Incentive Effects of Illiquid Stock and Option Holdings of Target and Acquirer CEOs

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Abstract

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July 2004

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Abstract

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Introduction

Corporate acquisitions are important restructuring events judged by their wealth creation and redistribution effects. Andrade, Mitchell, and Stafford (2001) report that 4,256 publicly-traded firms in the U.S. economy were acquired by other publicly-traded firms during 1973-1998. These acquisitions resulted in average announcement to completion wealth gains of 23.8 percent to target shareholders, -3.8 percent to acquirer shareholders, and 1.9 percent to combined shareholders. A large part of the acquisition activity occurs in waves, and they document that the recent wave of 1990s has been quite big. Casual impression suggests that this period has also been characterized by an increase in the illiquid stock and option holdings of firm CEOs (chief executive officers).

This paper analyzes the incentive effects of illiquid stock and option holdings of target and acquirer CEOs in corporate acquisitions. Our motivation comes from a growing literature that documents the adverse effect of illiquidity on personal value of securities. Hall and Murphy (2002), Kahl, Liu, and Longstaff (2003), Cai and Vijh (2004), and many others show that the executive value of firm's stock and option holdings can be much lower than the market value. The difference arises because the executive is undiversified, but unable to sell his stock or hedge his options due to a variety of liquidity restrictions (discussed in the following section). The resulting divergence between the executive value and the market value explains many empirical facts; such as, why executives argue that the Black-Scholes option values are too high, and why they exercise their options much earlier than maturity.

Acquisitions allow target CEOs to cash out of their illiquid stock and option holdings. In almost all cases the restricted stock and options become vested upon a change in control, and the target CEOs become free to sell their stock and exercise or hedge their options.[1] This reduces or eliminates the difference between the executive value and the market value of their holdings. We therefore measure the target CEO's illiquidity incentive effect by an illiquidity discount, defined as the difference between the market value and the executive value of his holdings before acquisition. This is an *ex-ante* measure of his

[1] The stock holdings may include both restricted stock and contractually unrestricted stock. We later show that before acquisition both are illiquid.

incentive effect, and it represents the maximum possible wealth gains from the removal of all restrictions. It may not represent the *ex-post* wealth gains as some restrictions may not be removed. The remaining restrictions are unknown on the announcement date, and hard to determine even afterwards. Nevertheless, we argue that cross-sectionally a higher ex-ante illiquidity discount represents a higher potential benefit from the removal of restrictions on the target CEO's holdings.

We also measure the illiquidity incentive effect of acquirer CEOs in stock acquisitions by the illiquidity discount on their stock and option holdings. We realize that, except in a few cases where the target is relatively large, acquisitions do not allow acquirer CEOs to claim a change in control and cash out of their holdings. However, following Shleifer and Vishny (2003), we argue that stock acquisitions help acquirer CEOs in improving the long-term value of their illiquid stock and option holdings in cases where the target stock is currently undervalued relative to the acquirer stock. Their incentive to do so is related to the size of their holdings and the severity of liquidity restrictions on their holdings, which is effectively captured by the ex-ante illiquidity discount on their holdings.

We examine whether this meeting of interests between the target and acquirer CEOs – one motivated to cash out and the other motivated to improve the long-term stock price underlying his illiquid stock and option holdings – helps in explaining the acquisition activity of recent years. Using a sample of 250 acquisitions of publicly-traded firms by other publicly-traded firms during 1993-2001, we estimate a median illiquidity discount of $6.2 million for target CEO holdings and $15.1 million for acquirer CEO holdings. More importantly, we find a large cross-sectional variation in the illiquidity discount, which allows us to document several manifestations of illiquidity incentive effects as follows.

1. The illiquidity discount for target and acquirer CEOs is higher than for CEOs of industry, size, and book-to-market matching firms. The difference is statistically significant for acquirer CEOs, who typically initiate the acquisition process. The difference is statistically insignificant for target CEOs, but assumes significance in light of previous literature which documents that firms with higher managerial ownership are less likely to receive acquisition offers. We infer that a higher illiquidity discount motivates an acquirer CEO to make the acquisition offer, and that it motivates a target CEO to accept the acquisition offer.

2. The acquisition premium is significantly negatively related to the illiquidity discount for target CEOs and positively related to the illiquidity discount for acquirer CEOs. Regression results show that a one standard-deviation increase in the log illiquidity discount changes the acquisition premium by -3.6 percent in the first case and +3.1 percent in the second case. This suggests that target CEOs are less willing to contest and more willing to accept lower acquisition premium in cases where they face a higher illiquidity discount. This also suggests that acquirer CEOs are more willing to acquire and pay higher acquisition premium in cases where they face a higher illiquidity discount. Logistic model results further show that target CEOs with higher illiquidity discount are more likely to relinquish control after completing the acquisition.
3. A higher illiquidity discount attached to target and acquirer CEO holdings has a strong effect on speeding up the acquisition process. The average gap between the announcement and completion dates equals 4.6 months when both CEOs have illiquidity discounts above median, compared to 6.3 months when both have below median. In addition, the target CEOs with a higher illiquidity discount are significantly less likely to contest the announced acquisition offer.
4. Acquirer CEOs with a higher illiquidity discount are more likely to seek relatively undervalued targets. They are more likely to make diversifying acquisitions, which decreases the risk of their holdings and the associated illiquidity discount. They are also more likely to make multiple acquisitions and pay with acquirer stock, which increases the long-term value of acquirer stock if it is currently overvalued as in the Shleifer and Vishny (2003) model.

The cumulative evidence suggests that the illiquidity incentive effects facing target and acquirer CEOs are a significant factor in explaining several aspects of corporate acquisitions. One may conjecture alternate explanations for individual parts of our evidence. However, we argue that this is the most likely explanation for our cumulative evidence. We also show that our results are robust to an alternate proxy for incentive effects based on the market value of stock and option holdings. These market value results cannot be explained by the traditional incentive alignment and entrenchment hypotheses. Finally, data limitations prevent us from investigating periods before 1993. However, the incentive effects documented by us are very basic and should hold over other periods. The incentive effects for target CEOs only

require that they have illiquid holdings, and the incentive effects for acquirer CEOs additionally require that the acquirer stock is overvalued and is used to pay for the acquisition. The first requirement hardly needs elaboration, and the second requirement holds over different time periods as shown in previous literature.

I. Liquidity restrictions on CEO holdings and the effect of corporate acquisitions

A. Sources of liquidity restrictions

Kahl, Liu, and Longstaff (2003) discuss several sources of liquidity restrictions on CEO holdings. Stock options and restricted stock are illiquid for obvious reasons. Stock options may not be exercised before the end of vesting period, and restricted stock may not be sold before the end of restriction period. Kole (1997) documents that options are granted with a typical vesting period of four years, and restricted stock is granted with an average restriction period of 34 months for low-R&D firms and 74 months for high-R&D firms. Although restricted stock is only granted by about one-fourth of all firms, stock options are far more common and constitute a significant proportion of the CEO's portfolio in most cases.

The other significant proportion of the CEO's portfolio consists of contractually unrestricted stock. The simpler term unrestricted stock is often used for such stock, but we argue that it is usually a misnomer. CEOs face many implicit and explicit restrictions prohibiting the sale of their firm's stock, such as the stock ownership requirements and trading restrictions established by their firms, the Securities and Exchanges Commission (SEC) regulations on insider sales of unregistered stock, and the market reaction to insider sales.

To be more specific, we investigate 71 S&P 500 target firms in our sample. We find that 35 of the 71 firms have explicit stock ownership requirements (or guidelines) in place. The requirements generally specify the minimum amount of stock an executive should hold as a multiple of his annual salary, and this multiple has mean and median values of 5.24 and 5.00 for CEOs. Many firms also specify explicit penalties if the executive fails to achieve the ownership requirements within a specified period of time.[2]

[2] Core and Larcker (2002) analyze the changes in stock ownership requirements with a sample of 195 firms and list three basic types of penalties: (1) a fraction of the executive's annual salary is paid as restricted stock, (2) the executive's grants of options, restricted stock, and cash long-term incentives are reduced or eliminated, or, (3) the vesting of executive's outstanding restricted stock and options is delayed.

Finally, we find that firms that do not have explicit stock ownership requirements often seem to not need it, as their CEOs still hold considerable amount of stock.

Besides stock ownership requirements, firms place restrictions on when CEOs and other insiders can trade their stock. Bettis, Coles, and Lemmon (2000) analyze a sample of 626 firms and find that 92 percent of them have some trading restrictions in place. An estimated 78 percent of firms have blackout periods during which the CEOs or other insiders cannot trade their firm's stock, and 74 percent of firms require all insider trades to be cleared by an individual or office of the firm before execution.

Even when the firm clears a trade during a permitted trading window, CEOs face additional legal restrictions from the SEC. Firm affiliates (a term broader than insiders) who want to sell large amounts of stock must go through a lengthy and expensive registration process and incur substantial underwriting fees. Alternately, the SEC Rule 144 allows them to sell unregistered stock, but places several restrictions discussed by Osborne (1982) and Kahl, Liu, and Longstaff (2003).[3]

Together the firm restrictions and the SEC regulations constrain the rate at which CEOs can sell their stock, impose substantial compliance costs, and limit their ability to time their trades.[4] These restrictions are designed to protect investors and increase their confidence in the stock market. That brings us to the last but not the least of restrictions on CEO stock sales. Shareholders expect key executives of their firm to hold the firm's stock and react negatively to the adverse information conveyed by insider sales. In addition, sometimes there are significant liquidity concerns arising from the likely price impact of such sales. Many entrepreneurs of growth firms during the last decade owned a large part of their firm's stock. Anecdotal evidence suggests that the high prices of these stocks were sometimes maintained

[3] First, this rule requires that any stock to be sold by affiliates should have been held for a minimum period of one year after direct acquisition from the firm, receipt from exercise of stock option grants, or an open-market purchase. Second, during any one three-month period an affiliate can sell no more than the greater of one percent of all outstanding stock of the firm and the average weekly trading volume in that stock over a four-week period preceding the planned sale. Third, if the amount of proposed sale exceeds 500 shares or $10,000, then the affiliate is first required to file Form 144 with the SEC and the exchange where the stock is listed.

[4] It has been suggested that sometimes firm officers are able to reduce the risk of their undiversified holdings by entering into zero-cost collars, equity swaps, and forward sales agreements. These arrangements would undermine the intent of stock and option awards, and it is unlikely that these would be properly reported to shareholders. Furthermore, Hall and Murphy (2002) state: "Existing evidence suggests that such transactions are observed but are not widespread." Bettis, Bizjak, and Lemmon (2001) report that for the individuals involved in these transactions the effective ownership position is reduced by 25 percent.

by a small float volume. The unloading of a large number of shares held by entrepreneur-CEOs of such firms using any sale mechanism could have caused their stock prices to crash.

