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WHO MAKES ACQUISITIONS?
CEO OVERCONFIDENCE AND THE MARKET'S REACTION

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ABSTRACT

Overconfident CEOs over-estimate their ability to generate returns. Thus, on the margin, they undertake mergers that destroy value. They also perceive outside finance to be over-priced. We classify CEOs as overconfident when, despite their under-diversification, they hold options on company stock until expiration. We find that these CEOs are more acquisitive on average, particularly via diversifying deals. The effects are largest in firms with abundant cash and untapped debt capacity. Using press coverage as "confident" or "optimistic" to measure overconfidence confirms these results. We also find that the market reacts significantly more negatively to takeover bids by overconfident managers.

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"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 profitability of Company T[arget]...We've observed many kisses but very few miracles. Nevertheless, many managerial princesses remain serenely confident 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 and disruptive activities undertaken by large corporations. 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 activity, often for specific epochs. The empirical results on returns to mergers, however, are mixed, suggesting that mergers may not create value on average.[2] Moreover, even if there are gains from mergers, they do not appear to accrue to the shareholders of the acquiring company. 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.

In this paper, we argue that overconfidence among acquiring CEOs is an important explanation of merger activity. We develop a model of CEO overconfidence that shows the impact of overconfidence on merger decisions. We test the predictions on a data set of large US companies from 1980 to 1994. Using the CEOs' personal portfolio decisions to measure overconfidence, we find that overconfident CEOs conduct more mergers and, in particular, more value-destroying mergers. As predicted, these effects are most pronounced in firms with abundant cash or untapped debt capacity. Furthermore, the market's assessment of overconfident CEOs, reflected by press coverage in major business publications and the stock price reaction to merger announcements, corroborates the overconfidence theory.

The idea that mergers may be driven by biases of the acquiring manager has long had popular appeal, as evidenced by our introductory quote. In the finance literature, Roll (1986) first introduced the "hubris hypothesis" of corporate takeovers.[4] 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). Building on this literature, we propose that overconfident CEOs overestimate the positive impact of

their leadership and 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 induces mergers that are, on the margin, value-destroying. At the same time, 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, e.g. to finance a 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. However, the model makes the unambiguous prediction that overconfident managers are more likely to conduct value-destroying mergers. They are also more likely to conduct mergers if their firm has abundant sources of internal finance and they do not need to issue "undervalued" equity to finance the deal. Moreover, the lower average quality of mergers undertaken by overconfident CEOs should be reflected in a (more) negative market reaction to the merger announcement. This negative announcement effect is reinforced by the tendency of overconfident CEOs to overpay for their acquisitions in the face of competition.

We test these predictions empirically on a sample of Forbes 500 firms from 1980 to 1994. Our main empirical measure of overconfidence employs time series data on the CEOs' holdings of company stock options in their private portfolios. Previous literature in corporate finance shows that risk averse CEOs should exercise stock options well before expiration due to the suboptimal concentration of their portfolio in company-specific risk.[5] As in Malmendier and Tate (2003), we classify CEOs as overconfident when they display the opposite behavior, i.e. if they hold company stock options until the last year before expiration. This behavior suggests that the CEO is persistently bullish about his company's future prospects.

We find that overconfident CEOs are 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. Moreover, the effect of overconfidence on merger activity comes primarily from an increased likelihood of conducting diversifying acquisitions. Previous literature suggests that diversifying mergers are unlikely to create value in the acquiring firm.[6] 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.

Additional empirical tests corroborate our results. We show that the observed differences in option exercises and merger decisions are not due to inside information. Instead, the hypothetical returns CEOs could have obtained by exercising their options earlier are positive on average. In addition, the acquisitions of overconfident managers are distributed uniformly over their tenures suggesting that the effect of overconfidence is a true managerial fixed effect. 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 between 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." Controlling for the total number of press mentions, we perform the same empirical analysis as with the portfolio overconfidence measure. The results replicate. Furthermore, the two 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 a bid if the CEO is overconfident. 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[7], 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.

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 describes the empirical strategy and provides evidence that overconfidence can explain managerial acquisitiveness. We also discuss alternative explanations and explore the robustness of our results to changes in the empirical specification. 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

A Setting and Psychological Foundations

We construct a simple model of managerial overconfidence. The model demonstrates the harmful effects of 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 first consider the case of limited debt capacity. A firm with scarce cash reserves and high leverage must issue equity in order to finance a sufficiently costly acquisition. We will show later that the introduction of additional internal funds and untapped debt capacity only increases the incentives of overconfident managers to conduct acquisitions. Risky debt, on the other hand, has similar properties to equity since managers and financiers might disagree on the appropriate risk-adjusted rate.

Our analysis focuses on one type of heterogeneity among managers, overconfidence in their own abilities. The hypothesis of managerial overconfidence has a foundation in the psychology literature on self-enhancement. Psychologists find that individuals tend to overestimate their abilities when comparing themselves to an anonymous benchmark or to their peers (Larwood and Whittaker, 1977; Svenson, 1981; Alicke et al. 1995; Weinstein and Klein, 2002;).[8] 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.[9]

Psychologists have found that executives are 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. 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. First, 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). Second, 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.

In our theoretical framework, overconfidence manifests itself in two forms. First, an overconfident manager overestimates the value of the potential merger, either due to the belief that his leadership skills are "better than average" (and, by implication, better than the target's current management) or due to an underestimation of the downside to the merger. Second, he believes that his company's equity is undervalued by the market, again due to the overestimation of his leadership skills and his ability to "hand-pick" profitable investment projects.

The basic notation of the model is as follows. There are two companies, Acquiror A and Target T, which have market values of V_A and V_T respectively. The manager of A chooses whether or not to acquire T. We denote by $\overline{c}$ the total internal resources (cash and riskless debt) available to the manager of A and by c the amount of cash he pays to the target shareholders as part of the merger financing. $V(c)$ 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. We call a CEO overconfident when $\widehat{V}_A > V_A$ and $\widehat{V}(c) - V(c) > \widehat{V}_A - V_A$ for some c. The first condition is that the CEO overvalues his own company. The second condition is that the CEO overvalues the merger.

We examine the impact of overconfidence on several dimensions: the decision to undertake an acquisition, the means of finance, and the ultimate payment offered to target shareholders. First, we explore the tradeoff between heightened acquisitiveness and perceived financing constraints in a world with a single bidder for the target company. However, in this simplified framework, only an assumption on the relative bargaining power of the target and the acquiror can uniquely identify the amount of the transfer from the acquiror to the target shareholders.

Later, we consider a more general model with multiple bidders in which we endogenously derive potential over-payment by overconfident acquirors.

B Acquisition Decision of a Rational CEO

We first consider the takeover decision of a single rational bidder. For simplicity, we assume the acquiror has all bargaining power and, thus, must pay V_T for the target.[10] If he 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 $sV(c) = V_T - c$. Since the CEO acts in the interest of current shareholders, 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

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

Thus the manager decides to acquire whenever $e > 0$. Not surprisingly, the rational CEO makes the first best acquisition decision. 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.

C Acquisition Decision of an Overconfident CEO

An overconfident CEO overestimates the future value he can generate. In terms of our model, overconfidence implies $\widehat{V}_A > V_A$ and $\widehat{V}(c) - V(c) > \widehat{V}_A - V_A$ for some cash payment c. As a result, the value of a merger to an overconfident manager depends on the means of financing. In particular, an overconfident manager perceives a cost to financing with undervalued shares.[11] Since the target shareholders, like the market, believe that the merged company will be worth $V(c)$, they demand a share s of the merged company such that $sV(c) = V_T - c$. Whenever $\widehat{V}(c) > V(c)$, the acquiring CEO believes that issuing new equity entails a loss to current shareholders of $(\frac{V_T - c}{V(c)} - \frac{V_T - c}{\widehat{V}(c)})\widehat{V}(c)$. 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 $(1-s)\widehat{V}(c) > \widehat{V}_A$ for some $c \leq \bar{c}$. Substituting for s, he acquires T iff $\widehat{V}(c) - (V_T - c) - \frac{[\widehat{V}(c) - V(c)](V_T - c)}{V(c)} > \widehat{V}_A$ for some c. That is, the manager's perceived valuation of the merged company minus what he must give to target shareholders minus the perceived loss due to

dilution must exceed his perceived value of A without the merger. Denoting the "perceived" additional merger synergies as $\widehat{e} \in R_{++}$,[12] we can decompose $\widehat{V}(c)$ into

$$\widehat{V}(c) = \widehat{V}_A + V_T + e + \widehat{e} - c \tag{2}$$

Then, using (1) and (2), the overconfident manager's decision rule is to merge whenever $e+\widehat{e} > \frac{(\widehat{V}_A - V_A + \widehat{e})(V_T - c)}{V(c)}$. 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 propositions.

