diversification during the conglommerate merger wave." Journal of Finance, 1996, 51, pp. 1201-1225.

[59] **Shefrin, Hersh.** Beyond Greed and Fear : Understanding Behavioral Finance and the Psychology of Investing. Cambridge: Harvard Business School Press 2000.

[60] **Shleifer, Andrei.** Clarendon Lectures: Ine*ffi*cient Markets. Oxford: Oxford University Press 2000.

[61] **Shleifer, Andrei and Vishny, Robert W.** "Stock market driven acquisitions." Working Paper, June 2002.

[62] **Svenson, Ola.** "Are we all less risky and more skillful than our fellow drivers?" Acta Psychologica, 1981, 47, pp. 143-148.

[63] **Weber, Roberto A. and Camerer, Colin.**."Cultural conflict and merger failure: An experimental approach." Management Science, 2003, 49(4), pp. 400-415.

[64] **Van den Steen, Eric**. "Organizations beliefs and managerial vision." Mimeo, Stanford 2001.

[65] **Weinstein, Neil D.** "Unrealistic optimism about future life events." Journal of Personality and Social Psychology, 1980, 39, pp. 806-820.

[66] **Weinstein, Neil D. and Klein, William M.** "Resistance of personal risk perceptions to debiasing interventions." in Thomas Gilovich, Dale Griffin, and Daniel Kahneman (eds.), Heuristics and Biases: The Psychology of Intuitive Judgment, Cambridge, UK: Cambridge University Press, 2002, pp. 313-323.

[67] **Weston, J. Fred; Chung, Kwang S. and Sui, Juan A.** Takeovers, Restructuring, and Corporate Governance. Upper Saddle River, NJ: Prentice Hall 1998.

[68] Who's Who in Finance and Industry. Chicago, Marquis Who's Who 1980/81-1995/96.

[69] **Yermack, David**. "Do corporations award CEO stock options effectively?" Journal of Financial Economics, October 1995, 39(2-3), pp. 237-269.

Notes

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[1]Quote taken from Weston et al., (1998).

[2]Moeller et al. (forthcoming) find net losses of $134bn at announcement for mergers from 1998 to 2001. Andrade et al. (2001) find net 1.9% positive announcment net announcement effect for the prior 25 years. Whether the net effect is significantly positive also varies with the data used (SDC, CRSP) and the event study methodoly employed. See Jensen and Ruback (1983) and Roll (1986) for surveys of earlier studies.

[3]See, e.g. Asquith (1983), Bradley et al. (1983), and Andrade et al., (2001) for target gains and Dodd (1980), Firth (1980), and Ruback and Mikkelson (1984) for acquiror losses. Andrade et al. (2001) find a negative, but insignificant effect on the acquiror's value, and Asquith (1983) finds no significant pattern.

[4]US Newslink December 13, 2001 ("Enron's Bust: Was it the result of Over-Confidence or a Confidence Game?"); CFO Magazine June 1, 2004 ("Avoiding decision traps"); Accenture Outlook Journal January 2000 ("Mergers & Acquisitions: Irreconcilable Difference").

[5]Hayward and Hambrick (1997) and Hietala et al., (2002) also relate acquisitiveness to CEO hubris. Heaton (2002) provides a modelling framework for overconfidence and corporate investment.

[6]See Larwood and Whittaker, 1977; Svenson, 1981; Alicke et al. 1995; Weinstein and Klein, 2002. A different form of overconfidence is analyzed in the calibration literature; i.e., individuals also tend to overestimate the accuracy of their beliefs (Fischhoff et al., 1977; Alpert and Raiffa, 1982).

[7]We follow the literature on self-serving attribution and on the "illusion of control" and assign the labels

"overconfidence" to the overestimation of one's own abilities (such as IQ or driving skill; see Feather and Simon 1971, Langer 1975) and "overoptimism" to the overestimation of exogenous outcomes (such as the outbreak of a war, see Milburn 1978, Hey 1984, and Bazerman 2002).

[8] See e.g. Lambert et al., (1991).

[9] Lang and Stulz (1994), Berger and Ofek (1995), Servaes (1996), and Lamont and Polk (2002), e.g., show that diversified firms trade at a disount relative to stand-alones in the same line of business.

[10] Schelling (1960), Goel and Thakor (2000), Bernardo and Welch (2001), and Van den Steen (2001) explore positive effects of overconfidence.

[11] See Shleifer (2000).

[12] For an overview see Camerer and Malmendier (forthcoming).

[13] Risky debt has similar properties: mangers view the demanded interest rate as too high.

[14] More generally, the perceived synergies $\widehat{e}$ might depend on the outflow of cash c. In particular, allowing $\widehat{e}$ to decrease with c is a way to capture the dynamic effects of cash constraints (perceived undervaluation) on an overconfident CEO's future merger and investment decisions. As long as $\widehat{e}(\cdot) > 0$, the results of the section go through.

[15] We ignore the knife-edge case of a tie.

[16] Another potential use of internal resources is to repurchase shares the overconfident CEO perceives to be undervalued. However, since any gain to remaining shareholders by repurchasing undervalued shares is offset by a loss to the former shareholders, a CEO who maximizes current shareholder value will not undertake such a transaction.

[17] Few of our 477 sample firms are targets; even fewer are acquired by another sample firm.

[18] This criterion essentially excludes IPOs from our sample. Thus, the more stringent restrictions on insider trading associated with such firms, such as lockup periods, do not apply.

[19] All of our results, however, are robust to using only the CRSP merger database, i.e. mergers involving publicly traded U.S. targets.

[20] This selection criterion is especially important in our context since we merge data from the SDC database

with the CRSP merger data. Acquisitions of small units of another company differ substantially from the acquisition of large NYSE firms and may not require the direct involvement of the acquiring company's CEO.

[21] Definitions of Q and its components as in Fama and French (2002).

[22] The Longholder measure in Malmendier and Tate (2003) does not add this additional restriction. Adding the restriction here does not have much impact on the results (see Figure 1, e.g., in the NBER working paper version of this paper #10807).

[23] We do not calculate a separate threshold for every option package in our sample – depending on the CEO's wealth, diversification, and risk aversion. As we cannot observe each CEO's degree of risk aversion and wealth or the fraction of his total wealth invested in company equity, individual calibration would introduce a great deal of observation-specific noise into the estimation without clear benefits.