We now discuss the empirical evidence. Ofek and Yermack (2000) study the changes in stock ownership with a sample of 3,221 CEO-year observations during 1993-1995 and conclude that despite substantial new awards the annual changes in CEO stock ownership are close to zero. Their evidence can be simultaneously interpreted as suggesting that CEOs are able to sell additional annual grants of stock and options and that they are unable to reduce their existing stock holdings. In our limited sample of 250 CEOs of target firms that were acquired during 1993-2001, we find that their ownership of contractually unrestricted stock had been growing by a median rate of 3.7 percent a year. These CEOs may have faced greater liquidity restrictions on their stock and option holdings. Finally, direct evidence on the value of liquidity restrictions is provided by Silber (1991), who analyzes a sample of 69 private placements of Rule 144 stock during 1981-1988 and documents an average 34 percent discount to closing market price.

Given the cumulative evidence of restrictions on contractually unrestricted stock, we assume that the CEOs will be required to maintain their current level of stock holding until retirement in the absence of acquisitions.

B. The motivation: The illiquidity incentive effects of target and acquirer CEOs from acquisitions

Corporate acquisitions may be the most effective mechanism for target CEOs (and sometimes acquirer CEOs) to remove restrictions on their illiquid stock and option holdings. First, instead of selling their contractually unrestricted stock for a large discount as in a private placement, the target CEOs end up selling it to the acquirer shareholders for a substantial premium. Second, for non-transferable restricted stock and options, acquisitions are one of the few ways to remove restrictions (other than unpleasant events like involuntary termination of services or death).[5] We read many proxy statements before acquisition and find that there is always a "change in control" clause. Typically, this clause says that all vesting restrictions on restricted stock and options are to be removed after a change in control. A

[5] When a CEO voluntarily leaves his job, he often forfeits his unvested options and restricted stock. However, Fee and Hadlock (2003) find that the hiring grant from the new employer is highly related to the forfeited position. Therefore, the benefit of removing the forfeiture risk through acquisitions is likely to be small, and we do not explicitly model it. Note also that changing job does not remove the liquidity restrictions on his stock and option holdings, as he may face the same restrictions from the new employer.

completed acquisition always constitutes a change in control for the target firm, and sometimes even for the acquirer firm. In addition, there are many instances where a change in control occurs when the shareholders approve the merger, even if the merger later runs into regulatory hurdles.

Whether and to what extent the remaining restrictions on stock and option holdings of target CEO are lifted depends on whether he chooses to leave or to stay. If he chooses to leave, all restrictions are lifted, and he is free to sell all his stock, including previously restricted stock, for market value. As an outside investor, he may further hedge his options by shorting the stock, which makes the option value equal to the market value.[6] However, if he chooses to stay, some, but not all, of the restrictions may be lifted. He may be able to reduce his holdings as he typically occupies a lower position in the merged firm and faces lower ownership requirements. This eliminates the discount on the sold securities and reduces it on the held securities due to the resulting increased diversification (i.e., an x percent reduction in illiquid portfolio in fact reduces the total discount by more than x percent). The exact removal of restrictions is endogenous to his decision to stay or to leave, which makes the ex-post wealth gains an inappropriate measure of incentive effects, especially in tests where we examine his decision to stay or to leave. This is one reason why we measure the incentive effects by an illiquidity discount that is based on the ex-ante maximum possible wealth gains from the removal of restrictions. As another reason, whether and when the acquisition will complete and the resulting ex-post wealth gains are unknown on the announcement date, which suggests that we should relate the acquisition premium to the ex-ante illiquidity discount. A final reason for using an ex-ante measure relates to the difficulty of determining the ex-post wealth gains.[7]

We now discuss the incentive effects created by liquidity restrictions on the stock and option holdings of acquirer CEOs. In many cases the merger triggers the change in control clause even for the

[6] Whether or not the target CEO can hedge his options after acquisition and conversion to options on the acquirer stock depends on whether continuing employment is required to hold the options. Unfortunately, this information is not available from many of the merger agreements (30 of the 50 cases) that we investigated. In the large majority of remaining cases the CEO can hold the converted options for the original term or a reduced term after leaving the firm, which means he can hedge the options and will value the options at the risk-neutral market value. These cases show that it is possible for the target CEO to eliminate the entire illiquidity discount. Therefore, it is fair to say that the illiquidity discount is an ex-ante measure of the target CEO's *maximum possible* wealth gain from the removal of liquidity restrictions through the acquisition.

[7] As discussed in the previous footnote, in many cases there is insufficient information to determine whether and for how long the target CEO can hold on to the options after leaving the firm, which is necessary to determine the post-acquisition option value.

acquirer executives. This can happen when, for example, their compensation agreement specifies that a change in control will occur if the existing shareholders own less than a certain proportion of the new stock. However, the immediate effect of removing restrictions even in these cases may be lower for the acquirer CEOs than for the target CEOs as most of them remain CEOs and continue to be subject to the stock ownership requirements of their firms. Besides, in the majority of cases the acquisition does not trigger the change in control clause for the acquirer firm and the restrictions on acquirer CEO holdings are not removed. So what motivates acquirer CEOs in such cases?

To answer this question, we invoke a recent paper on stock market driven acquisition activity by Shleifer and Vishny (2003), which finds empirical support in Dong, Hirshleifer, Richardson, and Teoh (2003) and Rhodes-Kropf, Robinson, and Viswanathan (2004). Shleifer and Vishny argue that acquirer CEOs have long horizons as they are stuck with overvalued but illiquid stock and option holdings. In their model the acquirer CEOs pursue acquisitions of relatively undervalued targets in an attempt to increase the long-term value of their holdings. In absence of liquidity restrictions, they would not have such personal incentives for acquisitions, as they would cash out of their holdings immediately, especially considering the overvaluation and the negative announcement return to acquirer stock. Their incentive to acquire should therefore be related to the size of their holdings as well as the liquidity restrictions on their holdings. This incentive can be measured by the ex-ante illiquidity discount on their holdings. Specifically, the illiquidity discount increases with the size of holdings, the length of restriction period on the holdings, the percent of the CEO's aggregate portfolio tied to the holdings, and stock volatility. These factors increase the CEO's motivation to improve the long-term value of his holdings through acquisitions in the Shleifer and Vishny model.

C. Hypothesis development

Our tests center around the following chain of arguments. In recent years firm's stock and options have constituted a large part of the portfolios held by the target and acquirer CEOs. There is a large illiquidity discount associated with these holdings and it has significant incentive effects in mergers and acquisitions. In general, we expect target and acquirer CEOs to have higher illiquidity discount than matching firms. More important, subsequent to receiving an offer, we expect that target CEOs with higher

illiquidity discount are likely to do the following. First, they are likely to put up less resistance and get acquired for a lower premium.[8] Second, they are more likely to relinquish their control after acquisition. Third, they are more likely to speed up the acquisition process. All predictions are consistent with target CEOs increasing their own welfare. But their actions also increase the welfare of their existing shareholders who intend to sell out after receiving the acquisition premium (known as short-term shareholders in the Shleifer and Vishny model). However, their actions may not increase the welfare of their shareholders who intend to hold on to the possibly overvalued acquirer stock received as payment (known as long-term shareholders in the Shleifer and Vishny model).

To continue our chain of arguments, we conjecture that acquirer CEOs with higher illiquidity discount are likely to do the following. First, they are also likely to put up less resistance, which in their case means that they are willing to pay a higher premium. Acquisitions increase the long-term value of their illiquid holdings as argued by Shleifer and Vishny.[9] Second, further consistent with Shleifer and Vishny, they are more likely to look for relatively undervalued targets. Third, they are more likely to make multiple acquisitions paid with acquirer stock. All predictions are primarily consistent with the acquirer CEOs increasing their own welfare. The payment of a higher acquisition premium may seem anomalous, but will increase their welfare if it increases the odds of making an acquisition and if overpriced acquirer stock is used to pay for the acquisition. Their actions increase the welfare of their long-term shareholders and are consistent with the traditional incentive alignment hypothesis from their point of view. However, their actions are inconsistent with this hypothesis from the point of view of short-term shareholders who lose from the average negative acquirer announcement return.

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[8] The first part of this hypothesis is supported by Walkling and Long (1984) and Cotter and Zenner (1994), who find that the target manager resistance is negatively related to changes in managerial wealth induced by tender offers. The second part is supported by Hartzell, Ofek, and Yermack (2004), who find that target CEOs accept a lower acquisition premium when they derive personal gains in the form of side payments, and Wulf (2004), who finds that they accept a lower acquisition premium when they negotiate shared control in the merged firm.

[9] Several papers examine acquirer manager incentives using acquirer returns. Lewellen, Loderer, and Rosenfeld (1985) and Travelos and Waegelian (1992) find that the acquirer announcement returns are positively related to the percent ownership of acquirer managers. However, Loderer and Martin (1997) find that this relationship becomes insignificant in a simultaneous equations framework. Datta, Iskandar-Datta, and Raman (2001) document a positive relation between current equity-based compensation and the acquirer announcement and post-acquisition returns. Note that the Shleifer and Vishny model has no prediction concerning acquirer announcement returns. In addition, there is an insignificant relation between current equity-based compensation and the illiquidity discount on cumulative stock and option holdings in our sample.

II. Data and methods

A. Sample of acquisitions

To identify the sample of acquisitions, we start with all potential target firms delisted from the Center for Research in Security Prices (CRSP) database during 1993-2001. CRSP identifies the firms delisted because of acquisitions by a delisting code of 200, 201, 202, 203, 231, 241, or 242, and a two-digit last distribution code of 32, 37, or 38. The target firm delisting date is our acquisition completion date. To eliminate very small or distressed firms, we exclude firms trading at less than three dollars on the acquisition completion date. This results in an initial sample of 2,605 firms. We exclude target firms that are not available on the Compustat or ExecuComp databases. This reduces the sample size to 443 firms.[10]

We next search the *Wall Street Journal* to identify the acquisition announcement date, the acquirer firm, the payment terms, and various acquisition characteristics, such as the mode of acquisition, the method of payment, and the friendliness of acquisition. The acquisition announcement date (denoted by AD) is the last trading day before the first *Wall Street Journal* publication date. We require that both the target and the acquirer firms should be available from the CRSP, Compustat, and ExecuComp databases, and that the CEO stock ownership data is not missing in the year immediately before the announcement date. Since the ExecuComp data starts in 1992, only acquisitions announced after 1992 can be included. The net result is a sample of 250 acquisitions announced and completed during 1993-2001.

B. Sample description

Panel A of Table I shows the summary statistics for the target and acquirer firms in our sample. The median market value of outstanding stock, measured on AD-21, equals $1.22 billion for target firms and $7.92 billion for acquirer firms. The median size ratio equals 0.23, indicating that the size disparity between the target firm and the acquirer firm is not too severe. This suggests that there is significant potential for long-term revaluation of acquirer stock, and also that the target CEOs have reasonable bargaining power in the merger negotiation process.

[10] The availability of ExecuComp data is necessary to calculate the illiquidity discount as explained later in Appendix A and B. For each CEO, the computation requires inferring the contractual details of restricted stock and options by using the historical grants and exercises data over the years.

Panel A of Table I further shows that the median book-to-market ratio equals 0.373 for target firms and 0.303 for acquirer firms. The median earnings-to-price ratio equals 0.047 and 0.040, and the median prior-year excess return equals -7.11 and 7.93 percent. All three indicators are consistent with the Shleifer and Vishny (2003) proposition that in many cases relatively overvalued firms acquire relatively undervalued firms.