Proposition 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 $G = (1-s)\widehat{V}(c) = \frac{V(c)-V_T+c}{V(c)}\widehat{V}(c) = \frac{(V_A+e)\left(\widehat{V}_A+V_T+e+\widehat{e}-c\right)}{V_A+V_T+e-c}$, where the last equality uses (1) and (2). Then $\frac{\partial G}{\partial c} = \frac{(V_A+e)\left(\widehat{V}_A-V_A+\widehat{e}\right)}{(V(c))^2} > 0$ (as $\widehat{V}_A > V_A$ and $\widehat{e} > 0$ by assumption). Post-merger value is maximized on $c \in [0, V_T]$ by setting c as high as possible.

Proposition 2 A rational CEO never conducts a value-destroying merger. An overconfident CEO conducts a value-destroying merger if the perceived synergies $\hat{e}$ are sufficiently large relative to the perceived undervaluation $(\widehat{V}_A - V_A)$ and the portion of the deal financed by equity $\frac{V_T - c}{V}$.

Proof: The claim that a rational CEO does not conduct a value-destroying merger follows directly from his first-best decision rule (see Section B). In Section C, we showed that an overconfident CEO conducts a merger whenever $e + \widehat{e} > \frac{\left(\widehat{V}_A - V_A + \widehat{e}\right)(V_T - c)}{V(c)}$. Thus,if $e \leq 0$, he still conducts the merger as long as $\widehat{e} > |e|$ and $\widehat{V}_A - V_A$ and $\frac{V_T - c}{V(c)}$ are sufficiently small.

Proposition 3 Suppose $\overline{c} \geq V_T$, i.e. internal resources exceed the value of the target. Then, an overconfident CEO will conduct all mergers a rational CEO would conduct and some value-destroying mergers that a rational CEO would not conduct.

Proof: Since the overconfident manager has internal resources in excess of V_T, he will set $c = V_T$ by Proposition 1. Then, the condition for conducting the merger becomes $e + \widehat{e} > 0$.

Since the rational CEO merges whenever $e > 0$ (see Section B) and $\widehat{e} > 0$, the first part of Proposition 3 follows. The last statement of the proposition follows directly from Proposition 2.

Proposition 4 Suppose $\overline{c} < V_T$. Then, an overconfident CEO does some value-destroying mergers that a rational CEO would not and a rational CEO does some value-creating mergers that the overconfident CEO would not.

Proof: The first statement follows from Proposition 2. To show the second statement, suppose $e > 0$. Then, the rational CEO always does the merger (see Section B). From Section C, the overconfident CEO will not do the merger if and only if $e + \widehat{e} < \frac{\left(\widehat{V}_A - V_A + \widehat{e}\right)(V_T - c)}{V(c)}$, i.e. if $\widehat{e}$ is sufficiently small and $\widehat{V}_A - V_A$ or $\frac{V_T - c}{V(c)}$ are sufficiently large.

D Competing Bidders

So far, we have determined the transfer from the acquiror to the target shareholders by our allocation of bargaining power to the acquiror. Next, we endogenize this payment by allowing the possibility of competition. Suppose that there are I companies, denoted A_i, $i = 1, ..., I$, that compete for control of T in an English auction. Denote by W_i the A_i manager's maximal willingness to pay for T. Since 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, we can quantify W_i as follows:

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

Then, the equilibrium outcome is the following.[13] For $\max W_i \geq V_T$,

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

It is interesting to 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. Formally, we have the following proposition.

Proposition 5 *Suppose an overconfident manager* (i^*) *wins the takeover contest. Then, he will over-pay if* $\max_{i \neq i^*} W_i \in (V_T + e_{i^*}, W_{i^*})$.

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 hand-selected 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 he chooses first, for a sufficient influx of resources, we would expect the CEO to increase the number of projects of both types.[14]

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 may 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, view all but the most lucrative 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.[15]

E 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 for overconfident and rational CEOs. As noted above, overconfidence does not imply an unambiguous prediction about this quantity. However, higher average acquisitiveness of overconfident managers would indicate the importance of overconfidence as a general explanation of observed merger activity. Moreover, the model delivers three testable predictions. Proposition 2 and Proposition 3 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 2 and Proposition 4 together imply that mergers conducted by overconfident CEOs will be worse on average than mergers conducted by rational CEOs. In addition, Proposition 5 shows that overconfident managers are prone to overpay for their acquisitions in the face of potential competition. 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. 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. 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. The core of the data set is described in detail in Hall and Liebman (1998) and Yermack (1995). 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, 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 merger 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 and large subsidiaries. We include only successful merger bids and, 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.[16] 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 total assets (item 6) minus total liabilities (item 181) minus preferred stock (item 10) plus deferred taxes (item 35) plus convertible debt (item 79). When preferred stock is missing, we replace it with the redemption value of preferred stock. Book value of assets is total assets (item 6).[17] 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 320 firms. As in Malmendier and Tate (2003), we trim cash flow at the 1% level to deal with 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 when we run regressions on quintiles of the data set in Subsection E and only in the 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 educational background as technical, financial, or miscellaneous. We consider an MBA, a Ph.D. in economics or finance, an undergraduate degree in finance, or similar educational backgrounds to constitute a finance education. Similarly, undergraduate or graduate degrees in engineering, physics, operations research, chemistry, mathematics, biology, pharmacy, and other applied sciences constitute technical education.

Table 1 presents summary statistics of the data, divided into firm-specific variables (Panel A) and CEO-specific variables (Panel B). 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. Table 2 provides information about the mergers. Panel A presents summary statistics of the mergers undertaken by CEOs in our sample; panel B summarizes merger financing, both for our sample and for all U.S.

mergers during the sample period.

III The Impact of Overconfidence on Acquisitiveness

A Measure of Overconfidence

We use the timing of option exercises to identify overconfidence. Previous literature shows that it is typically not optimal for risk-averse, underdiversified executives to hold their options until expiration (Lambert et al., 1991; Carpenter, 1998; Hall and Murphy, 2002). CEO compensation contracts regularly contain large quantities of stock and option grants in lieu of cash compensation. While diversified investors should value options as if they were risk-neutral and, therefore, never forgo option value by exercising an option early (Black and Scholes, 1973), CEOs cannot trade their options or hedge the risk by short-selling company stock. Employment contracts can also limit the frequency and quantity of divestitures CEOs may undertake in any given year. As a result, CEOs' personal portfolios are likely to include too much of their own companies' idiosyncratic risks. In addition, their human capital is invested in their firm, further increasing their exposure to company-specific risk. Thus, the Black-Scholes formula will not apply. Instead, a CEO must trade-off the option-value of holding stock options against the costs of underdiversification. Though the optimal 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.

In our data, the behavior of a subset of CEOs cannot be reconciled with any reasonable calibration of a model of rational option exercise. The typical option in our sample has a duration of ten years and is fully vested after four years. 13% of the CEOs in our sample hold an option at least once until the year of expiration. These options are typically highly in the money, with a median of 278% at the beginning of the final year. As a frame of reference, Hall and Murphy (2002) find that a CEO should exercise an option during year 9 if it reaches 40% in the money (given a constant coefficient of relative risk aversion of 3 and 67% of wealth in company stock). 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. Rather than taking the current value of the option and investing in a diversified portfolio, the CEO is repeatedly betting his personal wealth on the company's future returns. Thus, we classify a

CEO as overconfident (and set the dummy variable "longholder" equal to 1) if he ever during his tenure as CEO holds an option until the last year before expiration. Though large stock or option holdings (ownership *levels*) might also indicate suboptimal exposure to company-specific risk, they are not entirely under the CEO's control (e.g. they are adjusted by the board to confer incentives) and are, therefore, inappropriate as overconfidence measures. Table 3 presents the correlation of our longholder measure with various firm and CEO characteristics.

There are a number of potential alternative interpretations of this measure of overconfidence. In the remainder of this section, we will first apply our measure of overconfidence and show that overconfident CEOs are significantly more likely to undertake mergers. We will then show that none of the alternative explanations can explain both the option-exercise behavior and the merger decisions of these CEOs.

B 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 "longholder" 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.[18] 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 4, for example, the number of observations drops from 3690 to 2261 and the number of firms from 327 to 184 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.

C 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.

Table 4 contains the results. All coefficients are presented as odds ratios. The first column is a logit estimation on only our longholder overconfidence measure. We find a positive and strongly significant coefficient, where standard errors are robust to heteroskedasticity and unspecified within-firm correlation. Standard errors that are robust to heteroskedasticity and unspecified within-year correlation are even smaller, suggesting that within-firm serial correlation is the more serious concern. The magnitude of the coefficient is quite large. We find an odds ratio of 1.68; that is, the odds of an overconfident manager making a successful takeover bid are 1.68 times the odds of a rational manager. More specifically, the odds of a rational CEO are 0.095 (or nearly 1 in 10) and the odds for an overconfident CEO are roughly 0.159.

In the remaining columns of Table 4, we modify the analysis to account for other potential factors in the decision to conduct a merger. In column 2, 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[19], 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.