[24] Note as a rough measure of the stakes involved for the CEO, we multiply the current stock price times the number of options remaining in the package entering the expiration year. The average value is $5,465,086.

[25] The definition of Holder 67 here has several differences from the definition in Malmendier and Tate (2003), though the basic intuition is the same. The biggest difference is the removal of all forward-looking information from the definition, per the suggestion of the referee.

[26] When we move towards the grant date in defining overconfidence, we need to worry about when the vesting period ends. The reason we do not go back further than year 5 is that the vast majority of options in our sample are 10 year options that are fully vested after year 4. If we considered year 4 or earlier, then, we would have to worry about the exact vesting date and whether heterogeneity in the length of the vesting period (and hence the point in time at which we could consider the decision to exercise) might affect our conclusions.

[27] Note that unidentified overconfidence among short-tenured CEOs may attenuate our estimates of the Longholder effect on acquisitiveness.

[28] We also increase the threshold for inclusion in the profits calculation by 0.05 per year to account for the increase in the Hall-Murphy threshold as remaining duration on the option increases. That is, we only propose that the CEO exercise if the option is beyond the relevant Hall-Murphy benchmark (approximately) for the year in question.

[29] Wherever econometrically possible, we confirmed the robustness of the estimates to the assumption that G is normal.

[30] The corporate governance literature suggests that an effective board should have no more than 12 members. The results are robust to the using the logarithm of board size or the number (or percentage) of CEOs of other companies sitting on the board as alternative measures of governance.

[31] This effect appears to be non-monotonic. For example, we find a positive and marginally significant coefficient when we include a dummy variable for "high Tobin's Q." ($Q > 1$) Alternatively, including the square of Tobin's Q reverses the direction of the level effect (though it remains insignificant).

[32] We note, again, that it is possible in the Holder 67 specification for a CEO to begin in the sample as non-overconfident, but later become overconfident. So, Holder 67 in the fixed effect specification is identified using both variation within firm across CEOs and also (potential) variation within the CEO.

[33] Here standard errors are adjusted for clustering within industry, rather than firm.

[34] See Ken French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html) for definitions.

[35] Further suggestive evidence comes from Lys and Vincent (1995) and Shefrin (2000), who chronicle AT&T's 1990 acquisition of NCR using exactly this paradigm. Reassuringly, the longholder measure identifies AT&T's CEO (Robert Allen) as overconfident.

[36] For this test, we use the definition of Q employed by Kaplan and Zingales (1997) to avoid rendering the weights meaningless. The COMPUSTAT data items are: cash flow to capital = (item 18 + item 14) / item 8 ; Q = [item 6 + (item24 * item 25) - item 60 - item 74] / item 6 ; debt to capital (leverage) = (item 9 + item 34) / (item 9 + item 34 + item 216) ; dividends to capital = item21 + item 19) / item 8 ; cash to capital = item 1 / item 8. Item 8, capital, is always taken at the beginning of the year (lagged).

[37] The effects of a simple logit are similar. Fixed effects logit is not feasible since quintiling the sample leaves us with too few identifiable cases in some subsamples.

[38] Sample size and power issues make the parallel estimates using Post-Longholder and Holder 67 unreliable; nevertheless, in each case we observe a higher odds ratio among the most unconstrained quintile than the most constrained quintile.

[39] While the three-day window minimizes the effect of any noise in our proxy for expected returns, we find similar results using a window of five days (-2 to $+2$).

[40]Nevertheless, the market-model results are almost identical.

Table 1. Summary Statistics

Panel A. Summary Statistics of Firm Data	Obs.	Mean	Median	St. Dev.
Assets	3,959	5,950.49	2,234.77	13,907.91
Capital (PPE)	3,959	2,258.94	855.30	5,557.83
Investment (CAPX)	3,742	382.47	151.66	948.64
Cash Flow	3,959	447.46	189.75	963.92
Cash Flow normalized by lagged capital (CF/k)	3,959	0.37	0.26	0.37
Cash Flow normalized by lagged assets (CF/a)	3,959	0.11	0.10	0.07
Q	3,959	1.42	1.12	0.89
Corporate Governance	3,959	0.55	1	0.50
Technical Industry	3,942	0.04	0	0.19
Manufacturing Industry	3,942	0.48	0	0.50
Transportation Industry	3,942	0.24	0	0.42
Trade Industry	3,942	0.11	0	0.31
Financial Industry	3,942	0.09	0	0.29
Service Industry	3,942	0.05	0	0.21

Panel B. Summary Statistics of CEO Data	Full Sample (747 CEOs)				Overconfident CEOs (100 CEOs)			
	Obs.	Mean	Median	St. Dev.	Obs.	Mean	Median	St. Dev.
Age	3,958	57.53	58	6.74	676	57.61	58	6.28
CEO Tenure	3,913	8.53	6	7.38	653	10.65	9	7.02
President and Chairman	3,959	0.38	0	0.48	676	0.35	0	0.48
Founder	3,386	0.17	0	0.37	605	0.13	0	0.34
Stock Ownership	3,959	0.02	0.00	0.07	676	0.02	0.00	0.04
Vested Options	3,959	0.02	0.00	0.11	676	0.07	0.02	0.25
Finance Background	2,102	0.25	0	0.43	378	0.18	0	0.38
Engineering Background	2,102	0.19	0	0.39	378	0.11	0	0.31

Number of firms = 400. Financial variables are reported in $m. Q is the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation. Stock ownership is the fraction of company stock owned by the CEO and his immediate family. Vested options are the CEO's holdings of options that are exercisable within 6 months, as a fraction of common shares outstanding. Vested Options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members.

Technical Industry is binary and equal to 1 for firms with primary SIC codes 1000-1799, 8711; Finance Industry is equal to one for firms with primary SIC codes 6000-6799; Manufacturing Industry equals 1 for firms with primary SIC codes 2000-3999; Transportation Industry includes all firms with primary SIC codes 4000-4999; Trade Industry are SIC codes 5000-5999; and Service Industry are SIC codes 7000-8710, 8712-8720, 8722-8999. Assets, capital, Q, Stock Ownership, and Vested Options are at the beginning of the fiscal year; all other variables are at the end. Finance background is binary and equal to 1 if the CEO previously worked in a financial institution or as a CFO, treasurer, accountant, or in another finance related position. Engineering background is binary and equals 1 if the CEO is an individual patent-holder or previously worked as an engineer, in the natural sciences, or in another technically-oriented position.