Panel B of Table I categorizes the sample by acquisition characteristics. Consistent with previous studies, such as Holmstrom and Kaplan (2001), most acquisitions during our study period are friendly mergers paid with the acquirer stock. In the majority of cases the target and the acquirer firms are from the same broad industry as shown by the two-digit SIC code. Finally, Panel C of Table I shows that our sample is well-dispersed over time and across industries.

C. Estimating illiquidity discount

We measure the liquidity incentive of the stock and option holdings of the target and acquirer CEOs by the ex-ante illiquidity discount, defined as the difference between the market value and the executive value of a CEO's stock and option holdings on AD-21. It is empirically estimated as follows.

First, we infer the contractual details of the target and acquirer CEOs' stock and option holdings from the ExecuComp database. This is necessary for calculating the market value and the executive value. Unfortunately, ExecuComp does not directly provide these details. We therefore adopt and extend the procedure of Hall and Knox (2002) to infer these details. This procedure is described in Appendix A.

Second, we calculate the market value and the executive value of the stock and option holdings of target and acquirer CEOs. Given the contractual details, calculating the market value is straightforward. We next use the Cai and Vijh (2004) model to estimate the executive value of stock and option holdings as *the amount of unrestricted outside wealth that gives the CEO the same expected utility as the holdings*. This model allows the CEO to optimally invest the unrestricted outside wealth in the market portfolio and the riskfree asset as suggested by the portfolio theory, and it provides several improvements over the one state-variable models that only allow the CEO to invest his outside wealth in the riskfree asset. Appendix B describes the model and the estimation details.

Finally, we calculate the illiquidity discount of the target and acquirer CEOs' stock and option holdings as the difference between the market value and the executive value of holdings. The illiquidity discount for a target CEO is an ex-ante measure of the maximum possible wealth gain he can realize from the removal of liquidity constraints through an acquisition. The illiquidity discount for an acquirer CEO is a proxy for his incentive in buying relatively undervalued target firms in order to increase the long-term value of acquirer stock.

Panel A of Table II shows that both the target and the acquirer CEOs hold substantial amounts of illiquid stock and options. The median illiquidity discount equals $6.21 million for the target CEOs and $15.07 million for the acquirer CEOs. The stock option and the contractually unrestricted stock are the two main sources of illiquidity discount. The restricted stock has smaller illiquidity discount, not surprising since less than half of the CEOs hold any restricted stock at all.

Figure 1 shows that the illiquidity discounts of target and acquirer CEO holdings have substantial cross-sectional variation. It is also highly skewed, and the distribution seems better behaved when plotted on a log scale. Therefore, in all subsequent regression analyses, we log-transform the illiquidity discount. Given its definition, the ex-ante illiquidity discount is highly correlated with the pre-acquisition market value of the CEO's stock and option holdings. However, it is not a proxy for the market value. Besides the size of the holdings, the illiquidity discount captures many CEO and stock characteristics, such as the length of restrictions period, the CEO's diversification level, expected market return, and stock beta and volatility. Figure 1 also shows that the ratio of illiquidity discount to market value has substantial cross-sectional variation. Therefore, we argue that the illiquidity discount is an economically correct measure of incentive effects arising from illiquid stock and option holdings of target and acquirer CEOs.

D. Do target and acquirer CEOs have higher illiquidity discount than CEOs of matching firms?

We compare the illiquidity discounts of target and acquirer CEOs with corresponding values for CEOs of industry, size, and book-to-market matching firms chosen from CRSP and ExecuComp as described in Table II. Panel B of Table II shows that the acquirer CEOs have substantially higher median illiquidity discount than the matching firm CEOs, and the Wilcoxon z-statistic is significant at the 10-percent level. This suggests that a higher illiquidity discount is related to the acquirer CEO's acquisition

decision. For target CEOs, the difference is slightly positive, but statistically insignificant. This is not surprising since Mikkelson and Partch (1989), Hadlock, Houston, and Ryngaert (1999), and North (2001) find that firms with higher managerial ownership are less likely to receive takeover bids. In view of this evidence, our results suggest that CEOs with higher ex-ante illiquidity discount are more likely to accept an acquisition offer when they receive one.

III. Main results

A. Market reaction to acquisition announcements

We measure the market reaction to acquisition announcement using market-adjusted excess returns computed over two windows surrounding the announcement date (AD). The exact computation procedure is described in Table III. The short window spans AD-1 to AD+1, and the long window spans AD-20 to AD+1. The long window is necessary as there is some leakage of news before the announcement. Panel A of Table III shows that the target excess returns average a highly significant 17.94 percent over the short window and 23.79 percent over the long window, and that the acquisition premium averages 31.84 percent. The acquirer excess returns average a significant -3.00 percent and an insignificant -0.39 percent over the short and the long window, and the combined excess returns average an insignificant 0.39 percent and a significant 3.39 percent.

B. Long-term excess return to acquirer stocks

In the Shleifer and Vishny (2003) model, an overvalued acquirer firm buys a relatively undervalued target firm with stock to improve its own long-term valuation. The acquirer stock price eventually reverts to its fundamental value, so they predict that the acquirer firms have poor long-term returns. Consistent with their model, Agrawal, Jaffe, and Mandelker (1992) and Loughran and Vijh (1997) document that acquirer firms have poor long-term returns following stock mergers.

We first measure the long-term performance of acquirer stocks using buy-and-hold excess returns over a three-year period after acquisition completion. For each acquirer firm that made a stock acquisition, we identify an industry, size, and book-to-market matching firm following the procedure described in Table III. We then calculate the buy-and-hold excess return as the difference between the

sample and matching firm buy-and-hold returns. Panel B of Table III shows that the average buy-and-hold excess return equals -14.25 percent, significant at the five-percent level.

Given the controversy surrounding buy-and-hold returns, we next analyze the calendar-time portfolio returns using the Fama-French three-factor model as described in Table III. Panel C of Table III shows that the monthly excess returns measured by the intercepts equal about -0.39 percent a month, or $(1.0000-0.0039)^{36}-1.0000 = -13.12$ percent over 36 months.

Both the buy-and-hold and calendar-time returns are consistent with the Shleifer and Vishny proposition that acquirer stocks are overvalued at the time of acquisition. The overvaluation may be understated, as the acquisition corrects some of the overvaluation. Besides, some of the overvaluation may persist for more than three years. The remaining negative 13 to 14 percent long-term excess returns to acquirer stocks fall short of the positive 23 percent announcement excess returns to target stocks, which suggests that, on average, the long-term target shareholders do not lose from acquisitions (since $[1+0.23]\times[1-0.14]=1.06$). However, the averages may be determined by valuation-driven acquisitions modeled by Shleifer and Vishny as well as the synergy-driven acquisitions from past literature. In the latter case, the target announcement excess returns are positive and the acquirer long-term excess returns should be zero or positive. Viewed in this light, the existence of significantly negative long-term returns suggests that in a sufficient number of cases the acquirer stock is considerably overvalued at the time of acquisition, which should motivate acquirer CEOs holding illiquid stock and options.

C. Do target CEOs with higher illiquidity discount accept lower acquisition premium? Do acquirer CEOs with higher illiquidity discount pay higher premium?

The ex-ante illiquidity discount of the target CEO proxies for his incentive in getting acquired. A target CEO faced with a large illiquidity discount may not bargain hard for a higher acquisition premium as hard bargaining may decrease his chances of making a deal.[11] The illiquidity discount of an acquirer

[11] In addition to the removal of liquidity restrictions, the target CEOs may benefit in two additional ways. First, the acquisition premium increases the market value of stock and option holdings. This incentive effect is traditionally measured by using either the market value of holdings or the market value of holdings times the premium as an independent variable. The first of these variables is correlated with the illiquidity discount, which introduces multicollinearity, and the second is correlated with the premium that is the dependent variable. We later discuss results by using the market value in place of the illiquidity discount. Second, the target CEO may receive other

CEO is a proxy for his long-term interest in his firm. If the acquirer CEO believes that the acquisition will improve his long-term stock value, a large illiquidity discount may motivate him to offer a higher premium as it increases his chances of making a deal. To some extent both CEOs may understand their own as well as each other's situation. Under such circumstances the acquisition premium should decrease with the target CEO's illiquidity discount and increase with the acquirer CEO's illiquidity discount.

Regressions (4) to (9) in Table IV test these predictions. The dependent variable is either the target announcement excess return over a long window (AD-20 to AD+1) or a short window (AD-1 to AD+1), or the acquisition premium. The independent variables include the illiquidity discount for target CEO, the illiquidity discount for acquirer CEO, and control variables in the three multivariate regressions. The illiquidity discount for target CEO has a negative coefficient in all six regressions, significant at the five-percent level or better. Since the illiquidity discount (log transformed) has a standard deviation of 1.73 for target CEOs, a one standard-deviation increase makes them accept a $2.06 \times 1.73 = 3.56$ percent lower return (where 2.06 is the average coefficient across the three multivariate regressions). While these actions are motivated by CEO's own interest, it does not follow that these are against their shareholders' interests, who can all benefit from the increased likelihood of making a deal.

Table IV also shows that the illiquidity discount for acquirer CEO has a positive coefficient in all six regressions and that it is significant in five cases. Since the illiquidity discount (log transformed) has a standard deviation of 2.03 for acquirer CEOs, a one standard-deviation increase makes them pay $1.54 \times 2.03 = 3.13$ percent higher return (where 1.54 is the average coefficient across the three multivariate regressions). This increased payment can be rational if it increases the odds of making a deal and if overpriced acquirer stock is used as payment. Overall, the combined evidence in Table IV supports our main story related to the incentive effects of illiquid stock and option holdings of target and acquirer CEOs. The evidence on target CEO incentives is also consistent with Hartzell, Ofek, and Yermack (2004) and Wulf (2004), who document a similar relation between the acquisition premium and the target CEO's personal benefits in the form of severance bonus or shared power in the merged firm.

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payments as part of the merger agreement, such as golden parachute and severance bonus. We do not include these variables since they require a large data collection effort that is beyond the scope of our study.

D. Are target CEOs with higher illiquidity discount more likely to relinquish control after acquisition?

If the target CEO remains a top executive of the combined firm after the acquisition completes, he may not be able to sell all his stock holdings, and he may not be able to hedge his option holdings. To capture more of the illiquidity discount, the target CEO has to step down from being a top executive. We examine whether target CEOs with higher illiquidity discount are more likely to relinquish control after the acquisition completes. For this purpose, we construct the relinquish dummy, which equals one if the target CEO is not among the top executives listed in ExecuComp at the first fiscal year-end after the acquisition completes, and zero otherwise. It is possible that the former target CEO remains employed with the combined firm, but is not among the listed executives. It is also possible that the former target CEO is listed among the top executives, but it is a nominal arrangement, and he will step down after a short period of time. However, given the data availability, the relinquish dummy is the best proxy we can get. We find that 195 of the total 250 target CEOs relinquish control after acquisition.[12]

Table V shows the results of logistic regressions where the dependent variable is the relinquish dummy. We include relative size and relatedness dummy as control variables, under the assumption that target CEOs from relatively large firms and similar industry backgrounds are more likely to remain as a top executive of the combined firm. We include age as a control variable since older CEOs may be more willing to retire. Regression (10) includes all 250 acquisitions and shows that the illiquidity discount for target CEO is significant at the five-percent level. This suggests that target CEOs with higher illiquidity discount are more likely to relinquish control. However, the added significance of relative size variable suggests that the CEOs of small target firms are less likely to remain as a top executive of the combined firm. To ensure that our results are not driven by acquisitions with large size disparity, we exclude cases where the relative size is less than 0.10 in Regression (11). Despite the reduced sample size, we find that the illiquidity discount for target CEO still has a positive coefficient, significant at the 10-percent level.