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. On the surface, it appears that smaller firms are more likely to conduct a merger; however, much of this result may be mechanical within-firm variation. That is, the assets of a firm are necessarily larger after a merger. Because our sample already selects firms based on size, this effect can overwhelm the cross-sectional variation. It does not affect the remaining coefficients, though; running the regressions without size yields the same results. We also 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.[20] Further, more cash flow leads to more acquisition activity, as expected if cash eases financing constraints. Effective corporate governance strongly mitigates CEO acquisitiveness. Stock ownership and higher levels of vested options appear to have a positive (though mostly insignificant) effect on acquisitiveness in the cross-section, but the effect reverses when we restrict attention to within-firm variation (Col-

umn 6). The positive cross-sectional effect is consistent with (high) stock and option holdings being a noisy proxy for overconfidence; however, we are reluctant to make this interpretation since the CEO does not have full control over ownership levels. The negative within-firm effect is consistent with an incentive interpretation since mergers destroy value for the acquiror, on average.

Column 3 adds year fixed effects to the regression. As noted in the introduction, the literature has identified a myriad of epoch-specific explanations for merger activity. Controlling for this variation, however, does not impact our estimates of the overconfidence effect. Similarly, Column 4 adds industry fixed effects and the interaction of industry effects with the year effects to the regression.[21] This specification allows us to control for the possibility that mergers cluster within industries over time, as argued by Andrade et al., (2001). Again, there is only a negligible impact on the results. Thus, overconfidence appears to be an explanation of merger activity that generalizes across merger waves.

Finally, Columns 5 and 6 control for unspecified firm-specific variation in the probability of conducting a merger. Though the regressions in the previous columns explicitly address the most natural firm characteristics that might affect acquisitiveness, there may be an omitted, or even unobservable, firm-specific variable that leads to more acquisitiveness and positively correlates with our overconfidence measure. To rule out this possibility, we first explicitly model the average probability of conducting a merger within each firm as a random draw from a normal distribution. The random effects specification controls for potential firm-specific effects on merger activity without eliminating all between firm variation from the analysis. As reported in Column 5, taking this step actually increases both the magnitude and significance of our estimate of the effect of overconfidence on acquisitiveness. In Column 6, we eliminate firm fixed effects and identify the overconfidence effect using only cases in which an overconfident manager either precedes or follows a rational manager within a firm. Here the magnitude of the overconfidence effect substantially increases. An overconfident manager now has 2.53 times the odds of doing a merger compared to a rational manager.[22]

Thus, all of the regressions confirm that overconfidence is an important determinant of merger activity, even on average.

Alternative Explanations. Before examining the specific predictions of our model, we discuss some alternative interpretations of our measure of overconfidence.

1. Inside information. An important determinant of option exercise is private 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. However, in order to explain repeated delay of option-exercise over a multi-year horizon, inside information has to be persistently positive, rather than random (i.e. sometimes positive and sometimes negative) over time. Most importantly, to explain both the persistent delay and the increased acquisitiveness of CEOs, the positive inside information must be related to upcoming or recently completed mergers. Thus, we should observe insider trades right around mergers, which does not seem to be the case empirically (Boehmer and Netter, 1997). Nevertheless, we perform two additional tests to distinguish between inside information and overconfidence.

First, if inside information were the main explanation of our findings, we should see a concentration of mergers in the years following the vesting date of those options that the CEO holds until expiration. To test for evidence on the joint timing of option exercise and mergers, we estimate Equation (3), splitting longholder into two dummies: an indicator for the last 3 (4 or 5) years[23] of an option that is held until expiration and an indicator for the remaining years of the overconfident CEO's tenure (Table 5). We do not find a significant difference between the effect of overconfidence on acquisitiveness for years in which the CEO is holding the vested option (i.e. when he is *identified* as overconfident) and when he is not. If anything, we find weak evidence that the effect on acquisitiveness is smaller while the CEO is holding the option.[24] We also run random effects logit regressions of (3) in the subsample of overconfident CEOs, i.e. we condition on longholder being equal to 1. Again, we include dummies for the last 3, 4, or 5 years of an option that is held until expiration. As before, we find no evidence that overconfident CEOs are more likely to conduct mergers in the particular period we use to identify them as overconfident, i.e. in the last $3, 4$ or 5 years of the duration of an option that is held until expiration, relative to the rest of their tenures.

We also test directly whether inside information influences the decision to hold an option to expiration. In particular, the CEO may have held the option due to private information about the company's prospects unrelated to his merger projects. Though it is difficult to explain how this form of private information would lead to heightened acquisitiveness, we can nevertheless address its potential impact on our overconfidence measure. In Panel A of Table 6, 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 make this calculation for all CEOs whose options were at least 40% in the money at the start of the

final year, again using Hall and Murphy (2002) as a benchmark. 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. Moreover, the heightened acquisitiveness among longholder CEOs is due almost entirely to CEOs who more often than not lost money by holding their options until expiration (Table 6, Panel B). Thus, inside information appears to have little power to explain the properties of our longholder measure. We also replicate these results assuming hypothetical exercise $2, 3, 4$, and 5 years before expiration.[25] The average CEO would have done better under all four alternative strategies than by holding to expiration. And, in all cases the heightened acquisitiveness of longholder CEOs is stronger for the "losing" CEOs. For example, looking 5 years before expiration, the odds ratio on the "loser" portion of longholder is 1.7, but only 1.27 for those CEOs who, more often than not, profited by holding.

2. Signalling. A closely related story, that also derives from an information asymmetry about the merger, is that longholder CEOs are holding their options until expiration as a signal to the market about the merger. Again, the evidence that mergers do not cluster in time when the CEO fails to exercise options speaks strongly against this alternative story. Further, as we will see in Section IV, the market responds more negatively to the mergers conducted by "longholder" CEOs than by their peers. Thus, holding options until expiration does not convey positive information about the merger to the market.

3. Stock price bubbles. Another explanation for merger activity is 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 (non-)exercise behavior if managers want to reap the benefits of the bubble or to avoid "popping" it with a negative signal. However, to the extent that "overvaluation" is a market-wide phenomenon, the time fixed effects already control for it. In addition, our conditional logit estimation eliminates all cross-sectional variation. What remains to be checked is whether the probability of doing a merger moves with the stock price of a particular firm. To test whether lagged stock returns can explain both the probability of doing a merger and our longholder indicator, 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 7). In addition, the lags of returns have no significant effect on merger decisions.

4. *Stock price volatility.* Another reason why some CEOs may hold their options longer than their peers is that 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 D that much of the acquisitiveness of overconfident CEOs is due to diversifying mergers. However, the fact that we find a significant positive effect of overconfidence using a fixed effects logit specification implies that cross-sectional variation in volatility among firms cannot explain our results. Only variation in volatility across the tenures of CEOs in the same company could potentially confound the estimation. So, we estimate Equation (3) including our usual controls and adding the volatility of returns over the prior year as a 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 (2.72 with fixed effects).

5. Risk Neutrality. CEOs might hold options until expiration if they are risk neutral or if they manage to perfectly hedge the risk of their options, despite the prohibition of trading and short sales. However, shareholders should prefer a risk neutral CEO over a risk-averse CEO since they are not prevented from diversifying their portfolios. So, if risk aversion dampens acquisitiveness and longholder measures risk neutrality, the market should react positively to the extra bids of longholders. In Section IV, we show that, instead, the market reacts more *negatively* on average to the bids of longholder CEOs than other acquirors.

6. Finance Education and Other Personal Characteristics. To test whether educational background determines both the option exercise and the merger behavior of CEOs, we estimate Equation (3) including an indicator of financial education. Finance education has a positive impact on acquisitiveness, but the effect is orthogonal to overconfidence. Similarly, 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 longholder captures an observable CEO characteristic other than overconfidence.

There are other explanations of why CEOs may hold options until expiration (like procrastination) or conduct more mergers than their peers. These stories, however, cannot simultaneously explain takeovers and excessive option holding.

D 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.[26]

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. Table 8 shows that overconfident managers are far more likely to do diversifying mergers than rational managers. In the fixed effects logit specification, the odds ratio on the longholder measure of overconfidence is 3.15. By comparison, the effect of overconfidence on all mergers, reported in Table 4, is 2.53. And, though the effect of overconfidence on the likelihood of making a related bid appears to be positive (1.51), the z-statistic of 0.75 is far below conventional standards of significance.

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.

E 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[27]. 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.[28] 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 9. In Panel A, 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 2.29) and no significant effect in the "most constrained" quintile. 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 virtually identical in the top and bottom quintiles (70 versus 66).