Table 1. Summary Statistics *(continued)*

Panel C. Summary Statistics for Press Data (327 firms; 661 CEOs)	Obs.	Mean	Median	St. Dev.
Total Mentions	3,936	91.81	39	175.77
"Confident" Mentions	3,936	0.81	0	1.92
"Optimistic" Mentions	3,936	0.71	0	1.70
"Not Confident" Mentions	3,936	0.02	0	0.19
"Not Optimistic" Mentions	3,936	0.06	0	0.29
"Reliable, Cautious, Conservative, Practical, Steady, Frugal" Mentions	3,914	0.52	0	1.34

Panel D. Summary Statistics of Me	Obs.	Mean	Median	St. Dev.
Relatedness	865	0.398	0	0.490
Cumulative abnormal return to	865	-0.004	-0.007	0.048
Acquiror in Technical Industry	865	0.023	0	0.150
Acquiror in Manufacturing Industry	865	0.302	0	0.459
Acquiror in Transportation Industry	865	0.105	0	0.307
Acquiror in Trade Industry	865	0.073	0	0.260
Acquiror in Financial Industry	865	0.453	0	0.498
Acquiror in Service Industry	865	0.044	0	0.205

Number of firms = 400. Press data comes from Business Week, The New York Times, Financial Times, The Economist and The Wall Street Journal using LexisNexis and Factiva.com. Relatedness is a dummy variable which takes the value 1 when the acquiror and target share the same Fama-French 48 industry group. Cumulative abnormal returns to the acquiror are calculated for an event window of -1 to +1 using a modified market model with the daily S&P 500 return as proxy for expected returns. The sample consists of 865 merger bids.

Table 2. Correlations with Overconfidence Measure

Panel A. Correlations with Firm Characteristics (N=3959)

	Longholder	Size	Q	Cash Flow	Stock Ownership	Vested Options	Corporate Governance
Longholder	1.00						
Size	-0.09	1.00					
Q	0.08	-0.32	1.00				
Cash Flow	0.09	-0.14	0.40	1.00			
Stock Ownership	-0.04	-0.19	0.12	0.13	1.00		
Vested Options	0.19	-0.16	0.08	0.17	0.09	1.00	
Corporate Governance	0.03	-0.38	0.13	0.07	0.20	0.08	1.00

Panel B. Correlations with CEO Characteristics (I) (N=3912)

	Longholder	Age	Pres & Chm	Tenure
Longholder	1.00			
Age	0.01	1.00		
President and Chairman	-0.03	-0.03	1.00	
Tenure	0.13	0.39	0.01	1.00

Panel C. Correlations with CEO Characteristics (II): Educational Background (N=2102)

	Longholder	Fin. Ed.	Tech. Ed.
Longholder	1.00		
Financial Background	-0.07	1.00	
Engineering Background	-0.09	-0.23	1.00

Longholder is a binary variable and equals 1 if the CEO ever held an option package until the year before expiration, unless it was < 40% in the money entering its last year. Size is the log of assets, Q the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation, normalized by beginning-of-the-year capital. Stock Ownership is the fraction of company stock owned by the CEO and his immediate family. Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding and multiplied by 10 so that the mean is comparable to Stock Ownership. Size, Q, Stock Ownership, and Vested Options are measured at the beginning of the year.

Corporate governance is a binary variable equal to 1 if the board has between 4 and 12 directors. Finance background (dummy) equals 1 if the CEO previously worked as CFO, treasurer, accountant, in a financial institution or another finance related position. Engineering background (dummy) equals 1 if the CEO is an individual patent-holder, previously worked as engineer, in the natural sciences or another technically-oriented position.

Table 3. Do Overconfident CEOs Complete More Mergers?

	logit (1)	Random Effects logit (2)	Fixed Effects logit (3)	logit (4)	Random Effects logit (5)	Fixed Effects logit (6)	logit (7)	Random Effects logit (8)	Fixed Effects logit (9)
Size	0.946	0.9358	0.6537	0.9428	0.9334	0.66	0.9932	0.9844	0.4942
	(0.95)	(1.03)	(2.68)***	(1.01)	(1.06)	(2.61)***	(0.08)	(0.18)	(2.32)**
Q_{t-1}	0.6476	0.6225	0.7135	0.6465	0.6222	0.7154	0.6664	0.6547	0.7701
	(4.23)***	(3.99)***	(1.88)*	(4.26)***	(3.99)***	(1.86)*	(2.93)***	(2.74)***	(1.10)
Cash Flow	1.9143	2.1949	2.0231	1.9196	2.2002	2.0377	1.6238	1.787	1.7283
	(4.34)***	(4.76)***	(2.08)**	(4.36)***	(4.78)***	(2.10)**	(2.37)**	(2.53)**	(1.08)
Stock Ownership	1.4913	1.1862	0.384	1.4593	1.1626	0.3813	0.3297	0.3906	0.0327
	(0.50)	(0.18)	(0.70)	(0.47)	(0.16)	(0.70)	(0.70)	(0.56)	(0.81)
Vested Options	1.5125	1.0626	0.4566	1.4798	1.0413	0.4595	3.3821	2.5566	1.093
	(2.42)**	(0.15)	(1.64)	(2.18)**	(0.10)	(1.62)	(1.48)	(1.00)	(0.07)
Corporate Governance	0.7569	0.8105	1.0817	0.7592	0.8123	1.0811	1.1563	1.2306	2.1376
	(2.05)**	(1.53)	(0.42)	(2.03)**	(1.52)	(0.42)	(0.75)	(1.08)	(2.52)**
Longholder	1.658	1.8292	2.1891						
	(3.15)***	(3.62)***	(2.30)**						
Post-Longholder				1.4444	1.538	1.8642			
				(1.76)*	(1.89)*	(1.54)			
Pre-Longholder				1.8259	2.0581	2.3305			
				(3.08)***	(3.71)***	(2.41)**			
Holder 67							1.7578	2.0552	2.6558
							(3.15)***	(3.76)***	(2.83)***
Firm Fixed Effects	no	no	yes	no	no	yes	no	no	yes
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3911	3911	2568	3911	3911	2568	1795	1795	986
Number of Firms		394	225		394	225		315	140

Robust z statistics in parentheses. Constant included.