[12] Martin and McConnell (1991), Agrawal and Walkling (1994), and Hartzell, Ofek, and Yermack (2004) also find that there is a large turnover of target CEOs after acquisitions.

E. Do target and acquirer CEOs with higher illiquidity discounts speed up the acquisition completion?

The liquidity constraints on the stock and option holdings of the target CEO are not removed until the acquisition completes. If removing constraints is an important motivation for a target CEO, he may want to complete the acquisition as soon as possible. Similarly, until the target firm becomes a part of the acquirer firm, the long-term value of the acquirer firm remains unchanged. The acquirer firm may even have to pay out more stock if the acquirer stock price falls substantially before the acquisition completes.[13] If improving the long-term firm value is an important motivation for the acquirer CEO, he may also want to complete the acquisition as soon as possible. We therefore predict that it will take less time for target and acquirer CEOs with higher illiquidity discount to complete the acquisition.

Table VI shows strong evidence consistent with this prediction. The dependent variable is the number of trading days between announcement and completion. The key independent variables are the illiquidity discounts for the target and acquirer CEOs. Control variables include the target market value, since larger acquisitions may take longer time, and relatedness dummy, since acquisitions in the same industry are more likely to be subject to antitrust scrutiny. Regressions (12) to (14) show that the key independent variables are highly significant. In Regression (14), the coefficient of illiquidity discount for target CEO equals -11.04 and the coefficient of illiquidity discount for acquirer CEO equals -9.14, both significant at the one-percent level. Alternately, a one standard deviation increase in illiquidity discount leads to an acquisition completing 11.04×1.73 = 19.1 trading days earlier in the first case and 9.14×2.03 = 18.6 trading days earlier in the second case. Further, as reported in the introduction but not shown in a table, the average time lag between announcement and completion dates equals 4.6 months when both CEOs have illiquidity discounts above median, compared to 6.3 months when both have below median. The combined evidence suggests that the target and acquirer CEOs with higher illiquidity discounts speed up the acquisition completion as predicted.

[13] Many merger agreements include a collar provision. If the acquirer stock price falls below a certain threshold, the exchange ratio is increased so that the target shareholders receive a relatively predictable price for their shares.

F. Are target CEOs with higher illiquidity discount less likely to contest the offer?

A higher ex-ante illiquidity discount means that the target CEO has a greater potential wealth gain from the removal of restrictions through acquisition. This may discourage him from contesting the offer, as contesting may delay or kill the offer. Conversely, target CEOs with lower illiquidity discount may seek higher wealth gains by contesting the offer in an attempt to preserve their job or to increase the acquisition premium.

Table VII tests this prediction. The dependent variable is the contest dummy, which equals one if the acquisition is hostile, the payment terms are changed after the initial announcement, or there are multiple bidders, and zero otherwise. We find 29 contested acquisitions in our sample. The main independent variable is the illiquidity discount for target CEO, and Regression (15) shows that it has a negative coefficient, significant at the five-percent level. This is consistent with our prediction that target CEOs with higher illiquidity discount are less likely to contest the acquisition. In addition to illiquidity discount, Regression (16) includes the acquirer book-to-market ratio, as acquisitions by overvalued firms may be more likely to be contested, the relative size, as CEOs of large target firms may have more bargaining power, and the acquisition premium, as a low premium offer is more likely to be contested. The results are virtually unchanged. The illiquidity discount for target CEO has a slightly higher coefficient that remains significant at the five-percent level.

Previous literature analyzes managerial resistance to tender offers. Walkling and Long (1984) and Cotter and Zenner (1994) show that such resistance is negatively related to the induced changes in managerial wealth. Tender offers are considerably more hostile than mergers as acquirers bypass the target management and make a direct offer to the target shareholders. Only two cases in our sample are tender offers, so the degree of resistance in our sample is likely to be much lower than in studies of tender offers. Still we find significant evidence that target CEOs with higher illiquidity incentives are more cooperative in the acquisition process.

G. Are acquirer CEOs with higher illiquidity discount more likely to buy relatively undervalued targets?

Corporate acquisitions may be motivated by synergy reasons, valuation reasons, or both. In stock acquisitions, both target and acquirer shareholders care about the potential accretion or dilution to their book value and future earnings, which depend on the relative valuations of the two stocks. Both firms usually employ investment bankers to render an opinion on the likely accretion and dilution as well as the fairness of stock prices and payment terms. In the Shleifer and Vishny model, acquisitions are motivated by the relative undervaluation of target stock, which means that absent market sentiments the acquisitions would likely be accretive to the acquirer shareholders and dilutive to the target shareholders. Such acquisitions would require extra effort and persuasion from acquirer managers in the form of presenting future growth prospects and building synergistic scenarios, in an attempt to justify the acquirer stock price. We next argue that acquirer CEOs with a higher long-term interest in their firms as measured by the illiquidity discount on their holdings should be more motivated to undertake such acquisitions of relatively undervalued targets.

Consider a target shareholder who owns \$1 worth of target stock. She exchanges this for \$(1+q) worth of acquirer stock, where q is the acquisition premium. Ignoring synergies, the acquisition will dilute her book value if the target book-to-market is higher than (1+q) times the acquirer book-to-market. We refer to the difference between the two quantities as the difference in adjusted book-to-market. We define the difference in adjusted earnings-to-price in a similar fashion. These two measures serve as our proxies for the relative undervaluation of the target stock.[14]

Table VIII shows that acquirer CEOs with higher illiquidity discount are more likely (or motivated) to buy relatively undervalued targets. Regressions (17) and (19) use the difference in adjusted book-to-market and earnings-to-price as dependent variables, and Regressions (18) and (20) use logistic models in which the dependent variable equals one if the difference in adjusted valuation measures is

[14] The exact accretion or dilution will additionally depend on the relative sizes of the two firms and the synergies from acquisition. Unfortunately, the true synergies are unobservable. Measuring synergies by the combined return to the two stocks may not be correct if there is a significant negative information effect of stock issue (i.e., a price correction rather than a wealth effect). Assuming no synergies, it can be shown that the dilution to target stock should equal 1/(1+*relsize*) times the difference between unadjusted book-to-market or earnings-to-price. We confirm that using these alternate measures as dependent variables in Regressions (17) to (20) gives similar results.

positive. The key independent variable is the illiquidity discount for acquirer CEO. Control variables include the relatedness dummy, since there is an industry factor in book-to-market and earnings-to-price, and relative size, which also affects the changes in valuations. The coefficient of illiquidity discount is always significant at the five-percent or one-percent level, and it supports our prediction.

H. Are acquirer CEOs with higher illiquidity discount more likely to make diversifying acquisitions, multiple acquisitions, and stock acquisitions?

Since the CEOs are risk averse and their portfolio is undiversified, the executive value of their stock and option holdings usually increases as the stock risk (or standard deviation) decreases.[15] Large illiquidity discount means the executive value of an acquirer CEO's stock and option holdings is far below the market value, which should motivate him to reduce his stock risk by making diversifying acquisitions. Regression (21) in Table IX tests this prediction. The dependent variable is the diversification dummy, which equals one if the target and acquirer firm have different two-digit SIC codes, and zero otherwise. The independent variable is the illiquidity discount for acquirer CEO. This regression, like others in this table, uses a logistic model. A significantly positive coefficient supports the prediction that the acquirer CEOs with higher illiquidity discount are more likely to make diversifying acquisitions.[16]

Since buying undervalued or less overvalued target firms helps improve the long-term valuation of the acquirer firm, an acquirer CEO with higher long-term interest in his firm, as measured by the illiquidity discount, may be more active in making acquisitions. We test this prediction with Regression (22) in Table IX. The dependent variable is the multiple acquisition dummy, which equals one if the acquirer firm makes more than one acquisitions in our sample, and zero otherwise. We acknowledge that this is a somewhat noisy variable, since the acquirer firm may have bought other target firms not included in our sample. The independent variables include the illiquidity discount for acquirer CEO and the

[15] The executive value of stock increases when risk decreases. For reasonable risk aversion levels, the executive value of many options also increases when risk decreases. However, the executive value of deep out-of-the-money options may decrease when risk decreases. Our sample period is characterized by a bull market. Since most options are granted at-the-money, there are not many CEOs in our sample holding predominantly out-of-the-money options.

[16] Hubbard and Palia (1995) find that firms are more likely to make diversifying acquisitions when managers as a group own more than five percent of the firm's equity than when they own less. Morck, Shleifer, and Vishny (1990) also find that diversification is an important motivation in acquisitions.

relative size. Despite the noise in the dependent variable, we find that the coefficient of the illiquidity discount is significantly positive at the one-percent level. This supports the prediction that acquirer CEOs with higher illiquidity discount are more active in making acquisitions.

In the Shleifer and Vishny model, stock payment is a necessary condition for the overvalued acquirer firm to improve its long-term valuation by merging with a relatively undervalued target firm. Given that the illiquidity discount for acquirer CEO is a proxy for his long-term interest in the firm, we predict that the acquirer CEOs with higher illiquidity discount are more likely to use the overvalued acquirer stock to buy the relatively undervalued target firm. Regression (23) in Table IX tests this prediction. The dependent variable is the stock acquisition dummy, which equals one if the acquisition is paid entirely by acquirer stock (216 cases), and zero if paid partly or entirely by cash (34 cases). The key independent variable is the illiquidity discount for the acquirer CEO. For control variables, we include relative size, as it may be harder to pay for larger acquisitions with cash, relatedness dummy, as firms in the industry are more likely to share generally high or low valuations, acquirer book-to-market, as overvalued firms are more likely to use stock payment, and calendar year dummies, as there have been secular trends in stock payment. The positive coefficient of the illiquidity discount for acquirer CEO supports our prediction, and it is significant at the five-percent level.

IV. Robustness tests

A. Using an alternate measure of the illiquidity incentive effects

The illiquidity discount is a new concept introduced in this paper for measuring the illiquidity incentive effects of the target and acquirer CEOs. To test the robustness of our results, we examine an alternate and more conventional proxy for the incentive effects. Note that the illiquidity discount of the CEO's stock and option holdings can be expressed as the product of the market value of his holdings and the degree of illiquidity, which suggests that the market value of holdings is an alternate proxy. Using this proxy amounts to assuming that the degree of illiquidity does not vary across the CEOs. Table III earlier reported the average and the median market value of the stock and option holdings of target and acquirer CEOs. This variable is also highly skewed, so we use its log-transform in all regressions.