In Section D, we show that overconfident managers are particularly prone to make diversifying bids, which are, from an ex-ante perspective, less likely to generate future returns. Thus, the

discrepancy in beliefs (between the market and an overconfident CEO) about the profitability of a diversifying merger is likely to be particularly high. In other words, the undervaluation effect when making a diversifying bid is likely to be particularly acute because the contribution of $\widehat{e}$ to $\widehat{V}(c) - V(c)$ will be particularly large. As a result, we expect to find an even starker demonstration of Prediction 2 when we limit our attention to diversifying mergers. The results are in Panel B of Table 9. As in Panel A, we find a strong and significant effect of overconfidence among the least constrained managers (the odds ratio on overconfidence is 2.55) and no significant effect among the most constrained managers. Notably, the effect among unconstrained managers is larger here than in Panel A. The effect of overconfidence appears to decline monotonically as we move progressively to more constrained quintiles of the index.

The data confirms Prediction 2 of our model: the effects of overconfidence on acquisitiveness are strongest for managers with abundant internal resources. This effect is most pronounced when we restrict attention to a class of value-destroying mergers most prevalent among overconfident managers. 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 (Table 10). The effect is strongest if we control for market over- and undervaluation. In Panel C, we run a logit regression to estimate the probability of conducting a cash acquisition conditional on overconfidence, stock and option ownership, size of the target as a fraction of the acquiror's value, and over- or undervaluation. We find that overconfident CEOs are far more likely than rational managers to conduct a cash acquisition when the effects of undervaluation are acute, as captured by Tobin's Q being less than 1. Interestingly, CEOs do fewer cash deals when they are overvalued by the market. These result confirm both that overconfident managers are particularly sensitive to (perceived) market undervaluation and that investor sentiment affects merger financing decisions, as in Shleifer and Vishny (2002).

F Robustness

We briefly discuss the robustness of our results to changes in the empirical specification. We focus on the baseline estimates of Equation (3).

1. Is the Option in the Money? Our longholder measure of overconfidence is appealing in its simplicity: we classify a CEO as overconfident if he ever holds an option until expiration. Of course, the less an option is in the money, the less delayed exercise indicates likely overcon-

fidence. As a robustness check of our measure, then, we require that the option that is held until expiration be at least $x\%$ in the money at the beginning of its final year. We vary x between 0 and 100 by increments of 10. As we increase x, the classification as overconfident becomes more restrictive. At the same time, we hold the definition of "rational" option exercise behavior constant, i.e. we require that the CEO never holds an option until the final year. This restriction keeps the comparison group the same across all regressions.[29] Figure 1 presents the coefficients on these modified proxies for overconfidence in estimates of Equation (3). In the logit and random effects logit specifications, the overconfidence coefficient is roughly constant as we vary x. In the fixed effects logit specification, the coefficient appears to modestly increase. We conclude that the effect of longholder on acquisitiveness is not driven by CEOs with out-of-the money options.

2. Consistency of behavior. Thus far, we have classified CEOs as overconfident if they ever held an option until expiration. A natural alternative is to require that they always hold their option packages until expiration. Similarly, we can require the non-overconfident CEOs to be "habitual" early exercisers. Of course, the restrictions these tests impose on sample size are severe. For example, when we require that an overconfident CEO never exercises an entire option package before expiration, we reduce our sample of overconfident CEO years from 742 to 259. Or, comparing overconfident CEOs to early exercisers decreases total firm years in the regression from 3690 to 1181. Nevertheless, our results hold. When we require that CEOs always hold options to expiration to be overconfident, we find a significant odds ratio of 1.81 on overconfidence in the random effects estimation of Equation (3). Similarly, when we compare overconfident CEOs, measured by longholder, only to CEOs who always exercise options while they still have 6 or more years of remaining duration (the average remaining duration at exercise is 5.2 years in our sample), we find an odds ratio of 1.57 on longholder. Finally, if we impose both restrictions, i.e. require that overconfident CEOs always hold to expiration and that rational CEOs always exercise early, we find an odds ratio of 1.69 on overconfidence.

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. To confirm that our measure is identifying overconfident CEOs, we now construct an alternative measure. Rather than identifying differences in beliefs from the managerial side, we identify them from the perspective of corpo-

rate outsiders. In particular, we classify CEOs as overconfident if the market perceives them as "confident" and "optimistic." Our proxy for market perception is 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 the number of articles from the 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 construct the alternative overconfidence measure by comparing the number of articles that portray the 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 define the following indicator of overconfidence:

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

We choose a measure that removes coverage frequency for two reasons. First, conducting mergers may lead to heightened press coverage. This effect could ultimately trigger reverse causality if total coverage creeps into our overconfidence measure. Second, some CEOs are simply mentioned more often in the press than others, regardless of context. As a result, they are more likely to be mentioned as "confident" or "optimistic." A potential shortcoming of this overconfidence measure is that managers might try to convey confidence and optimism to the press as a way to keep their share price high. It is unlikely that managers consistently follow this strategy through their tenure since we would not expect them to be able to perpetually fool the market. However, it is possible that CEOs try to convey (false) confidence to the media around large events, like merger announcements, that can have deleterious effects on the share price. In order for such "hyping" to be successful, the CEO would require a wide audience. Thus, we can partially address this concern by controlling for the total number of articles referring to the CEO. Further, Table 12 reports a statistically significant positive correlation ($\rho = 0.11$, significant at 1%) between TOTALconfident and our longholder overconfidence measure (which is not susceptible to this critique). Moreover, if we split the longholder variable into "winners" and "losers" as in Section C, we find that the "loser" portion is positively and significantly correlated with the press measure ($\rho = 0.15$), but the "winner" portion is not ($\rho = -0.01$). If managerial hyping were the primary determinant of our press measure, we might expect CEOs to personally profit from portrayal as confident or optimistic. But, on average, it appears that a 1 under the TOTALconfident classification is more associated with

negative[30] personal returns.[31] And, TOTALconfident picks up the component of longholder most likely to represent overconfidence.

Our press measure of overconfidence not only positively correlates with the longholder measure of overconfidence, but also performs remarkably similarly in the acquisitiveness regressions.[32] First, we can replicate the overall acquisitiveness regressions of Table 4, using TOTALconfident as our proxy for O and the total number of mentions in the press as an additional control. In the random effects specification, for example, we find an odds ratio of 1.33, which is significant at the 5% level. We can also replicate the test of Prediction 1 from Section D, using diversification as a proxy for negative expected value. Table 13 presents the results. TOTALconfident, like longholder, predicts a heightened probability of conducting a diversifying deal. The odds ratio in the random effects specification is 1.78 (significant at the 1% level). And, as with longholder, we find that TOTALconfident does not predict heightened acquisitiveness via within industry deals. Here, the effect of TOTALconfident is virtually zero in all three specifications.

We also re-measure the effect of overconfidence conditioning on internal resources (Prediction 2). As in Section E, we estimate Equation (3) separately on quintiles of the Kaplan-Zingales index. We find a strong positive impact of overconfidence on acquisitiveness in the least constrained quintile and no significant impact in the most constrained quintile. As with longholder, the effect is most pronounced for "bad" (diversifying) acquisitions. The largest effect, a 2.90 odds ratio (significant at 5%), occurs among the least constrained firms and there is an insignificant 1.64 odds ratio among the most constrained firms.

Finally, we note that the TOTALconfident measure of overconfidence 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) present similar results for portfolio measures of overconfidence, including longholder. All results replicate with the TOTALconfident measure. This is a final piece of evidence against the hyping interpretation of the TOTALconfident results since the hyping argument is less relevant for investment decisions. Investment is measured annually as the aggregate capital expenditure at the end of the fiscal year. CEOs cannot consistently hype every element that goes into their firms' capex. Thus, the strong evidence that confidence in the press correlates with investment distortions further assuages our concern about this issue.[33]

These results bolster the overconfidence story in several ways. First, they provide an important confirmation that our personal portfolio approach indeed captures managerial overconfidence.

Whether we measure differences in beliefs between the manager and the market using managerial portfolio decisions or market perception, the results are the same. 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 provide further evidence that our overconfidence measures capture aspects of the CEOs' personalities rather than an omitted firm effect. While we address 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. 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.[34] 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.[35] So, assuming that $\alpha = 0$ and $\beta = 1$ for the firms in our sample, abnormal returns are given by

$$AR_{it} = r_{it} - r_t^m$$

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

$$CAR_i = \sum_t AR_{it}$$

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:

$$CAR_i = \gamma_1 + \gamma_2 O_i + X_i' G + \varepsilon_i \tag{4}$$

where O indicates an overconfident manager and X is the set of controls. The null hypothesis is $\gamma_2 < 0$. Table 14 presents the results. We estimate five specifications of the regression. First, we include only stock ownership and vested options in our set of controls, X.[36] Second, we add an indicator of relatedness (equal to 1 if the acquiror and target share a Fama-French industry group), an indicator of corporate governance (efficient board size), and an indicator of cash financed deals as additional controls. Third, we add controls for year fixed effects. Fourth, we add controls for industry fixed effects (measured using Fama-French industry groups) and their interaction with the year effects. And, fifth, we add age and an indicator of whether the CEO is also chairman of the board and president to the analysis.