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

The dependent variable is binary where 1 signifies that the firm made at least one merger bid that was eventually successful in a particular firm year. Size is the log of assets at the beginning of the year. Q is the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation and is normalized by capital at the beginning of the year. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year. Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members.

Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Post-Longholder is a dummy equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. Pre-Longholder are all years classified as 1 under Longholder, but 0 under Post-Longholder. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. The fixed effects logit model is estimated consistently using a conditional logit specification. Standard errors in columns 1, 4, and 7 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 4. Are Overconfident CEOs Right to Hold their Options?

Panel A. Returns

Percentile	Return
10th	-0.24
20th	-0.15
30th	-0.10
40th	-0.05
50th	-0.03
60th	0.03
70th	0.10
80th	0.19
90th	0.39
Mean	0.03
Standard Deviation	0.27

For each option that is held until expiration and that is at least 40% in the money at the beginning of its final year, we calculate the return the CEO would have gotten from instead exercising the option a year sooner and investing in the S&P 500. We assume exercise both in the final year and in the hypothetical year occur at the maximum stock price during that year.

Table 4. Are Overconfident CEOs Right to Hold their Options? *(continued)*

Panel B. Do "Mistaken" Holders Drive the Acquisitiveness Result?

	logit	Random Effects logit	Fixed Effects logit
	(1)	(2)	(3)
Size	0.9486	0.935	0.6757
	(0.88)	(1.02)	(2.43)**
Q_{t-1}	0.6313	0.607	0.7147
	(4.42)***	(4.07)***	(1.84)*
Cash Flow	1.9368	2.214	2.052
	(4.23)***	(4.64)***	(2.06)**
Stock Ownership	1.555	1.2547	0.3502
	(0.54)	(0.24)	(0.73)
Vested Options	1.6809	0.8461	0.3026
	(0.57)	(0.16)	(0.82)
Corporate Governance	0.7581	0.8157	1.111
	(2.01)**	(1.47)	(0.56)
Longholder: Did OK	1.5567	1.6346	1.4259
	(2.19)**	(2.31)**	(0.75)
Longholder: Should Have Exercised	1.7386	1.9848	3.4042
	(2.50)**	(2.99)***	(2.64)***
Year Fixed Effects	yes	yes	yes
Observations	3857	3857	2515
Number of Firms		392	221

Robust z statistics in parentheses. Constant included.
* significant at 10%; ** significant at 5%; *** significant at 1%

The dependent variable is binary where 1 signifies that the firm made at least one merger bid that was eventually successful in a particular firm year. Size is the log of assets at the beginning of the year. Q is the market value of assets over the book value of assets. Cash flow is earnings

Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration. Longholder: Did OK is 1 for CEOs for whom Longholder is 1 and who did better by holding at least as many times as they would have done better by exercising longheld options a year earlier. Longholder: Should Have Exercised is 1 for CEOs for whom Longholder is 1 and who would have done better by exercising a year earlier more times than they did better by holding. The fixed effects logit model is estimated consistently using a conditional logit specification. Standard errors in column 1 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios. Longholders whose longheld options were not at least 40% in the money at the beginning of their final year are excluded.

Table 5. Control for Returns

	logit (1)	Random Effects logit (2)	Fixed Effects logit (3)	logit (4)	Random Effects logit (5)	Fixed Effects logit (6)	logit (7)	Random Effects logit (8)	Fixed Effects logit (9)
Size	0.9708	0.9647	0.6481	0.968	0.9626	0.6531	0.9911	0.9862	0.507
	(0.50)	(0.55)	(2.56)**	(0.54)	(0.58)	(2.51)**	(0.11)	(0.16)	(2.16)**
Q_{t-1}	0.5885	0.5544	0.6074	0.5876	0.5542	0.6094	0.5651	0.5463	0.6135
	(4.40)***	(4.31)***	(2.20)**	(4.40)***	(4.31)***	(2.18)**	(3.43)***	(3.48)***	(1.63)
Cash Flow	1.7048	1.9283	1.5329	1.7093	1.9337	1.5431	1.3937	1.5382	1.7037
	(3.15)***	(3.72)***	(1.19)	(3.16)***	(3.73)***	(1.20)	(1.44)	(1.81)*	(1.01)
Stock Ownership	0.6843	0.6223	0.2552	0.6707	0.6105	0.2531	0.2027	0.2977	0.0765
	(0.42)	(0.44)	(0.79)	(0.45)	(0.46)	(0.80)	(0.85)	(0.69)	(0.67)
Vested Options	3.7237	2.6886	0.853	3.6868	2.6485	0.843	1.865	1.5508	1.2135
	(1.65)*	(1.20)	(0.14)	(1.65)*	(1.18)	(0.15)	(0.73)	(0.46)	(0.15)
Corporate Governance	0.745	0.7952	1.129	0.7466	0.7967	1.1289	1.1876	1.2486	2.2015
	(2.09)**	(1.64)	(0.64)	(2.08)**	(1.63)	(0.64)	(0.88)	(1.15)	(2.57)**
$Returns_{t-1}$	1.8244	1.8364	1.5734	1.8194	1.8292	1.5675	1.88	1.8759	1.4211
	(2.95)***	(2.93)***	(1.94)*	(2.93)***	(2.91)***	(1.93)*	(2.09)**	(2.02)**	(0.94)
$Returns_{t-2}$	1.3241	1.3238	1.1289	1.3233	1.3228	1.1273	1.8242	1.8335	1.4268
	(1.60)	(1.46)	(0.57)	(1.59)	(1.46)	(0.56)	(2.23)**	(2.13)**	(1.07)
$Returns_{t-3}$	1.1158	1.1207	1.0679	1.1166	1.1214	1.0675	1.525	1.6086	1.5792
	(0.57)	(0.60)	(0.33)	(0.57)	(0.61)	(0.33)	(1.47)	(1.73)*	(1.41)
$Returns_{t-4}$	1.3781	1.4092	1.4469	1.3769	1.407	1.4444	1.1727	1.1993	1.3252
	(1.45)	(1.76)*	(1.76)*	(1.44)	(1.75)*	(1.76)*	(0.46)	(0.65)	(0.87)
$Returns_{t-5}$	1.1987	1.1756	1.1215	1.1997	1.1756	1.1209	1.7428	1.6508	1.4586
	(0.99)	(0.84)	(0.58)	(1.00)	(0.84)	(0.57)	(2.22)**	(1.80)*	(1.23)
Longholder	1.5722	1.7061	2.1272						
	(2.71)***	(3.18)***	(2.19)**						
Post-Longholder				1.4219	1.5074	1.9328			
				(1.67)*	(1.80)*	(1.60)			
Pre-Longholder				1.6899	1.8611	2.2084			
				(2.59)***	(3.14)***	(2.23)**			
Holder 67							1.9475	2.2638	2.8113
							(3.77)***	(4.21)***	(2.98)***
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	3681	3681	2439	3681	3681	2439	1758	1793	960
Number of Firms		365	211		365	211		307	137

Robust z statistics in parentheses. Constant included.