We find that our results remain statistically significant in all but two regressions with the market value as the measure of the CEO's illiquidity incentive effects.[17] This shows that our results are robust to an alternate measure of the illiquidity incentive effects of target and acquirer CEOs, and that such effects are a significant factor in explaining several aspects of acquisitions as discussed before.[18]

The market value of target and acquirer CEOs' holdings may also have alternate interpretations under alternate hypotheses. First, it can be argued that an increase in the market value of holdings, at least initially, aligns the interests of the target and acquirer CEOs with their shareholders. This is typically known as the incentive alignment hypothesis. Second, it can be argued that the market value of holdings is related to the CEO's control of the firm, and a CEO with too much control becomes entrenched and pursues his own interests at the cost of his shareholders' interests. This is typically known as the entrenchment hypothesis. For example, it is sometimes suggested that the acquirer CEOs pursue empire building through acquisitions, or that they suffer from hubris whereby they overestimate their ability to make acquisitions work. From the target firm perspective, target CEOs sometimes unreasonably resist acquisitions that are in their shareholders' interests in order to protect their own jobs. It is important to note that in the previous literature relating to these hypotheses there is usually no distinction between the short-term and long-term shareholders.

These alternate hypotheses cannot explain many of our results. For example, the incentive alignment hypothesis cannot explain the negative announcement and long-term excess returns to acquirer firms, and why despite negative returns the acquirer CEOs with higher market value of holdings pay higher acquisition premiums and make diversifying and multiple acquisitions. It also does not explain why target CEOs with higher market value of holdings accept lower acquisition premium. The entrenchment hypothesis cannot explain that acquirer CEOs with higher market value of holdings speed up the acquisition completion, buy relatively undervalued target firms, and pay with stock. It also cannot

[17] The market value becomes insignificant in the two relinquish control regressions. We conjecture that the market value of the target CEO's holdings captures both his ability to stay in the merged firm and his incentive to leave. The insignificant coefficient of market value in the relinquish control regressions may be the result of these two conflicting effects. All robustness test results are available from the authors on request.

[18] The market value and the illiquidity discount are correlated by construction. Therefore, we do not include the two variables in any regression simultaneously, since doing so introduces multicollinearity.

explain why entrenched target CEOs with higher market value of holdings are less likely to contest the acquisition terms and speed up the acquisition completion. The only hypothesis that is consistent with all our results is that the market value is a proxy for the illiquidity discount and measures the target CEO's incentive to cash out of his holdings and the acquirer CEO's incentive to improve the long-term value of his holdings. This meeting of self-interests of the target and acquirer CEOs can explain all aspects of their behavior in acquisitions documented in this paper.

B. Using an alternate model to estimate the illiquidity discount

We use the Cai and Vijh (2004) model to estimate the executive value of the CEO's stock and option holdings as the amount of unrestricted outside wealth that gives him the same expected utility as the holdings. In this model the CEO optimally invests his unrestricted outside wealth in the riskfree asset and the market portfolio. To test the robustness of our results to model specification, we further estimate the illiquidity discount using an alternate model by Hall and Murphy (2002) in which the CEO invests his unrestricted outside wealth in the riskfree asset. We find our results are qualitatively unchanged with the illiquidity discount estimated using the alternate model, although the statistical significance becomes weaker in some regressions. This shows that our results are robust to alternate model specifications for computing the illiquidity discount.

V. Conclusions

In recent years there has been a sharp increase in the stock and option holdings of firm CEOs. Previous literature shows that the executive value of such undiversified holdings is much lower than the market value. We argue that acquisitions offer an effective mechanism for target CEOs to remove many restrictions that prevent them from selling or hedging their holdings while they remain employed with their firms. This reduces or eliminates the illiquidity discount, which is defined as the difference between the pre-acquisition market value and the executive value of their holdings. Following Shleifer and Vishny (2003), we further argue that for overvalued firms the acquisitions enable acquirer CEOs to improve the long-term value of their illiquid wealth by purchasing relatively undervalued target firms using stock payment. Their incentive to do so depends on the size and the illiquidity of their holdings, which is

measured by the illiquidity discount. For both target and acquirer CEOs, the ex-ante illiquidity discount is therefore a proxy for their personal incentive effects in completing an acquisition.

Using a sample of 250 acquisitions of publicly-traded firms by other publicly-traded firms in the U.S. market during 1993-2001, we show that target CEOs who face a higher illiquidity discount accept a significantly lower acquisition premium and are more likely to relinquish control after acquisition. Simply stated, this suggests that they want to cash out. In further support of this argument, we find that a higher illiquidity discount is associated with lower resistance from target CEOs and has a strong effect on speeding up the acquisition completion.

We next analyze the illiquidity incentive effects of acquirer CEOs. We show that the illiquidity discount associated with stock and option holdings of acquirer CEOs is higher than that for matching firm CEOs. We also show that acquirer CEOs who face higher illiquidity discount pay significantly higher acquisition premium, speed up the acquisition process, pursue relatively undervalued targets, and make multiple and diversifying acquisitions using stock payment. Their actions increase the long-term value and reduce the risk of their illiquid holdings.

To test the robustness of our results, we run all our tests with an alternate proxy for incentive effects that is simply the market value of illiquid stock and option holdings. We find that our results are similar, and we argue that these results cannot be explained by the traditional incentive alignment and entrenchment hypotheses. Only the illiquidity hypothesis can explain all our results. We therefore conclude that the incentive effects of illiquid stock and option holdings of target and acquirer CEOs have been a significant factor in explaining the acquisition activity during 1993-2001. While their actions clearly increase their own welfare, it is less clear whether these actions increase the welfare of all their shareholders. In general, the acquisitions increase the welfare of target shareholders in view of the substantial acquisition premium. But target shareholders who hold on to the overpriced acquirer stock may eventually lose. In comparison, the short-term acquirer shareholders clearly lose from the negative announcement effect, but the long-term acquirer shareholders may gain if the target stock is sufficiently undervalued relative to the acquirer stock.

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Appendix A

To calculate the illiquidity discount of a CEO's stock and option holdings, we need the contractual details of his holdings. Our procedure is based in large part on the methodology of Hall and Knox (2002), with additions related to estimation of vesting period for stock options and restricted stock.

A.1. Contractually unrestricted stock

ExecuComp reports the number of shares and the market value of a CEO's total stock holdings (including both the contractually unrestricted stock and the restricted stock), as well as the market value of his restricted stock holdings. To separate the restricted stock from the contractually unrestricted stock, we calculate the number of restricted shares held by a CEO as the market value of the restricted stock divided by the stock price at the fiscal year end. The number of the contractually unrestricted shares held by the CEO is then calculated as the total number of shares minus the number of the restricted shares.

A.2. Restricted stock

The restricted stock holdings of a CEO may be granted at different times, and therefore will be vested at different times. We need to distinguish between the restricted stock holdings with different vesting dates to estimate the illiquidity discount. ExecuComp reports the value of the restricted stock granted to a CEO each year, and the time to vest if the restricted stock vests within three years.[19] To be conservative, we assume that a restricted stock grant vests four years after the grant date if the time to vest is missing in ExecuComp. Besides the grant data, we also need a CEO's initial restricted stock holdings to infer his current holdings. We find the first year in which the number of the restricted shares held by a CEO is available, and use this as the CEO's initial restricted stock holdings. We treat the initial holdings as a grant, and assume it vests at the end of the next fiscal year. Given the initial holdings, we can calculate a CEO's current holdings by adding new grants and removing vested grants. Finally, we adjust the number of restricted shares granted so that our estimated total number of the restricted shares held by a CEO at the end of any fiscal year equals the number from ExecuComp.[20]

[19] SEC requires companies to report the time to vest of a restricted stock grant if the grant vests within three years.
[20] Our estimated number of restricted shares held by a CEO may differ from ExecuComp's number for two reasons. First, CEOs sometimes receive restricted stock not included in restricted stock grant. For example, some companies pay their CEO salary or bonus by restricted stock or stock options. (See section 2.2.2 of Hall and Murphy (2002) for

A.3. Stock options

The option portfolio of a CEO is more complicated. He may have several option grants, each with different exercise price, maturity date, and number of options. Within each option grant, some options may be vested one year after the grant date, while others may be vested a few years after the grant date. Unfortunately, ExecuComp does not directly report these contractual details. Instead, ExecuComp reports the exercise price, the expiration date, and the number of options of each option grant, the number of options exercised in a fiscal year, and the number of vested and unvested options a CEO holds at the end of a fiscal year. To estimate the illiquidity discount of a CEO's option holdings, we infer the contractual details of each option series in a CEO's portfolio as follows.

We first estimate the vesting date for each option grant. When a CEO receives an option grant, he usually cannot exercise the options before they are vested. Most companies vest 1/N fraction of the option grant on each of the N anniversaries of the grant date. The number N ranges from 1 to 10, with most values falling between 2 and 5. Given a value of N, we can calculate the number of unvested options held by a CEO from the number of options granted during the last N years. We then compare this estimated number of unvested options to the actual number of unvested options reported by ExecuComp, and choose the N that minimizes the difference between the two numbers.[21] An option grant is then divided into N series of equal number of options. Each series has a different vesting date, ranging from one year after the grant date to N years after the grant date.

Similar to restricted stock, we also need the initial option portfolio of a CEO to infer his current option holdings. We find the first year in which the total number of options held by a CEO is available, and use this as the CEO's initial option holdings. We assume the initial option holdings have 7 years to maturity, and set the option exercise price to the stock price at the previous fiscal year end. The vesting dates of these options are determined by the estimated vesting schedule discussed earlier.

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details.) Second, we assume a restricted stock grant vests in four years if ExecuComp does not report the vesting period, which may understate the actual vesting period.

[21] We require the estimated number of unvested options to be within 5% of the reported number of unvested options. If the difference between the two numbers is greater than 5%, we set N=3 years. Kole (1997) finds the average vesting period to be 23.6 months, which is consistent with the N=3 assumption. (For N=3, the average vesting period is (12+24+36)/3 = 24 months.)

Given the initial holdings, we can calculate a CEO's current option holdings by adding new option grants and removing exercised options. Adding new option grants is straightforward since ExecuComp reports the exercise price, the expiration date, and the number of options of each grant. ExecuComp, however, does not report which options are exercised. Instead, it reports the total number of options exercised during each fiscal year, and the dollar value realized from exercising these options. The dollar value data provides little information in identifying which options are exercised since we do not know the date and the stock price at which the options are exercised. We focus on the number of options exercised, and assume that the CEOs exercise options in the following order. Among all vested options, the CEOs exercise the deepest-in-the-money options first. For options with the same moneyness, they exercise the options with the earliest maturity date first. For options with the same moneyness and maturity date, they exercise the options with the earliest grant date first. For options with the same moneyness, maturity date, and grant date, they exercise the option series with the greatest number of options first. Occasionally, the number of options a CEO exercised in a year exceeds the number of vested options available.[22] If this happens, we allow the CEO to exercise unvested options after exhausting all vested options.

After adding the new option grants and removing the exercised options, our estimated total number of options held by a CEO may still differ from the total number of options from ExecuComp.[23] We adjust this difference annually by adding a new option grant or exercising more options. If we need to add a new option grant, we assume the options are granted at the money at the end of the fiscal year, with 10 years to maturity, and vesting dates determined by the estimated vesting schedule. If we need to exercise more options, we follow the same exercising order discussed earlier.