The corporate governance control has the expected effect: good corporate governance is associated with higher cumulative abnormal returns. The same is true for high managerial stock ownership and vested option holdings (at least until they reach extreme levels). The market views related mergers and cash financed deals more favorably, although the effect of relatedness is often just under conventional significance levels. Interestingly, the market discounts deals of older CEOs by 5 basis points per additional year. Most importantly, overconfidence has a significant negative effect on cumulative abnormal returns across specifications. The market discounts overconfident bids by 60 to 100 basis points over the three day window relative to the average merger of a non-overconfident CEO.[37] Given a baseline negative announcement effect of 50 basis points, the additional discount for mergers of overconfident CEOs is large.

V Conclusion

The goal of this paper is twofold. First, we establish the effect of overconfidence on managerial acquisitiveness and, second, we explore the market's response. We develop a simple model of the acquisition decision of an overconfident CEO. The model shows that overconfident CEOs are more eager to make acquisitions, but that perceived financing constraints can prevent them from doing so. 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 find strong evidence in support of the overconfidence hypothesis. Overconfidence positively impacts the acquisitiveness of CEOs over our entire sample of firm years. That is, overconfidence boosts the number of takeovers on average, despite the mitigating impact of cash constraints. Further, as predicted by our 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 hold using both option exercise and press coverage to measure overconfidence. Finally, the market prefers the bids of rational managers: cumulative abnormal returns around overconfident bids are roughly 100 basis points lower on average than for rational bids.

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. Indeed, overconfidence may be a more attractive assumption than empire-building preferences, under which CEOs are perpetually and consciously disregarding the interests of the shareholders. Because overconfident CEOs believe they are maximizing value, standard incentives are unlikely to correct their suboptimal decisions. However, overconfident CEOs do respond to financing constraints. Thus, overconfidence 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.

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Notes

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

[2]Andrade et al., (2001) suggest a small positive, but statistically insignificant combined abnormal return during the announcement period. Jensen and Ruback (1983) and Roll (1986) present surveys of many 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]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.

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

[6]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.

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

[8]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).

[9]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).

[10]Variation in bargaining power, coupled with overconfidence, can give rise to over-payment. Over-payment arises endogenously in a multi-bidder framework, see Subsection D.

[11]As noted above, risky debt has similar properties: mangers view the demanded interest rate as too high.

[12] 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.

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

[14] 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 must be offset by a loss to the former shareholders, a CEO who maximizes current shareholder value will not undertake such a transaction.

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

[16] This selection criterion is especially important here 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.

[17] Definitions as in Fama and French (2002).

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

[19] 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.

[20] 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).

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

[22] In the fixed effects (or conditional) logit specification, standard errors are not robust to clustering 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.

[23] If we look beyond the last 5 years before expiration, we risk entering the vesting period (during which the CEO could not have exercised the option).

[24] Note that this test also assuages reverse causality and endogeneity concerns.

[25] 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.

[26] 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.

[27]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).

[28]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.

[29]The results are similar if we instead group longholders who do not meet the more stringent requirements together with the "rational" CEOs.

[30]Negative here means relative to the S&P 500 and not necessarily < 0.

[31]In addition, we do not find a positive impact on the announcement effect around merger announcements for TOTALconfident CEOs, again suggesting that the incentive to hype projects in the press may not be very strong (on average). This interpretation (and the intepretation of the personal returns from holding options) comes with the caveat that we cannot observe how the market would have reacted to these merger announcements (or firm performance in general) if the same CEOs had not been portrayed as optimistic or confident in the press.

[32]For the sake of brevity, we only tabulate selected results.

[33]While total press coverage has strong positive predictive power for acquisitions, it has none for investment cash flow sensitivity. This confirms that hyping is more important for merger projects than investment, but also suggests that it is not driving our results.

[34]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 $+2$).

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

[36]For these regressions, we omit the 7 observations in the upper 1% tail of vested options. These CEOs have holdings (as a fraction of shares outstanding) as high as 0.32 (the mean holding is 0.0034 with a standard deviation of 0.014). Including these observations destroys the strong positive relationship between vested options and CAR. As a result, our overconfidence proxy must capture this relationship (recall the positive correlation between longholder and vested options), mitigating somewhat the estimated coefficient. The results are similar if, instead, we winsorize option holdings.

[37]The results are slightly stronger when we estimate this difference in market reaction only using overconfident bids that come *after* the first time the overconfident CEO holds an option until the last year before expiration.

Table 1.

Number of firms = 327. Financial variables are reported in $ millions. 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 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. Assets, capital, and Q are at the beginning of the fiscal year; all other variables are at the end.
Technical Education is a dummy variable equal to 1 if the CEO has "technical education," i.e. an undergraduate or graduate degree in engineering, physics, operations research, chemistry, mathematics, biology, pharmacy, and other applied sciences. Press data comes from *Business Week* , *The New York Times* , *Financial Times* , *The Economist* and *The Wall Street Journal* using *LexisNexis* and *Factiva.com* .

Panel A. Summary Statistics of Firm Data

Variable	Observations	Mean	Median	Standard	SIC codes
Assets	3,690	4,800.46	2,106.54	10,348.56	
Capital (PPE)	3,690	2,146.37	905.75	4,022.94	
Investment (CAPX)	3,610	357.47	150.95	785.07	
Cash Flow	3,690	420.80	187.71	837.98	
Cash Flow normalized by lagged capital (CF/k)	3,690	0.34	0.25	0.32	
Cash Flow normalized by lagged assets (CF/a)	3,690	0.11	0.10	0.07	
Q	3,690	1.41	1.12	0.87	
Corporate Governance	3,690	0.57	1	0.50	
Technical Industry	3,676	0.04	0	0.20	1000-1799,2800-2999,3300-3699,4900-4999,8711
Manufacturing Industry	3,676	0.50	0	0.50	600-6799,8721
Transportation Industry	3,676	0.25	0	0.43	2000-2799,3000-3299,3700-3999
Trade Industry	3,676	0.11	0	0.31	4100-4999
Financial Industry	3,676	0.06	0	0.24	5000-5999
Service Industry	3,676	0.04	0	0.21	7000-8699,8712-8713,8730-8999

Panel B. Summary Statistics of CEO Data

	Full Sample: Number of CEOs=661				Overconfident CEOs: Number=85			
Variable	Observations	Mean	Median	St. Dev.	Observations	Mean	Median	St. Dev.
Age	3,689	57.53	58	6.80	742	57.01	57	6.49
Years as CEO	3,664	8.51	6	7.42	719	9.99	8	6.85
President and Chairman	3,690	0.38	0	0.49	742	0.38	0	0.49
Founder	3,143	0.17	0	0.38	652	0.14	0	0.34
Stock Ownership	3,690	2.30	0.12	7.04	742	1.81	0.24	5.05
Vested Options	3,690	0.02	0.00	0.11	742	0.06	0.02	0.24
Finance Education	2,164	0.34	0	0.47	478	0.39	0	0.49
Technical Education	2,164	0.55	1	0.50	478	0.53	1	0.50

Panel C. Summary Statistics for Press Data for Merger Sample

Number of Firms = 327; Number of CEOs = 661						
Variable	Observations	Mean	Median	St. Dev.	Minimum	Maximum
Total Mentions	3,669	92.19	39	178.62	0	2,447
"Confident" Mentions	3,669	0.82	0	1.95	0	25
"Optimistic" Mentions	3,669	0.73	0	1.74	0	20
"Not Confident" Mentions	3,669	0.02	0	0.20	0	3
"Not Optimistic" Mentions	3,669	0.06	0	0.29	0	3
"Reliable, Cautious, Conservative, Practical, Steady, Frugal" Mentions	3,647	0.53	0	1.36	0	12

* The maximum number returned from *LexisNexis* is 1000.

Table 2.

Relatedness is a dummy variable which takes the value 1 when the acquiror and target share a 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. The modified market model takes the daily S&P 500 return as the expected return in computing abnormal returns. Industry variables are defined on Table 1. The sample consists of 869 completed mergers.