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

The dependent variable is binary where 1 signifies that the firm made at least one merger bid that was eventually successful in a particular firm year. Size is the log of assets at the beginning of the year. Q is the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation and is normalized by capital at the beginning of the year. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year. Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members. Returns are the natural logarithm of 1 plus the annual return on company equity.

Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Post-Longholder is a dummy equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. Pre-Longholder are all years classified as 1 under Longholder, but 0 under Post-Longholder. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. The fixed effects logit model is estimated consistently using a conditional logit specification. Standard errors in column 1 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 6. Diversifying and Same-Industry Mergers

	Panel 1. Diversifying Mergers			Panel 2. Within Industry Mergers		
	logit	Random Effects logit	Fixed Effects logit	logit	Random Effects logit	Fixed Effects logit
	(1)	(2)	(3)	(4)	(5)	(6)
			A. Longholder			
Size	1.0849	1.0968	0.7585	0.7772	0.7446	0.4456
	(1.31)	(1.18)	(1.37)	(3.03)***	(3.14)***	(3.45)***
Q_{t-1}	0.68	0.7014	0.9606	0.6496	0.5878	0.5001
	(2.77)***	(2.45)**	(0.20)	(3.55)***	(3.23)***	(2.49)**
Cash Flow	1.9102	2.1723	1.8172	1.8388	2.0455	2.3926
	(3.90)***	(3.99)***	(1.60)	(3.07)***	(3.13)***	(1.62)
Stock Ownership	2.6364	1.5318	0.0692	1.4355	2.0722	2.2829
	(1.06)	(0.36)	(1.28)	(0.26)	(0.64)	(0.55)
Vested Options	1.6215	1.4471	0.9125	0.827	0.5201	0.1903
	(3.00)***	(0.84)	(0.17)	(0.81)	(1.08)	(2.10)**
Corporate Governance	0.69	0.7253	0.8347	0.834	0.8675	1.1175
	(2.21)**	(1.91)*	(0.79)	(0.97)	(0.74)	(0.43)
Longholder	1.6942	1.8465	2.005	1.3167	1.4166	1.4432
	(2.89)***	(3.07)***	(1.83)*	(1.23)	(1.46)	(0.73)
Year Fixed Effects	yes	yes	yes	yes	yes	yes
Observations	3911	3911	1900	3911	3911	1520
Number of Firms		394	167		394	131
			B. Holder 67			
Size	1.1387	1.1673	0.4742	0.8244	0.7951	0.442
	(1.46)	(1.43)	(1.90)*	(1.68)*	(1.88)*	(1.92)*
Q_{t-1}	0.6191	0.6431	0.8883	0.7117	0.6795	0.6058
	(2.36)**	(2.18)**	(0.36)	(2.20)**	(1.93)*	(1.26)
Cash Flow	1.6166	1.7717	0.8871	1.4547	1.5346	2.7408
	(2.11)**	(2.12)**	(0.21)	(1.42)	(1.35)	(1.30)
Stock Ownership	2.7453	3.2534	0.0663	0.0221	0.0137	0
	(0.66)	(0.69)	(0.62)	(1.87)*	(1.41)	(1.24)
Vested Options	3.5317	3.88	2.1107	2.6078	1.5671	0.1204
	(0.98)	(1.14)	(0.47)	(1.31)	(0.36)	(1.07)
Corporate Governance	1.1145	1.1588	1.5289	1.0639	1.0733	2.2568
	(0.47)	(0.63)	(1.11)	(0.25)	(0.28)	(1.96)**
Holder 67	1.7166	1.8729	2.2903	1.1504	1.2528	1.232
	(2.51)**	(2.73)***	(1.95)*	(0.60)	(0.92)	(0.45)
Year Fixed Effects	yes	yes	yes	yes	yes	yes
Observations	1795	1795	693	1795	1795	581
Number of Firms		315	102		315	80

Robust z statistics in parentheses. Constant included.

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

The dependent variable in panel 1 is binary where 1 signifies that the firm made a diversifying merger bid that was eventually successful in a particular firm year. The dependent variable in panel 2 is binary where 1 signifies that the firm made a within-industry merger bid that was eventually successful in a particular firm year. Industries are the 48 Fama and French industry groups (1997). Size is the log of assets at the beginning of the year. Q is the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation and is normalized by capital at the beginning of the year. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year. Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership.

Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. The fixed effects logit model is estimated consistently using a conditional logit specification. Standard errors in columns 1 and 4 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 7. Overconfidence and Acquisitiveness by Equity Dependence

Panel A. Longholder

	Least Equity Dependent		---------->		Most Equity Dependent
	Random Effects logit Quintile 1	Random Effects logit Quintile 2	Random Effects logit Quintile 3	Random Effects logit Quintile 4	Random Effects logit Quintile 5
Size	0.8721	1.1371	0.9434	0.7672	0.9828
	(1.05)	(1.00)	(0.39)	(1.43)	(0.10)
Q_{t-1}	0.4601	0.8058	0.62	0.6522	0.6072
	(3.05)***	(1.00)	(1.46)	(1.28)	(1.31)
Cash Flow	0.9115	1.6897	8.0689	3.973	5.6369
	(0.27)	(0.98)	(2.61)***	(1.38)	(2.35)**
Stock Ownership	0.1046	0.2199	4.9239	3.1767	2.978
	(0.82)	(0.59)	(0.71)	(0.38)	(0.74)
Vested Options	1.0536	111.1586	2.0983	0.7263	12.3633
	(0.06)	(2.25)**	(0.70)	(0.11)	(1.62)
Corporate Governance	0.924	0.8296	0.447	0.8871	0.9991
	(0.24)	(0.63)	(2.42)**	(0.36)	(0.00)
Longholder	2.0289	1.6269	1.6465	2.1899	1.0654
	(2.09)**	(1.54)	(1.40)	(1.58)	(0.15)
Year Fixed Effects	yes	yes	yes	yes	yes
Observations	731	733	708	735	665
Number of Firms	121	157	172	167	149

z statistics in parentheses. Constant included.