[22] This may be caused by the discrepancy between the estimated vesting dates and the actual vesting dates.
[23] A potential source of the difference is that CEOs may receive options from sources not reported in ExecuComp. For example, part of their salary and bonus may be paid in options.

Appendix B

Following Cai and Vijh (2004), we estimate the executive value of a CEO's stock and option holdings as the amount of outside wealth that gives him the same expected utility as the holdings. We begin with option valuation as stock valuation can be considered to be a special case of option valuation. We assume that the CEO has N_{OPT} options with an exercise price of \$$X$ and non-option wealth of W_0, α proportion of which is tied up in the company stock. We denote the remaining $(1-\alpha)$ proportion as the outside wealth, of which he optimally invests p proportion in the market portfolio and $(1-p)$ in the riskfree asset. When the options mature in T years, assuming no early exercise, the CEO has total wealth

$$W_T = W_0[\alpha\ e^{\delta T}\frac{S_T}{S_0} + (1-\alpha)(p\frac{M_T}{M_0} + (1-p)R_f{}^T)] + N_{opt}\,Max(S_T - X,0)\,. \tag{B.1}$$

Here S_0 and S_T are the stock price today and at year T, M_0 and M_T are the market level today and at year T, δ is the continuous dividend yield on stock, and R_f is the annual riskfree rate.[24]

Executive options are generally exercisable after an initial vesting period. If the CEO exercises his options at any time $t < T$, we assume he invests the exercise proceeds in the riskfree asset and the market portfolio according to his optimal portfolio choice p. His wealth at year T is then given by[25]

$$\begin{aligned} W_T = {} & W_0\alpha e^{\delta T}\frac{S_T}{S_0} + p[W_0(1-\alpha)\frac{M_t}{M_0} + N_{opt}\,Max(S_t - X,0)]\frac{M_T}{M_t} \\ & + (1-p)[W_0(1-\alpha)R_f{}^t + N_{opt}\,Max(S_t - X,0)]R_f{}^{T-t}\,. \end{aligned} \tag{B.2}$$

We assume that the CEO has power utility function defined on his terminal wealth at year T

$$U(W_T) = \frac{W_T{}^{1-\gamma}}{1-\gamma}\,. \tag{B.3}$$

The CEO chooses p to maximize his expected utility, i.e.,

$$p^* = \arg\max_p\ [E(U(W_T))]. \tag{B.4}$$

Utility maximization also determines the CEO's option exercise decision. After vesting, he exercises the options whenever the expected utility from exercise exceeds the expected utility from holding. The executive value of the N_{OPT} options equals the amount of outside wealth equivalent (*OWE*) that solves

$$E\left(U(W_T{}^{OWE})\right) = E\left(U(W_T^{OPT})\right). \tag{B.5}$$

[24] M_T includes all dividends since we assume that the CEO invests in the market portfolio through an index fund.
[25] Following Cai and Vijh (2004), we do not allow the CEO to update p over time due to computational constraints.

where $W_T{}^{OWE}$ is given by

$$W_T{}^{OWE} = W_0\alpha\ e^{\delta T}\frac{S_T}{S_0} + [W_0(1-\alpha) + OWE](p^*\frac{M_T}{M_0} + (1-p^*)R_f{}^T)\,. \tag{B.6}$$

$W_T{}^{OPT}$ is given by (B.1) if the options are not exercised before T, and it is given by (B.2) if the options are exercised before T. Solving (B.5) for OWE gives the executive value of the N_{OPT} options.

We estimate the executive value of restricted stock in the same manner as options by setting the exercise price to zero and the time to maturity to restriction period. As discussed in Section I.A, we assume that CEOs are required to maintain their current holding of contractually unrestricted stock until they retire. The time to retirement is calculated as the difference between the CEO's current age and 65 years.[26] Similar to Cotter and Zenner (1994), we use three or 15 years if the difference is less than three or more than 15 years. The executive value of contractually unrestricted stock is given by OWE that solves[27]

$$E\left(U(W_T{}^{OWE})\right) = E\left(U(W_T^{STK})\right)\,. \tag{B.7}$$

where $W_T{}^{OWE}$ is given by

$$W_T{}^{OWE} = [W_0(1-\alpha) + OWE](p^*\frac{M_T}{M_0} + (1-p^*)R_f{}^T)\,, \tag{B.8}$$

and W_T^{STK} is given by

$$W_T{}^{STK} = W_0[\alpha\ e^{\delta T}\frac{S_T}{S_0} + (1-\alpha)(p^*\frac{M_T}{M_0} + (1-p^*)R_f{}^T)]\,. \tag{B.9}$$

We use the CAPM to calculate expected stock returns and assume that the stock returns and the market returns follow a joint log-normal distribution. We use the three-dimensional rainbow grid from Rubinstein (1994) to approximate the movements of the stock and the market. Since Cai and Vijh show that the executive value is not sensitive to the step size, we set the step size to one year.

We then estimate the parameters of the model. The stock beta, the stock volatility, the market volatility, and the correlation between the stock and the market are estimated during the 60-month period before the announcement month. The stock dividend yield is provided by ExecuComp. We use the 5-year T-bill rate for the risk-free rate. There are three parameters in the model that are only observable to the

[26] We collect CEO age from ExecuComp and proxy statements. If age is missing, we assume it is 55 years.
[27] We exclude the options when estimating the executive value of contractually unrestricted stock because including options will make the terminal utility path-dependent and numerically very expensive to calculate. The exclusion of options actually makes the CEO more diversified and reduces the magnitude of the illiquidity discount.

CEO himself: his outside wealth, his expected market risk premium, and his risk aversion. We make the following assumptions about these parameters. First, we set the outside wealth of a CEO to three times his prior year cash compensation (salary plus bonus). If the resulting outside wealth is less than 5 percent of his total non-option wealth, we set his outside wealth to 5 percent of his non-option wealth. This adjustment is necessary because some CEOs receive only nominal cash compensation, such as $1. Second, we set the expected market risk premium to 6.5 percent. Cai and Vijh show that the executive value of stock and options are not sensitive to the expected market risk premium. Finally, we set the CEO risk aversion to 2.5. Unreported sensitivity tests show that our results are robust to these assumptions.

A CEO may hold multiple series of options with different maturity date, vesting date, exercise price, and number of options. Unfortunately, the model cannot accommodate multiple series of options because this makes the terminal utility path-dependent. Therefore, we calculate the executive value of options one series at a time. To ensure this does not alter the CEO's diversification level too much, we use the total number of options for calculating the expected utility.

For each series of options, we first calculate the terminal wealth and the corresponding utility at each node on the maturity date, assuming no early exercise. Then, starting backward from one period before the last period, we calculate at each node the expected utility from holding the option for one more period and the expected utility from early exercise. If the options are vested, the expected utility at this node equals the higher of the expected utility from continuing to hold and early exercise, otherwise, it equals the expected utility from continuing to hold. We repeat this process at each node until the initial node is reached, and the expected utility at the initial node is $E(U(W_T^{OPT}))$ in (B.5). The next step is to find the optimal p that maximizes the expected utility. We calculate the expected utility for 21 values of p from 0 to 1 in increments of 0.05, and choose the p that gives the highest expected utility.[28] Finally, we numerically solve (B.5) for the executive value of options. The executive value of stock is estimated in a similar fashion with zero exercise price and no early exercising.

[28] This step becomes very time consuming and intractable if we estimate a different optimal p for each option series. To save computing time, we construct an average option series for each CEO, and estimate the optimal p for the average option series. This optimal p is used in estimating the executive values of all option series held by the CEO. The time to maturity, time to vest, and exercise price of the average option series equal the average time to maturity, the average time to vest, and the average exercise price of all options held by the CEO. The number of options of the average option series equals the total number of options held by the CEO.

Table I

Summary statistics of target and acquirer firms and acquisition characteristics

To identify the sample of acquisitions, we start with all potential target firms delisted from the CRSP files with a delisting code of 200, 201, 202, 203, 231, 241, or 242 and a two-digit last distribution code of 32, 37, or 38. The final sample of 250 acquisitions has the following additional requirements: 1. The target stock price exceeds $3 on the delisting date. 2. One or more *Wall Street Journal* reports can be found to establish the identity of the acquirer firm, the acquisition announcement date, and the acquisition characteristics. 3. The acquisition is announced and completed during 1993-2001. 4. The target and acquirer firms are included in the Compustat and CRSP files. 5. The stock ownership data for the CEOs of both firms is available from ExecuComp for the last fiscal year before the acquisition announcement year. The acquisition announcement date (AD) is the last trading day before the first *Wall Street Journal* publication date. The book values, the earnings, and the SIC codes are obtained from Compustat as of the last fiscal year ending before AD. The stock prices and market values are obtained from CRSP as of AD-21. The stock volatility is estimated over a 60-month period prior to the acquisition announcement month. The prior-year excess returns are calculated by subtracting the cumulative market returns from stock returns over the period AD-272 to AD-21, and the market returns are measured by the CRSP value-weighted returns including dividends (VWRETD). There are three modes of acquisition: a merger, which is negotiated with the target managers, approved by the target's board of directors, and voted upon by the shareholders; a tender offer, which is made directly to the target shareholders; and ambiguous, which has features of both a merger and a tender offer. There are three methods of payment: stock, if entire payment is in the form of acquirer stock; cash, if entire payment is in cash; and mixed, if payment includes both stock and cash. We determine the friendliness of acquisitions from the tone of *Wall Street Journal* reports. We classify an acquisition as related if the target and the acquirer have the same two-digit SIC code, and unrelated otherwise. Firms are classified into various industry groups as follows: Energy firms with two-digit SIC code of 13 or 29; financial firms with two-digit SIC code between 60 and 69; manufacturing firms with two-digit SIC code between 20 and 28, 30 and 34, and 38 and 39; technology firms with two-digit SIC code of 35, 36, 48, or 73; transportation firms with two-digit SIC code of 37 or between 40 and 47; and utility firms with two-digit SIC code of 49. The others group includes firms with the remaining SIC codes.