Panel A. Summary Statistics of Completed Mergers

Variable	Observations	Mean	Median	Standard Deviation
Relatedness	839	0.415	0	0.493
Cumulative abnormal return to acquiror [-1,+1]	843	-0.005	-0.005	0.044
Acquiror in Technical Industry	850	0.022	0	0.148
Acquiror in Manufacturing Industry	850	0.332	0	0.471
Acquiror in Transportation Industry	850	0.071	0	0.256
Acquiror in Trade Industry	850	0.085	0	0.279
Acquiror in Financial Industry	850	0.444	0	0.497
Acquiror in Service Industry	850	0.047	0	0.212

Panel B. Merger Financing: Summary Statistics

Year	Number of Mergers with Disclosed Method of Payment	Cash and Debt			Stock			Combination		
		Sample		US	Sample		US	Sample		US
1980	23	7	30%	48%	9	39%	31%	7	30%	21%
1981	42	5	12%	43%	22	52%	34%	15	36%	23%
1982	46	8	17%	40%	23	50%	29%	15	33%	31%
1983	52	11	21%	32%	21	40%	35%	20	38%	33%
1984	53	22	42%	44%	12	23%	26%	19	36%	30%
1985	70	41	59%	51%	15	21%	23%	14	20%	26%
1986	90	57	63%	42%	23	26%	32%	10	11%	26%
1987	71	34	48%	42%	28	39%	34%	9	13%	24%
1988	62	48	77%	57%	7	11%	2%	7	11%	22%
1989	68	34	50%	47%	24	35%	30%	10	15%	23%
1990	27	12	44%	41%	11	41%	31%	4	15%	28%
1991	49	21	43%	35%	20	41%	34%	8	16%	31%
1992	46	16	35%	23%	22	48%	40%	8	17%	37%
1993	56	19	34%	25%	28	50%	40%	9	16%	35%
1994	50	26	52%	27%	15	30%	39%	9	18%	34%
Total	805	361	45%		280	35%		164	20%	

Source: Mergerstat Review 1996 and 2002 and authors' calculations. Years are calendar years of the announcement (in our sample).

Table 3. Correlations with Overconfidence Measure

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. 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 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. 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.

Technical Education is a dummy variable equal to 1 if the CEO has "technical education," i.e. an undergraduate or graduate degree in engineering, physics, operations research, chemistry, mathematics, biology, pharmacy, and other applied sciences.

Panel A. Correlations with Firm Characterisitcs (N=3690)

	Longholder	Size	Q	Cash Flow	Stock Ownership	Vested Options	Corporate Governance
Longholder	1.00						
Size	-0.09	1.00					
Q	0.09	-0.31	1.00				
Cash Flow	0.13	-0.25	0.46	1.00			
Stock Ownership	-0.03	-0.19	0.11	0.16	1.00		
Vested Options	0.18	-0.18	0.09	0.18	0.10	1.00	
Corporate Governance	0.04	-0.37	0.12	0.12	0.20	0.08	1.00

Panel B. Correlations with CEO Characteristics (I) (N=3663)

	Longholder	Age	Pres & Chm	Tenure
Longholder	1.00			
Age	-0.04	1.00		
President and Chairman	0.00	-0.03	1.00	
Tenure	0.10	0.39	0.01	1.00

Panel C. Correlations with CEO Characteristics (II): Educational Background (N=2164)

	Longholder	Fin. Ed.	Tech. Ed.
Longholder	1.00		
Finance Education	0.06	1.00	
Technical Education	-0.02	-0.09	1.00

Table 4. Do Overconfident CEOs Complete More Mergers?

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. The fixed effects logit model is estimated consistently using a conditional logit specification. Standard errors in columns 1-3 are robust to heteroskedasticity and arbitrary within-firm serial correlation. Standard errors in column 4 are robust to heteroskedasticity and arbitrary within-industry correlation, where industries are measured using the 48 Fama and French industry groups (1997). Coefficients are presented as odds ratios.

	logit (1)	logit (2)	logit (3)	logit (4)	Random Effects logit (5)	Fixed Effects logit (6)
Size		0.9046	0.8733	0.8683	0.8600	0.6234
		(1.80)*	(1.95)*	(1.60)	(2.05)**	(2.60)***
Q_{t-1}		0.7719	0.7296	0.6651	0.7316	0.8291
		(2.85)***	(2.97)***	(2.37)**	(2.70)***	(1.11)
Cash Flow		1.9631	2.0534	2.1712	2.1816	2.6724
		(3.75)***	(3.93)***	(2.35)**	(3.68)***	(2.70)***
Stock Ownership		1.1212	1.2905	0.4126	1.3482	0.8208
		(0.13)	(0.30)	(0.67)	(0.28)	(0.11)
Vested Options		1.5912	1.5059	1.9596	0.9217	0.2802
		(2.56)**	(1.96)*	(1.46)	(0.19)	(2.36)**
Corporate Governance		0.6697	0.6556	0.6125	0.7192	1.0428
		(3.02)***	(3.08)***	(2.89)***	(2.17)**	(0.21)
Longholder	1.6831	1.5904	1.5557	1.5423	1.7006	2.5303
	(2.98)***	(2.72)***	(2.58)***	(1.90)*	(3.09)***	(2.67)***
Industry Fixed Effects	no	no	no	yes	no	no
Year Fixed Effects	no	no	yes	yes	yes	yes
Industry*Year Effects	no	no	no	yes	no	no
Observations	3690	3690	3690	2192	3690	2261
Number of Firms					327	184

Robust *z* statistics in parentheses. Constant included.

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

Table 5. Timing of Mergers and Inside Information

All firm years included. 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.

'x' Final Years of a Longheld Option is a binary variable where 1 signifies the last 'x' years of the duration of one of the longholder CEO's longheld options. Remaining longholder CEO years are the years of a longholder CEO's tenure that do not fall in the 'x' final years of a longheld option. Regressions are logit with random effects. Coefficients are presented as odds ratios.

	(1)	(2)	(3)
Size	0.8599	0.8600	0.8600
	(2.05)**	(2.05)**	(2.05)**
Q_{t-1}	0.7303	0.7313	0.7317
	(2.71)***	(2.70)***	(2.69)***
Cash Flow	2.1713	2.1767	2.1827
	(3.65)***	(3.66)***	(3.67)***
Stock Ownership	1.3454	1.3465	1.3486
	(0.28)	(0.28)	(0.28)
Vested Options	0.9108	0.9189	0.9223
	(0.22)	(0.20)	(0.19)
Corporate Governance	0.7189	0.7192	0.7192
	(2.17)**	(2.17)**	(2.17)**
3 Final Years of a Longheld Option	1.5399		
	(1.86)*		
4 Final Years of a Longheld Option		1.6626	
		(2.41)**	
5 Final Years of a Longheld Option			1.7072
			(2.68)***
Remaining Longholder CEO years	1.8045	1.7371	1.6916
	(3.04)***	(2.68)***	(2.39)**
Year Fixed Effects	yes	yes	yes
Observations	3690	3690	3690
Number of Firms	327	327	327

z statistics in parentheses. Constant included.

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

Table 6. Are Overconfident CEOs Right to Hold their Options?

Panel A. Returns

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.

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

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

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. 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.

	logit (1)	Random Effects logit (2)	Fixed Effects logit (3)
Size	0.8721	0.8598	0.6251
	(1.93)*	(1.99)**	(2.46)**
Q_{t-1}	0.7259	0.7347	0.8806
	(2.86)***	(2.54)**	(0.74)
Cash Flow	2.0042	2.1030	2.8787
	(3.49)***	(3.22)***	(2.64)***
Stock Ownership	1.5555	1.5853	0.7498
	(0.51)	(0.42)	(0.15)
Vested Options	2.8574	1.7361	0.4921
	(1.36)	(0.53)	(0.51)
Corporate Governance	0.6220	0.6823	1.0343
	(3.31)***	(2.45)**	(0.16)
Longholder: Did OK	1.2015	1.2082	1.1555
	(0.74)	(0.80)	(0.27)
Longholder: Should Have Exercised	1.8277	1.9591	4.4648
	(1.95)*	(2.32)**	(2.32)**
Year Fixed Effects	yes	yes	yes
Observations	3532	3532	2111
Number of Firms		318	172

Robust z statistics in parentheses. Constant included.

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

Table 7. Control for Returns

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. 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.

	logit (1)	Random Effects logit (2)	Fixed Effects logit (3)
Size	0.9125	0.9047	0.5940
	(1.31)*	(1.36)	(2.65)***
Q_{t-1}	0.7234	0.7302	0.8434
	(2.63)***	(2.38)**	(0.85)
Cash Flow	1.7670	1.8825	2.0624
	(2.83)***	(2.79)***	(2.27)**
Stock Ownership	0.6436	0.7004	0.5843
	(0.49)	(0.29)	(0.21)
Vested Options	3.8995	2.4668	0.2675
	(2.16)**	(1.09)	(1.06)
Corporate Governance	0.6494	0.7049	1.0718
	(3.04)***	(2.29)**	(0.34)
$Returns_{t-1}$	1.4801	1.4467	1.1424
	(1.61)	(1.62)	(0.54)
$Returns_{t-2}$	1.2539	1.2391	1.0474
	(1.15)	(1.01)	(0.20)
$Returns_{t-3}$	1.0635	1.0405	0.9262
	(0.31)	(0.19)	(0.35)
$Returns_{t-4}$	1.3548	1.3452	1.2513
	(1.40)	(1.37)	(0.98)
$Returns_{t-5}$	1.2334	1.2202	1.1539
	(1.03)	(0.95)	(0.66)
Longholder	1.5048	1.6184	2.4628
	(2.33)**	(2.83)***	(2.56)**
Year Fixed Effects	yes	yes	yes
Observations	3479	3479	2157
Number of Firms		305	173

Robust z statistics in parentheses. Constant included.