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

The dependent variable in panel 1 is binary where 1 signifies that the firm made at least one merger bid that was eventually successful in a particular firm year. The dependent variable in panel 2 is binary where 1 signifies that the firm made at least one diversifying merger bid that was eventually successful in a particular firm year. Industries are the 48 Fama and French industry groups (1997). Size is the log of assets at the beginning of the year. Q is the market value of assets over the book value of assets. Cash flow is earnings before extraordinary items plus depreciation and is normalized by capital at the beginning of the year. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year.

Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Post-Longholder is a dummy equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. All regressions are logit with random effects. Coefficients are presented as odds ratios.

Table 8. Merger Financing and Overconfidence

Panel A. All Mergers with Disclosed Method of Payment

	Overconfidence Measure	Cash	Debt OR Cash and Debt	Stock AND Cash and/or Debt	Stock	odds (cash v. stock)	odds (cash v. other)	odds ratio (v stock)	odds ratio (v other)
Overconfident CEOs	Longholder	38.8%	6.9%	19.7%	34.6%	1.12	0.63	1.09	1.10
	Holder 67	40.0%	7.6%	18.8%	33.6%	1.19	0.67	1.47	1.38
	Longholder	33.5%	8.3%	25.6%	32.6%	1.03	0.58		
Non-overconfident CEOs	Holder 67	29.6%	9.1%	24.7%	36.6%	0.81	0.48		

Panel B. Regressions

	logit (1)	logit (2)	logit (3)	logit (4)	logit (5)	logit (6)	logit (7)	logit (8)	logit (9)	logit (10)
Undervalued (UV)	1.7215	1.8244	1.8457	1.9274	0.9073	1.8007	1.7894	1.7659	1.8733	0.9334
	(2.72)***	(2.97)***	(3.02)***	(3.11)***	(0.38)	(1.68)*	(1.66)*	(1.59)	(1.53)	(0.13)
Q_{t-1}		1.2532	1.2618	1.0288	0.4706		0.9784	0.9603	0.8908	0.3876
		(1.24)	(1.26)	(0.14)	(3.30)***		(0.11)	(0.19)	(0.49)	(2.79)***
Stock Ownership			1.7263	1.6837	0.2223			144.5774	25.8462	0.911
			(0.41)	(0.42)	(1.10)			(1.88)*	(1.19)	(0.03)
Vested Options			0.5818	0.4279	0.1464			0.7802	1.0133	0.9266
			(0.75)	(1.21)	(0.83)			(0.17)	(0.01)	(0.03)
Merger Size			0.981	0.9927	0.9922			1.0391	1.0713	1.0876
			(1.37)	(0.58)	(0.76)			(1.30)	(2.29)**	(2.76)***
KZ Quintile 2					0.7824					1.3553
					(0.73)					(0.58)
KZ Quintile 3					0.6403					0.7711
					(1.22)					(0.49)
KZ Quintile 4					0.5282					1.0217
					(1.70)*					(0.03)
KZ Quintile 5					0.4041					0.4097
					(2.57)**					(1.53)
Longholder	0.7423	0.708	0.7685	0.7766	0.6792					
	(0.84)	(0.99)	(0.76)	(0.72)	(0.97)					
UV * Longholder	2.3096	2.41	2.2577	1.9555	3.1857					
	(2.09)**	(2.20)**	(2.06)**	(1.71)*	(2.61)***					
Holder 67						1.2895	1.2928	1.3554	1.3902	0.8901
						(0.70)	(0.70)	(0.81)	(0.84)	(0.22)
UV * Holder 67						1.1564	1.1543	1.1521	1.1071	1.1994
						(0.31)	(0.31)	(0.30)	(0.20)	(0.28)
Year Fixed Effects	no	no	no	yes	yes	no	yes	yes	yes	yes
Observations	772	772	772	772	430	405	405	405	405	218

Robust z statistics in parentheses. Constant included.

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

Sample includes all merger bids that were eventually successful. The dependent variable is binary where 1 signifies that the bid was financed using only cash. Undervalued is a binary variable where 1 indicates that Q at the beginning of the year was less than or equal to industry Q, where industries are the 48 Fama-French industry groups. Q is the market value of assets over the book value of assets. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year. Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership.

Merger size is the amount the acquiror paid for the target as a fraction of acquiror value (for SDC mergers, amount paid is the value of the transaction; for CRSP mergers, it is the market value of the target the day after the announcement. When both variables are present, we use the minimum). KZ Quintile 'x' is a dummy variable equal to 1 if the lagged value of the Kaplan-Zingales index for that firm year is in the `x'th quintile. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package wa-283.8m)he least 40% in the money at its last year. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. UV * Longholder and UV * Beyond Threshold are interactions. Standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 9. Correlations of Press Measure

Panel A. Press Measures with Longholder (N = 3372)

	Longholder	TOTconf. (lagged)	TOTmen. (lagged)		Longholder	TOTconf. (cum.)	TOTmen. (cum.)
Longholder	1.00			Longholder	1.00		
TOTALconfident (lag.)	0.06	1.00		TOTconf. (cum.)	0.13	1.00	
TOTALmentions (lag.)	0.00	0.35	1.00	TOTmen. (cum.)	-0.01	0.35	1.00

Panel B. Correlations of Press Coverage with Firm Characteristics (N = 3372)