Panel A: Firm characteristics

		Target firms		Acquirer firms	
Variables	N	Mean	Median	Mean	Median
Market value ($billion)	250	4.30	1.22	25.98	7.92
Target to acquirer size ratio	250	0.35	0.23		
Book-to-market ratio	250	0.432	0.373	0.345	0.303
Earnings-to-price ratio	250	0.039	0.047	0.044	0.040
Prior year excess return (%)	250	4.86	-7.11	21.59	7.93
Stock volatility	250	0.39	0.36	0.32	0.28

Panel B: Number of observations by acquisition characteristics

	Merger	Tender Offer	Ambiguous
Mode of acquisition	241	7	2
	Stock	Cash	Mixed
Method of payment	216	6	28
	Friendly	Hostile	Ambiguous
Friendliness	239	2	9
		Related	Unrelated
Relatedness (based on two-digit SIC code)		185	65

Panel C: Sample distribution

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of acquisitions announced	1	9	29	24	40	50	48	34	15

Industry	Energy	Financial	Manufacturing	Technology	Transportation	Utility	Others
Number of targets	14	59	40	66	13	19	39
Number of acquirers	12	60	40	60	13	21	44

Table II

Illiquidity discount on stock and option holdings of target and acquirer CEOs

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. While all target and acquirer CEOs in our sample hold some amount of unrestricted stock, some CEOs do not hold restricted stock or stock options. We therefore report statistics for restricted stock and stock options for the full sample of 250 firms as well as the subset of firms in which the CEOs hold positive amounts of these securities. The market values of stock and option holdings are based on the target or acquirer stock price on day AD-21, and assume that the CEO faces no restrictions or illiquidity. The illiquidity discount equals the difference between the market value and the executive value of a CEO's aggregate stock and option holdings on day AD-21. The computation of executive value is described in Section II.C. and Appendix B. In Panel B, for each target and acquirer firm, we choose a matching firm from the CRSP and ExecuComp databases as follows. We first identify the subset of non-sample firms with the same two-digit SIC code as the sample firm, and with the market value between 70% and 130% of the sample firm market value. Within this subset we choose the matching firm with the closest book-to-market value to the sample firm. If this procedure does not give a matching firm, then we match only by the industry code and the closest market value of equity. The combined procedure gives a matching firm for 245 target firms and 242 acquirer firms. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

Panel A: Illiquidity discount and market value of stock and option holdings for target and acquirer CEOs

Variables		Unrestricted stock	Restricted stock		Stock options		Total portfolio
		All cases	All cases	Non-zero cases	All cases	Non-zero cases	All cases
Market value of target CEO holdings ($million)	N	250	250	77	250	237	250
	Mean	33.77	1.02	3.32	19.30	20.35	54.09
	Median	4.85	0.00	1.41	5.21	5.57	16.80
Illiquidity discount of target CEO holdings ($million)	Mean	18.87	0.20	0.64	6.31	6.66	25.39
	Median	**1.75**	**0.00**	**0.26**	**2.17**	**2.43**	**6.21**
Market value of acquirer CEO holdings ($million)	N	250	250	106	250	234	250
	Mean	713.46	7.20	16.99	126.87	135.55	847.53
	Median	18.18	0.00	6.66	24.59	27.14	65.07
Illiquidity discount of acquirer CEO holdings ($million)	Mean	326.35	1.21	2.86	24.75	26.44	352.31
	Median	**5.65**	**0.00**	**1.32**	**5.01**	**5.60**	**15.07**

Panel B: Illiquidity discount for sample and matching firm CEOs

Statistics	Target CEOs	Matching CEOs	Acquirer CEOs	Matching CEOs
N	245		242	
Median ($million)	**6.31**	**6.20**	**15.24**	**10.80**
Number of cases where illiquidity discount is higher for target or acquirer CEO	125		131	
Wilcoxon rank-sum z-statistic	0.02		1.92*	

Table III

Acquisition announcement period excess returns and long-term returns

The sample of 250 acquisitions announced and completed during 1993-2001 and used in Panel A is described in Table I. Panels B and C exclude six cash acquisitions. Panel A reports the acquisition announcement period excess returns, calculated as the differences between the cumulative target, acquirer, and combined stock returns and the cumulative market returns (VWRETD) over various windows bracketing AD. The combined returns are the market value weighted averages of the target and acquirer stock returns. The acquisition premium is calculated as the acquisition price divided by the target stock price on AD-21 minus one. The acquisition price is the acquirer stock price on AD+1 multiplied by the exchange ratio in case of stock payment, and the cash amount in case of cash payment. Panel B reports the buy-and-hold excess returns. For each acquirer firm in the sample, we identify a subset of non-sample firms that are available from both the Compustat and the CRSP databases, with the same two-digit SIC code as the sample firm, and with the market value between 70% and 130% of the sample firm market value. We then select the first matching firm with the closest book-to-market value to the sample firm from this subset. If this procedure does not give a matching firm, we match only by the industry code and the closest market value. We keep a reserve of up to six matching firms, so when the first matching firm is delisted we roll over the proceeds into the next matching firm, and so on. We calculate the buy-and-hold raw return for the acquirer firm and the matching firm over a holding period that starts on the day after the acquisition completion date and ends three years later. In some cases the holding period may be cut short by the delisting of acquirer stock or December 31, 2003. The buy-and-hold excess return equals the difference between the sample and matching buy-and-hold raw returns. Panel C reports the excess returns calculated using the Fama-French three-factor model. The dependent variable is the difference between the average monthly returns for calendar-time portfolios of all acquirer firms that completed a stock acquisition in the last 36 months and the monthly riskfree return. The first acquisition is completed in September 1994, so we have 111 monthly observations during October 1994 – December 2003. The market, size, and book-to-market factor returns are obtained from Professor French's website. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

Panel A: Announcement period mean excess returns (%)

Period	Target stocks	Acquirer stocks	Combined
[AD-20, AD+1]	23.79***	-0.39	3.39***
[AD-1, AD+1]	17.94***	-3.00***	0.39
Acquisition premium	31.84***		

Panel B: Buy-and-hold returns

	N	Mean (%)	(t-statistic)
Acquirer firm raw return	244	14.74	(2.59)***
Matching firm raw return	244	28.99	(5.20)***
Buy-and-hold excess return	244	**-14.25**	**(-1.99)****

Panel C: Fama-French three-factor model returns

	Equally-weighted portfolio		*Value-weighted portfolio*
Independent variables and statistics	*OLS* (1)	*WLS* (2) †	*OLS* (3)
Intercept	**-0.384** **(-1.83)***	**-0.382** **(-1.78)***	**-0.391** **(-1.90)***
$R_m - R_f$	1.273 (24.61)***	1.281 (25.68)***	1.070 (21.13)***
SMB	0.075 (1.40)	0.054 (1.10)	-0.258 (-4.91)***
HML	0.564 (8.12)***	0.616 (9.56)***	0.014 (0.20)
N	111	111	111
Adjusted R^2	0.855	0.866	0.853

† The weights in regression (2) are given by the number of firms in each calendar time portfolio.

Table IV

Do target CEOs with higher illiquidity discount accept lower acquisition premium? Do acquirer CEOs with higher illiquidity discount pay higher acquisition premium?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The acquisition announcement date (AD) is the last trading day before the first *Wall Street Journal* publication date. The dependent variables in (4) to (7) are the market-adjusted excess returns for the target stocks over two windows bracketing AD, which are calculated by subtracting the cumulative market returns from the cumulative stock returns. The dependent variable in (8) and (9) is the acquisition premium, which is calculated as the acquisition price divided by the target stock price on AD-1 minus one. The acquisition price is the acquirer stock price on AD+1 multiplied by the exchange ratio in case of stock payment, and the cash amount in case of cash payment. The illiquidity discounts for the target and acquirer CEOs are calculated as the differences between the market value and the executive value of their stock and option holdings on AD-21. These variables are highly skewed, so they are log transformed. The relative size is calculated as the ratio of target to acquirer market value on AD-21. The target and acquirer book-to-market ratios equal the book value of equity at last fiscal year-end divided by the market value of equity as of AD-21. The cash payment dummy equals one if there is some cash payment, and zero otherwise. The relatedness dummy equals one if the target and acquirer have the same two-digit SIC code, and zero otherwise. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

Independent variables and statistics	*Dependent variables*					
	Market-adjusted excess return for the target stocks (%)				*Acquisition premium (%)*	
	AD-20 to AD+1		*AD-1 to AD+1*		*AD-20 to acquisition price*	
	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	20.70 (2.33)**	33.63 (3.03)***	13.93 (1.94)*	28.65 (3.16)***	32.25 (3.16)***	50.44 (3.97)***
Illiquidity discount for target CEOs	**-3.18** **(-3.18)*****	**-2.28** **(-2.25)****	**-2.07** **(-2.57)*****	**-1.74** **(-2.21)****	**-3.18** **(-2.77)*****	**-2.17** **(-1.96)****
Illiquidity discount for acquirer CEOs	**3.13** **(3.67)*****	**1.89** **(2.18)****	**2.24** **(3.26)*****	**1.42** **(2.01)****	**2.78** **(2.84)*****	**1.30** **(1.31)**
Relative size		-22.04 (-4.79)***		-20.90 (-5.57)***		-24.25 (-4.60)***
Cash payment dummy		7.93 (1.86)*		6.59 (1.89)*		10.88 (2.23)**
Target book-to-market ratio		11.67 (2.02)**		-2.35 (-0.50)		11.12 (1.68)*
Acquirer book-to-market ratio		-1.88 (-0.28)		4.77 (0.88)		-4.05 (-0.53)
Relatedness dummy		-9.69 (-2.93)***		-4.98 (-1.84)*		-11.93 (-3.14)***
N	250	250	250	250	250	250
Adjusted R^2	0.054	0.209	0.038	0.177	0.034	0.193

Table V

Are target CEOs with higher illiquidity discount more likely to relinquish control after acquisition?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The dependent variable is the relinquish dummy in all regressions of this table. The relinquish dummy equals one if the target CEO is not listed among the top executives of the combined firm at the first fiscal year-end after the acquisition is completed, and zero otherwise. Given the binary nature of the dependent variable, this table shows the results of logistic regressions. The independent variables include the illiquidity discount for the target CEO, the relative size, the relatedness dummy, and the target CEO age. The illiquidity discount is calculated as the difference between the market value and the executive value of a CEO's stock and option holdings on AD-21. This variable is highly skewed, so it is log transformed. The relative size is calculated as the ratio of target to acquirer market value on AD-21. The relatedness dummy equals one if the target and acquirer have the same two-digit SIC code, and zero otherwise. We obtain the target CEO age from the ExecuComp and proxy statements. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

	Dependent variable = Relinquish dummy	
Independent variables and statistics	*All acquisitions* (10)	*Acquisitions with relative size > 0.10* † (11)
Intercept	-0.48 (0.24)	-1.63 (0.81)
Illiquidity discount for target CEO	**0.20** **(2.07)****	**0.17** **(1.70)***
Relative size	-2.37 (-4.95)***	-1.46 (-2.81)***
Relatedness dummy	-0.68 (-1.43)	-0.41 (-0.83)
Target CEO age	0.03 (0.96)	0.04 (1.23)
N	250	179
Number of target CEOs who relinquish control	195	124
Number of target CEOs who retain control	55	55

† The bottom two rows of this table show that all target CEOs of firms with relative size lower than 0.10 relinquish control. This may be because they actually leave, but possibly also because they stay and are not significant enough to be included in the top executives of the combined firm as reported in the proxy statements and ExecuComp. However, we do find that two target CEOs with relative size of 0.12 (and several with relative size greater than 0.12) stay and are included in the top five executives of the combined firm. This motivates the cutoff value of 0.10 for the relative size measure in (11). In addition, we include the relative size as a control variable in both multivariate regressions.