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

Table 8. Diversifying and Same-Industry Mergers

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. 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.

	Panel 1. Diversifying Mergers			Panel 2. Within Industry Mergers		
	logit (1)	Random Effects logit (2)	Fixed Effects logit (3)	logit (4)	Random Effects logit (5)	Fixed Effects logit (6)
Size	1.0153	1.0227	0.8466	0.6915	0.6555	0.3879
	(0.20)	(0.25)	(0.70)	(3.73)***	(3.75)***	(3.43)***
Q_{t-1}	0.7341	0.7293	0.8643	0.6998	0.7097	0.7516
	(2.33)**	(2.00)**	(0.59)	(2.39)**	(2.13)**	(1.15)
Cash Flow	1.9730	2.2331	3.1159	2.1259	2.0717	2.7895
	(3.03)***	(3.10)***	(2.65)***	(3.17)***	(2.40)**	(1.80)*
Stock Ownership	2.4749	2.1750	0.1895	0.6328	0.7951	2.5200
	(0.84)	(0.58)	(0.64)	(0.34)	(0.15)	(0.37)
Vested Options	1.6428	1.2012	0.5975	0.8585	0.5298	0.1630
	(3.31)***	(0.41)	(0.94)	(0.61)	(1.06)	(2.00)**
Corporate Governance	0.5342	0.5726	0.8255	0.8411	0.9331	1.3414
	(3.49)***	(2.90)***	(0.74)	(0.85)	(0.31)	(1.03)
Longholder	1.6008	1.7763	3.1494	1.3762	1.4498	1.5067
	(2.40)**	(2.70)***	(2.59)***	(1.36)	(1.47)	(0.75)
Year Fixed Effects	yes	yes	yes	yes	yes	yes
Observations	3690	3690	1577	3690	3690	1227
Number of Firms		327	128		327	100

Robust z statistics in parentheses. Constant included.

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

Table 9. Overconfidence and Acquisitivenss by Equity Dependence

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. The sample is split into quintiles using values of the Kaplan-Zingales index at the beginning of the prior year. All regressions are logit with random effects. Coefficients are presented as odds ratios.

	Panel A. All Mergers					Panel B. Diversifying Mergers				
	Least Equity Dependent				Most Equity Dependent	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	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	0.8516	1.2721	0.8755	0.7721	0.8669	1.1788	1.4193	0.9989	0.9243	1.0159
	(1.15)	(1.66)*	(0.78)	(1.34)	(0.88)	(0.84)	(2.06)**	(0.01)	(0.29)	(0.07)
Q_{t-1}	0.5255	1.1147	0.6670	0.6790	0.5420	0.6203	1.2163	0.4624	0.8078	0.2205
	(2.66)***	(0.50)	(1.45)	(0.91)	(1.54)	(1.49)	(0.63)	(1.71)*	(0.39)	(2.17)**
Cash Flow	1.3135	3.0960	11.4727	7.2486	6.3325	0.8742	5.2611	17.3604	11.2920	25.8691
	(0.75)	(1.90)*	(3.27)***	(1.78)*	(2.54)**	(0.24)	(2.22)**	(3.49)***	(1.60)	(3.29)***
Stock Ownership	0.0976	0.0000	7.8124	0.0546	2.3618	7.8331	0.0000	42.4903	0.1995	1.0701
	(0.79)	(1.83)*	(0.85)	(0.68)	(0.62)	(0.63)	(1.65)*	(1.50)	(0.28)	(0.03)
Vested Options	1.1400	83.7247	1.6643	70.1940	2.3858	0.8060	0.0003	2.9815	20953.4373	8.7639
	(0.20)	(1.76)*	(0.51)	(1.54)	(0.55)	(0.19)	(1.17)	(0.81)	(2.60)***	(1.05)
Corporate Governance	0.7322	0.8544	0.5226	0.6143	0.8863	0.6021	0.9693	0.2216	0.4310	0.9572
	(0.91)	(0.48)	(1.78)*	(1.41)	(0.37)	(1.08)	(0.08)	(3.43)***	(1.69)*	(0.10)
Longholder	2.2861	1.6792	1.7756	1.9533	0.8858	2.5462	1.8852	1.7297	1.0075	1.0865
	(2.46)**	(1.48)	(1.54)	(1.50)	(0.33)	(1.89)*	(1.51)	(1.36)	(0.01)	(0.18)
Year Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	718	719	719	719	718	718	719	719	719	718
Number of Firms	125	156	168	165	152	125	156	168	165	152

z statistics in parentheses. Constant included.

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

Table 10. Merger Financing and Overconfidence

Panel A. All Mergers with Disclosed Method of Payment

	Cash and Debt	Stock	Comb.	odds (cash v. stock)	odds (cash v. other)	odds ratio (v stock)	odds ratio (v other)
Overconfident CEOs	46.95%	36.15%	16.90%	1.30	0.88	1.01	1.12
Non-overconfident CEOs	44.05%	34.34%	21.61%	1.28	0.79		

Panel B. Mergers where Target Value is at Least 25% of Acquiror Value

	Cash and Debt	Stock	Comb.	odds (cash v. stock)	odds (cash v. other)	odds ratio (v stock)	odds ratio (v other)
Overconfident CEOs	45.59%	41.18%	13.24%	1.11	0.84	1.12	1.55
Non-overconfident CEOs	35.03%	35.53%	29.44%	0.99	0.54		

Panel C. Regressions

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 and debt. Undervalued is a binary variable where 1 indicates that Q at the beginning of the year was less than or equal to 1. 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).
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. UV * Longholder is the interaction of those two variables. Standard errors are robust to heteroskedasticity and arbitrary within-firm serial correlation. Coefficients are presented as odds ratios.

	logit (1)	logit (2)	logit (3)	logit (4)
Undervalued (UV)	1.1016	0.6976	0.7037	1.0911
	(0.39)	(1.31)	(1.17)	(0.25)
Q_{t-1}		0.5218	0.5201	0.5025
		(3.61)***	(3.22)***	(3.38)***
Stock Ownership			1.7834	1.1349
			(0.35)	(0.06)
Vested Options			0.7112	0.5941
			(0.84)	(1.27)
Merger Size			1.0011	1.0012
			(1.24)	(0.95)
Longholder	0.7653	0.7820	0.6909	0.6456
	(1.14)	(1.09)	(1.52)	(1.70)*
UV * Longholder	4.2664	4.2177	3.9958	2.4728
	(2.71)***	(2.72)***	(2.57)**	(1.61)
Year Fixed Effects	no	no	no	yes
Observations	441	441	394	394

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

Table 11. Overconfidence and Completed Mergers for Different % in the Money

Percentage in the money calculated at the beginning of the last year of duration. To keep the same comparison group across regressions (and limit attenuation for high % in the money), we omit observations where a CEO goes from overconfident to not overconfident as we increase the required % in the money to be overconfident. Regressions are specified as in Columns 3, 5, and 6 of Table 4.

	logit			Random Effects logit			Fixed Effects logit		
% in money	observations	odds ratio	p-value	observations	odds ratio	p-value	observations	odds ratio	p-value
0	3690	1.49	0.03	3613	1.65	0.01	2191	2.26	0.02
10	3613	1.53	0.02	3613	1.65	0.01	2191	2.26	0.02
20	3603	1.50	0.03	3603	1.61	0.01	2171	2.15	0.04
30	3581	1.40	0.08	3581	1.47	0.04	2142	1.94	0.08
40	3567	1.44	0.06	3567	1.51	0.03	2135	1.94	0.08
50	3558	1.39	0.10	3558	1.46	0.05	2126	1.99	0.07
60	3551	1.41	0.09	3551	1.49	0.04	2119	2.21	0.05
70	3534	1.43	0.08	3534	1.53	0.03	2108	2.63	0.03
80	3534	1.43	0.08	3534	1.53	0.03	2108	2.63	0.03
90	3531	1.43	0.08	3531	1.54	0.03	2105	2.78	0.02
100	3510	1.48	0.06	3510	1.59	0.02	2090	2.79	0.02