	TOTAL-conf. (lagged)	TOTAL-ment. (lagged)	Size	Q	Cash Flow	CEO Owner-ship	CEO Vested Options	Corporate Governance
TOTALconfident (lag.)	1.00							
TOTALmentions (lag.)	0.35	1.00						
Size	0.17	0.31	1.00					
Q	0.04	0.04	-0.32	1.00				
Cash Flow	0.01	0.04	-0.14	0.40	1.00			
CEO Ownership	0.00	0.14	-0.19	0.12	0.13	1.00		
CEO Vested Options	0.00	-0.01	-0.16	0.08	0.17	0.09	1.00	
Corporate Governance	-0.08	-0.11	-0.38	0.13	0.07	0.20	0.08	1.00
	TOTAL-confident (cum.)	TOTAL-mentions (cum)	Size	Q	Cash Flow	CEO Owner-ship	CEO Vested Options	Corporate Governance
TOTALconfident (cum.)	1.00							
TOTALmentions (cum.)	0.33	1.00						
Size	0.22	0.30	1.00					
Q	0.07	0.04	-0.32	1.00				
Cash Flow	0.03	0.04	-0.14	0.40	1.00			
CEO Ownership	0.03	0.09	-0.19	0.12	0.13	1.00		
CEO Vested Options	0.02	0.01	-0.16	0.08	0.17	0.09	1.00	
Corporate Governance	-0.08	0.07	-0.38	0.13	0.07	0.20	0.08	1.00

TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. The "lagged" version considers all articles in the previous year. The "cumulative" version considers all articles over the sample period up to the previous year. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Size is the natural logarithm of assets at the beginning of the year.

Q is the market value of assets over the book value of assets at the beginning of the year. Cash flow is earnings before extraordinary items plus depreciation and is normalized by capital at the beginning of the year. CEO ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year. CEO vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Corporate governance is the number of directors who currently serve as CEOs of other companies.

Table 9. Correlations of Press Measure *(continued)*

Panel C. Press Confidence Measures with CEO Characteristics (*N* = 3329)

	TOTconf. (lagged)	TOTmen. (lagged)	Age	Pres & Chm	Tenure	TOTconf. (cum.)	TOTmen. (cum.)	Age	Pres & Chm	Tenure
TOTALcon	1.00					1.00				
TOTALme	0.35	1.00				0.33	1.00			
Age	-0.03	0.02	1			0.01	0.09	1		
President	0.05	0.01	-0.03	1		0.03	.0.61	0.03	1	
Tenure	-0.01	-0.01	0.39	0.01	1.00	0.10	0.12	0.39	0.01	1.00

Panel D. Press Confidence Measures with CEO Education. (*N* = 1844)

	TOTconf. (lagged)	TOTmen. (lagged)	Finance Backgr.	Eng. Backgr.	TOTconf. (cum.)	TOTmen. (cum.)	Finance Backgr.	Eng. Backgr.
TOTALcon	1.00				1.00			
TOTALme	0.35	1.00			0.33	1.00		
Finance	-0.03	-0.02	1.00		-0.06	-0.01	1.00	
Engineerin	0.01	-0.02	-0.23	1.00	-0.01	-0.04	-0.23	1.00

TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. The "lagged" version considers all articles in the previous year. The "cumulative" version considers all articles over the sample period up to the previous year. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Finance Background is a dummy variable equal to 1 if the CEO previously worked in a financial institution or as a CFO, treasurer, accountant or in another finance related position. Engineering Background is a dummy variable equal to 1 if the CEO is an individual patent-holder, or previously worked as an engineer, in the natural sciences, or in another technically-oriented position.

Table 10. Press Coverage and Mergers

Panel A.

	(1)	(2)	(3)	(4)	(5)	(6)
CEO age	1.018	1.013	1.007	1.018	1.015	1.010
	(0.71)	(0.48)	(0.31)	(0.70)	(0.53)	(0.40)
CEO tenure	0.922	1.025	0.934	0.897	0.999	0.909
	(1.29)	(0.31)	(1.02)	(1.61)	(0.01)	(1.40)
CEO chairman & president	1.056	1.165	1.219	1.034	1.209	1.160
	(0.20)	(0.45)	(0.67)	(0.12)	(0.58)	(0.51)
CEO with finance background	0.958	1.221	0.975	0.995	1.232	1.035
	(0.12)	(0.40)	(0.07)	(0.01)	(0.42)	(0.10)
CEO with engineering background	1.037	1.115	1.127	1.030	1.027	1.091
	(0.11)	(0.25)	(0.32)	(0.09)	(0.06)	(0.24)
TOTALmentions (lagged)	1.007	1.009	1.010			
	(0.76)	(0.86)	(1.07)			
TOTALmentions (cumulative)				1.000	0.999	1.000
				(0.07)	(0.30)	(0.09)
TOTALconfident (lagged)	2.559	2.539	2.800			
	(2.33)**	(2.00)**	(2.49)**			
TOTALconfident (cumulative)				2.179	2.759	2.495
				(2.05)**	(2.22)**	(2.42)**
Firm & Ownership Controls	X	X	X	X	X	X
Year Fixed Effects		X	X		X	X
Industry Fixed Effects		X			X	
Firm Random Effects			X			X
Observations	657	576	657	657	576	657
Number of Firms			152			152

z statistics in parentheses. Constant included. (* significant at 10%; ** significant at 5%; *** significant at 1%)

The dependent variable is binary where 1 signifies in Panel A that the firm made at least one acquisition (of at least 51% of the target value) in a particular firm year. Firm and Ownership controls contain the full set of controls used in previous regressions (Size, Q, Cash flow, CEO ownership, CEO vested options, Corporate governance) and are included in every regression. The odds ratios (insignificant with the exception of the Corporate governance) are not displayed for brevity. CEO age and tenure are measured in years. CEO chairman & president is a dummy variable and is equal to one if the CEO is also chairman of the board and president of his company. CEO with finance background is a dummy variable equal to 1 if the CEO previously worked in a financial institution or as a CFO, treasurer, accountant or in another finance related position. CEO with engineering background is a dummy variable equal to 1 if the CEO is an individual patent-holder, or previously worked as an engineer, in the natural sciences, or in another technically-oriented position. Industry dummies are coded as the 48 Fama and French (1997) industry groups.

TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. The "lagged" version considers all articles in the previous year. The "cumulative" version considers all articles over the sample period up to the previous year. The sample is restricted to all firm years up to the first merger for a given CEO (and drops all firm years under that CEO after the first merger, if any). Standard errors in columns 1, 2, 4, and 5 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 10. Press Coverage and Mergers *(Continued)*

Panel B.