Table VI

Do target and acquirer CEOs with higher illiquidity discounts speed up the acquisition completion?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The dependent variable in all regressions of this table is the number of days between the acquisition announcement date and the acquisition completion date. The acquisition announcement date represents the last trading day before the first *Wall Street Journal* publication date, and the acquisition completion date represents the delisting date of the target stock. The independent variables include the illiquidity discounts for the target and acquirer CEOs, the target market value, and the relatedness dummy. The illiquidity discounts for the target and acquirer CEOs are calculated as the differences between the market value and the executive value of their stock and option holdings on AD-21. These variables are highly skewed, so they are log transformed. The target market value is calculated on AD-21. The relatedness dummy equals one if the target and acquirer have the same two-digit SIC code, and zero otherwise. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

Independent variables and statistics	*Dependent variable = Number of days between announcement and completion*		
	(12)	(13)	(14)
Intercept	97.63 (3.28)***	110.24 (3.55)***	147.04 (4.63)***
Illiquidity discount for target CEO	**-16.07** **(-6.06)*****		**-11.04** **(-3.81)*****
Illiquidity discount for acquirer CEO		**-13.30** **(-6.06)*****	**-9.14** **(-3.81)*****
Target market value	19.70 (5.87)***	16.44 (5.06)***	19.54 (5.98)***
Relatedness dummy	11.93 (1.16)	14.24 (1.39)	8.93 (0.89)
N	250	250	250
Adjusted R^2	0.203	0.203	0.245

Table VII

Are target CEOs with higher illiquidity discount less likely to contest the offer?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The dependent variable in both regressions of this table is the contest dummy, which equals one if any of the following three conditions is satisfied, and zero otherwise: 1. The acquisition is classified as hostile. 2. The acquisition payment terms have changed since the initial announcement. 3. There are multiple bidding firms for the target firm. Given the binary nature of the dependent variable, this table shows the results of logistic regressions. The independent variables include the illiquidity discount for the target CEO, the acquirer book-to-market, the relative size, and the acquisition premium. The illiquidity discount for the target CEO is calculated as the differences between the market value and the executive value of his stock and option holdings on AD-21. This variable is highly skewed, so it is log transformed. The relative size is calculated as the ratio of target to acquirer market value on AD-21. The acquisition premium is calculated as the acquisition price divided by the target stock price on AD-21 minus one, where the acquisition price is the acquirer stock price on AD+1 multiplied by the exchange ratio in case of stock payment, and the cash amount in case of cash payment. The acquirer book-to-market ratios equal the book value of equity at last fiscal year-end divided by the market value of equity as of AD-21. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

	Dependent variable=Contest dummy	
Independent variables and statistics	(15)	(16)
Intercept	0.212	-0.143
	(0.23)	(-0.12)
Illiquidity discount for target CEO	**-0.266**	**-0.294**
	(-2.37)**	**(-2.41)****
Acquirer book-to-market		-0.757
		(-0.81)
Relative size		1.632
		(2.60)***
Acquisition premium		0.006
		(0.81)
N	250	250
Number of contested acquisitions	29	29
Number of non-contested acquisitions	221	221

Table VIII

Are acquirer CEOs with higher illiquidity discount more likely to buy relatively undervalued targets?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. We exclude 6 cash acquisitions since the relative valuation is irrelevant in cash acquisitions. The dependent variables include the difference in adjusted book-to-market, the relative book-to-market dummy, the difference in adjusted earnings-to-price, and the relative earnings-to-price dummy. The difference in adjusted book-to-market equals the difference between the target firm book-to-market ratio and the acquirer firm book-to-market ratio times one plus acquisition premium. The relative book-to-market dummy equals one if the difference in adjusted book-to-market is positive, and zero otherwise. The difference in adjusted earnings-to-price equals the difference between the target firm earnings-to-price ratio and the acquirer firm earnings-to-price ratio times one plus acquisition premium. The relative earnings-to-price dummy equals one if the difference in adjusted earnings-to-price is positive, and zero otherwise. Given the binary nature of the dependent variable in (18) and (20), we use logistic regressions. The independent variables include the illiquidity discount for the acquirer CEO, the relative size, and the relatedness dummy. The illiquidity discount is calculated as the difference between the market value and the executive value of a CEO's stock and option holdings on AD-21. This variable is highly skewed, so it is log transformed. The relative size is calculated as the ratio of target to acquirer market value on AD-21. The relatedness dummy equals one if the target and acquirer have the same two-digit SIC code, and zero otherwise. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

	Dependent variables			
Independent variables and statistics	*Difference in adjusted book-to-market* (17)	*Relative book-to-market dummy* (18)	*Difference in adjusted earnings-to-price* (19)	*Relative earnings-to-price dummy* (20)
Intercept	-0.384 (-3.15)***	-2.680 (-3.17)***	-0.109 (-2.62)***	-2.671 (-3.27)**
Illiquidity discount for acquirer CEO	**0.035** **(3.31)*****	**0.285** **(3.77)*****	**0.008** **(2.07)****	**0.196** **(2.78)*****
Relatedness dummy	0.100 (2.04)**	0.092 (0.29)	0.020 (1.17)	0.319 (1.01)
Relative size	-0.163 (-2.47)**	-0.299 (-0.72)	0.006 (0.27)	0.398 (0.96)
N	244	244	244	244
Adjusted R^2	0.077		0.009	

Table IX

Are acquirer CEOs with higher illiquidity discount more likely to make diversifying acquisitions, multiple acquisitions, and stock acquisitions?

The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The dependent variables are the diversification dummy, the multiple acquisition dummy, and the stock acquisition dummy. Given the binary nature of dependent variables, this table shows the results of logistic regressions. The diversification dummy equals one if the target and acquirer have different two-digit SIC codes, and zero otherwise. The multiple acquisition dummy equals one if the acquirer firm makes more than one acquisition in our sample, and zero otherwise. The stock acquisition dummy equals one if entire payment is in the form of acquirer stock, and zero otherwise. Regression (22) excludes six cases where payment is all cash. The independent variables include the illiquidity discount for the acquirer CEO and the relative size. The illiquidity discount is calculated as the difference between the market value and the executive value of a CEO's stock and option holdings on AD-21. This variable is highly skewed, so it is log transformed. The relative size is calculated as the ratio of target to acquirer market value on AD-21. To control for the secular trend in stock payment, regression (23) also includes unreported calendar year dummies as independent variables. The relatedness dummy equals one if the target and acquirer have the same two-digit SIC code, and zero otherwise. The acquirer book-to-market ratios equal the book value of equity at last fiscal year-end divided by the market value of equity as of AD-21. The t-statistics are shown in parentheses. The notations *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels.

Independent variables and statistics	*Dependent variables*		
	Diversification dummy	*Multiple acquisition dummy*	*Stock acquisition dummy*
	(21)	(22)	(23)
Intercept	-2.61 (-3.53)***	-2.16 (-2.78)***	-1.70 (-0.98)
Illiquidity discount for acquirer CEO	**0.16** **(2.19)****	**0.20** **(2.79)*****	**0.27** **(2.04)****
Relative size		-0.78 (-1.75)*	0.47 (0.70)
Relatedness dummy			0.74 (1.58)
Acquirer book-to-market			-1.36 (-1.69)*
N	250	244	250
Number where dummy = 0	185	148	34
Number where dummy = 1	65	96	216

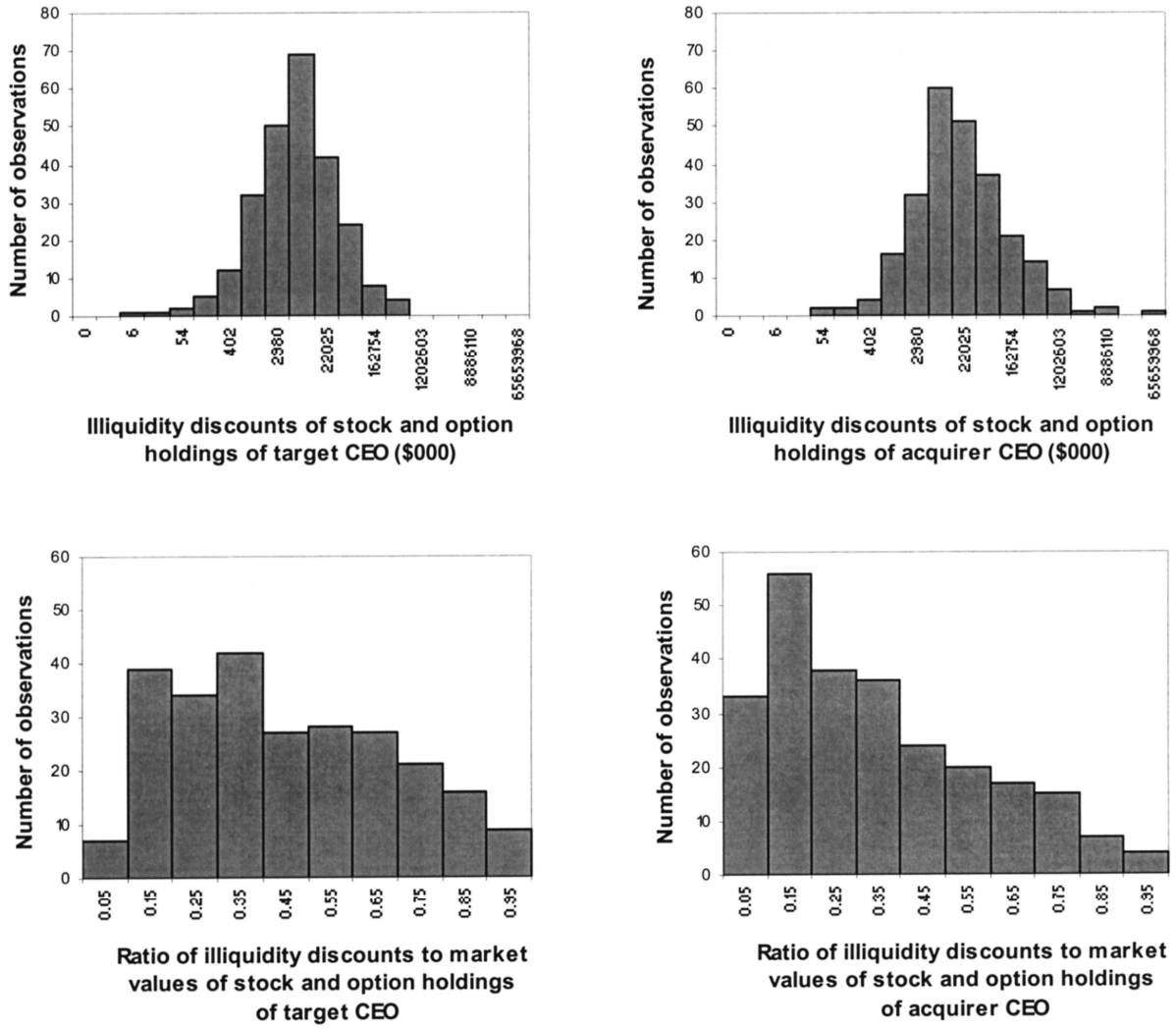

Figure 1. Distribution of illiquidity discounts of the stock and option holdings of the target and acquirer CEOs. The sample of 250 acquisitions announced and completed during 1993-2001 is described in Table I. The numbers next to the horizontal axes of all panels represent the middle points of the corresponding bars. The illiquidity discount is calculated as the difference between the market value and the executive value of a CEO's stock and option holdings on AD-21. The horizontal axes of the top two panels are not evenly spaced. Instead, the natural logarithms of the axes are evenly spaced.