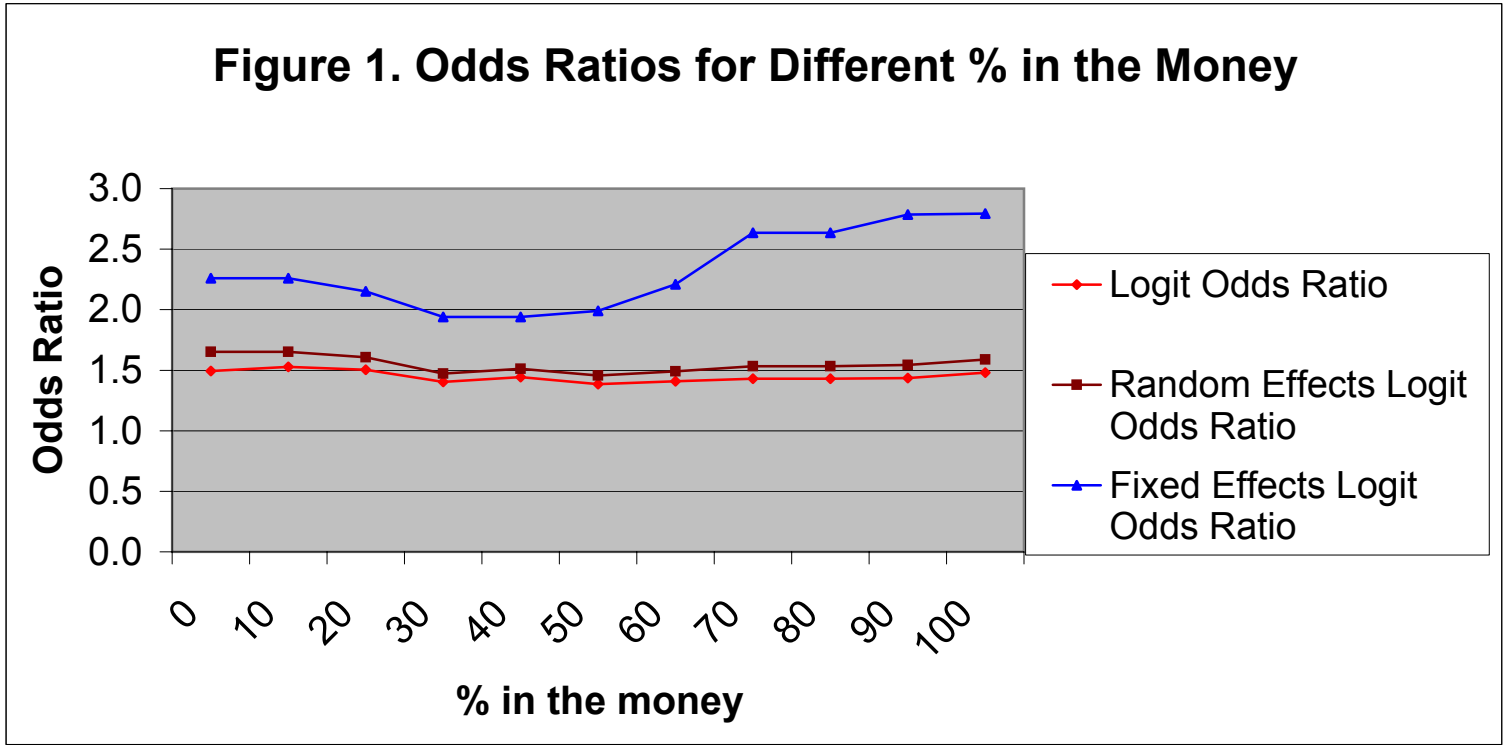

Table 12.

TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions in the *LexisNexis* and *Factiva.com* 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 the two search sets. 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.
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. Technical Education is a dummy variable equal to 1 if the CEO has "technical education," i.e. an undergraduate or graduate degree in engineering, physics, operations research, chemistry, mathematics, biology, pharmacy, and other applied sciences.

Panel A. Press Confidence Measures with Longholder. (N = 3448)

	Longholder	TOTAL-confident	TOTAL-mentions
Longholder	1.00		
TOTALconfident	0.11	1.00	
TOTALmentions	0.04	0.26	1.00

Panel B. Correlations of Press Coverage with Firm Characteristics. (N = 3448)

	TOTAL-confident	TOTAL-mentions	Size	Q	Cash Flow	CEO Owner-ship	CEO Vested Options	Corporate Governance
TOTALconfident	1.00							
TOTALmentions	0.26	1.00						
Size	0.13	0.31	1.00					
Q	0.04	0.03	-0.31	1.00				
Cash Flow	0.00	0.14	-0.25	0.46	1.00			
CEO Ownership	0.04	0.17	-0.19	0.11	0.16	1.00		
CEO Vested Options	0.05	0.04	-0.18	0.09	0.18	0.10	1.00	
Corporate Governance	-0.10	-0.10	-0.37	0.12	0.12	0.20	0.08	1.00

Panel C. Press Confidence Measures with CEO Characteristics. (N= 3525)

	TOTAL-confident	TOTAL-mentions	Age	Pres & Chm	Tenure
TOTALconfident	1.00				
TOTALmentions	0.26	1.00			
Age	-0.11	0.03	1.00		
President and Chairman	0.03	0.00	-0.03	1.00	
Tenure	-0.02	0.09	0.39	0.01	1.00

Panel D. Press Confidence Measures with CEO Education. (N = 2110)

	TOTAL-confident	TOTAL-mentions	Finance Education	Technical Education
TOTALconfident	1.00			
TOTALmentions	0.26	1.00		
Finance Education	0.11	-0.04	1.00	
Technical Education	-0.05	0.05	-0.09	1.00

Table 13. Press Coverage and Diversifying and Same-Industry Mergers

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. 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 a binary variable where 1 signifies that the board of directors has between four and twelve members.

TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTAL mentions is the total number of articles mentioning the CEO in both sets of searches. 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. All regressions include year fixed effects. Coefficients are presented as odds ratios.

	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)
Size	0.9270	0.9385	0.8585	0.6044	0.5605	0.3788
	(0.88)	(0.66)	(0.64)	(4.88)***	(4.74)***	(3.53)***
Q_{t-1}	0.7185	0.7126	0.8728	0.6842	0.6852	0.7563
	(2.56)**	(2.20)**	(0.56)	(2.54)**	(2.36)**	(1.13)
Cash Flow	1.9805	2.2542	3.3917	1.9001	1.9073	2.8360
	(2.92)***	(3.14)***	(2.80)***	(2.55)**	(2.12)**	(1.85)*
CEO ownership [in %]	1.0711	1.0020	0.5056	0.1814	0.1103	0.1693
	(0.06)	(0.00)	(0.26)	(1.42)	(1.32)	(0.55)
CEO vested options	1.6016	1.2355	0.5813	0.8717	0.5415	0.1773
	(3.30)***	(0.48)	(1.01)	(0.53)	(1.01)	(1.80)*
Corporate Governance	0.5633	0.5904	0.8135	0.8470	0.9292	1.3037
	(3.14)***	(2.75)***	(0.79)	(0.81)	(0.33)	(0.93)
TOTALmentions	1.0005	1.0005	0.9995	1.0014	1.0019	1.0094
	(2.07)**	(1.18)	(0.55)	(5.69)***	(3.44)***	(2.03)**
TOTALconfident	1.6971	1.7826	1.5077	1.0424	1.0368	0.8856
	(2.95)***	(3.21)***	(1.48)	(0.20)	(0.16)	(0.31)
Observations	3647	3647	1559	3647	3647	1226
Number of Firms		326	128		326	100

z statistics in parentheses. Constant included.

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

Table 14. How Does the Market Respond to Overconfident CEOs' Mergers?

The event window is the day before through the day after the announcement of the (eventually successful) 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. Industries are the 48 Fama and French industry groups (1997). Cash financing is a binary variable where 1 indicates that the acquisition was financed using some combination of cash and debt.

Boss is a binary variable where 1 signifies that the CEO is also the president and chairman of the board. 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. Standard errors in columns 1-3 and 5 are robust to heteroskedasticity and arbitrary within-firm correlation. Standard errors in column 4 are robust to heteroskedasticity and arbitrary within-industry correlation, where industries are measured using the 48 Fama and French industry groups (1997).

	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)
Stock Ownership	0.0703	0.0331	0.0362	0.1113	0.0291
	(2.15)**	(0.82)	(0.86)	(1.68)*	(0.68)
CEO Vested Options	0.1415	0.1360	0.1416	-0.0517	0.1505
	(2.43)**	(2.34)**	(2.41)**	(0.80)	(2.49)**
Relatedness		0.0045	0.0048	0.0062	0.0043
		(1.29)	(1.37)	(1.24)	(1.24)
Corporate Governance		0.0071	0.0079	0.0036	0.0073
		(1.96)*	(2.18)**	(0.64)	(1.98)**
Cash Financing		0.0121	0.014	0.0127	0.0145
		(3.67)***	(3.91)***	(2.60)***	(3.99)***
Age					-0.0005
					(1.46)
Boss					0.0001
					(0.04)
Longholder	-0.0061	-0.0066	-0.0067	-0.0099	-0.0079
	(1.73)*	(1.79)*	(1.81)*	(2.33)**	(2.00)**
Industry Fixed Effects	no	no	no	yes	no
Year Fixed Effects	no	no	yes	yes	yes
Industry*Year Effects	no	no	no	yes	no
Observations	759	687	687	687	687
R-squared	0.03	0.06	0.10	0.58	0.10

Absolute value of t statistics in parentheses. Constant included.

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