	Divers. (1)	Intra-ind. (2)		Divers. (3)	Intra-ind. (4)
CEO age	1.001	0.906		1.001	1.002
	(0.02)	(0.76)		(0.03)	(0.04)
CEO tenure	1.072	0.918		1.041	0.944
	(0.64)	(0.13)		(0.31)	(0.52)
CEO chairman & president	1.168	2.097		1.215	0.938
	(0.36)	(1.09)		(0.48)	(0.10)
CEO with finance background	0.994	0.299		0.950	2.212
	(0.01)	(1.12)		(0.08)	(1.22)
CEO with engineering background	1.538	0.406		1.404	0.316
	(0.80)	(1.03)		(0.62)	(1.11)
TOTALmentions (lagged)	1.016	0.974	TOTALmentions (cumulative)	0.998	0.997
	(1.51)	(1.06)		(0.43)	(0.31)
TOTALconfident (lagged)	3.371	1.845	TOTALconfident (cumulative)	4.155	1.292
	(2.10)**	(0.41)		(2.42)**	(0.23)
Firm & Ownership Controls	X	X		X	X
Year Fixed Effects	X	X		X	X
Industry Fixed Effects	X	X		X	X
Firm Random Effects	X	X		X	X
Observations	549	278		549	278

z statistics in parentheses. Constant included. (* significant at 10%; ** significant at 5%; *** significant at 1%)

The dependent variable is binary and equals 1 if the firm made at least one diversifying acquisition (columns (1) and (3)) or at least one intra-industry acquisition (columns (2) and (4)) of at least 51% of the target value in a particular firm year. Acquisitions are classified as diversifying or intra-industry using the Fama-French 48 industries. Firm and Ownership controls contain the full set of controls used in previous regressions (Size, Q, Cash flow, CEO ownership, CEO vested options, Corporate governance) and are included in every regression. The odds ratios (insignificant with the exception of the Corporate governance) are not displayed for brevity. CEO age and tenure are measured in years. CEO chairman & president is a dummy variable and is equal to one if the CEO is also chairman of the board and president of his company. CEO with finance background is a dummy variable equal to 1 if the CEO previously worked in a financial institution or as a CFO, treasurer, accountant or in another finance related position.

CEO with engineering background is a dummy variable equal to 1 if the CEO is an individual patent-holder, or previously worked as an engineer, in the natural sciences, or in another technically-oriented position. Industry dummies are coded as the 48 Fama and French (1997) industry groups.TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. The "lagged" version considers all articles in the previous year. The "cumulative" version considers all articles over the sample period up to the previous year. The sample is restricted to all firm years up to the first merger for a given CEO (and drops all firm years under that CEO after the first merger, if any). Standard errors in columns 1, 2, 4, and 5 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

Table 11. How Does the Market Respond to Overconfident CEOs' Bids?

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (6)	OLS (7)	OLS (8)	OLS (9)	OLS (10)	OLS (11)	OLS (12)
Stock Ownership		0.0462	0.0492	0.0488		0.0458	0.0492		0.0847	0.0933	0.0932
		(1.45)	(1.52)	(1.52)		(1.44)	(1.52)		(1.66)*	(1.67)*	(1.73)*
CEO Vested Options		0.103	0.1035	0.1034		0.1039	0.1031		0.1767	0.202	0.2145
		(2.68)***	(2.55)**	(2.55)**		(2.70)***	(2.54)**		(1.70)*	(2.04)**	(2.17)**
(CEO Vested Options)^2		-0.0318	-0.0317	-0.0318		-0.0324	-0.0319		-0.1122	-0.1366	-0.1463
		(2.69)***	(2.54)**	(2.55)**		(2.74)***	(2.56)**		(1.44)	(1.86)*	(1.99)**
Relatedness		0.0017	0.0018	0.0017		0.0019	0.002		0.0052	0.0053	0.0058
		(0.51)	(0.55)	(0.52)		(0.58)	(0.60)		(1.03)	(1.06)	(1.16)
Corporate Governance		0.0043	0.0049	0.005		0.0044	0.005		0.0069	0.0075	0.0065
		(1.09)	(1.22)	(1.24)		(1.12)	(1.24)		(1.24)	(1.34)	(1.18)
Cash Financing		0.0131	0.016	0.0174		0.0131	0.016		0.016	0.0169	0.0268
		(3.86)***	(4.39)***	(4.06)***		(3.88)***	(4.38)***		(3.47)***	(3.52)***	(3.53)***
Longholder	-0.0073	-0.0102	-0.0101	-0.0078							
	(1.96)*	(2.57)**	(2.56)**	(1.43)							
Longholder * Cash				-0.0056							
				(0.77)							
Post-Longholder					-0.0125	-0.0166	-0.0158				
					(2.15)**	(2.92)***	(2.68)***				
Pre-Longholder					-0.0046	-0.0069	-0.0071				
					(1.06)	(1.49)	(1.57)				
Holder 67								-0.0001	-0.0053	-0.003	0.0043
								(0.02)	(1.17)	(0.64)	(0.67)
Holder 67 * Cash											-0.0174
											(1.78)*
Year Fixed Effects	no	no	yes	yes	no	no	yes	no	no	yes	yes
Observations	846	846	846	846	846	846	846	446	446	446	446
R-squared	0.00	0.05	0.07	0.07	0.01	0.05	0.07	0.00	0.08	0.10	0.11

Absolute value of t statistics in parentheses. Constant included.

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

The event window is the day before through the day after the announcement of the bid. The dependent variable is the cumulative abnormal return on the bidder's stock from the day before the announcement of the bid through the day after. Abnormal returns are calculated by taking the daily return on the bidder's common equity and subtracting expected returns. Expected returns are the daily return on the S&P 500 index. Stock ownership is the fraction of company stock owned by the CEO and his immediate family at the beginning of the year in which the bid occurs. Vested options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year of the bid, as a fraction of common shares outstanding. Vested options are multiplied by 10 so that the mean is roughly comparable to stock ownership. Relatedness is 1 for acquisitions in which the bidder and target firms are in the same industry. Cash financing is a binary variable where 1 indicates that the acquisition was financed using some combination of cash and debt.

Corporate governance is a binary variable where 1 signifies that the board of directors has between four and twelve members. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Post-Longholder is a dummy equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. Pre-Longholder are all years classified as 1 under Longholder, but 0 under Post-Longholder. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. All standard errors are clustered by event date to account for cross-sectional correlation of stock returns.