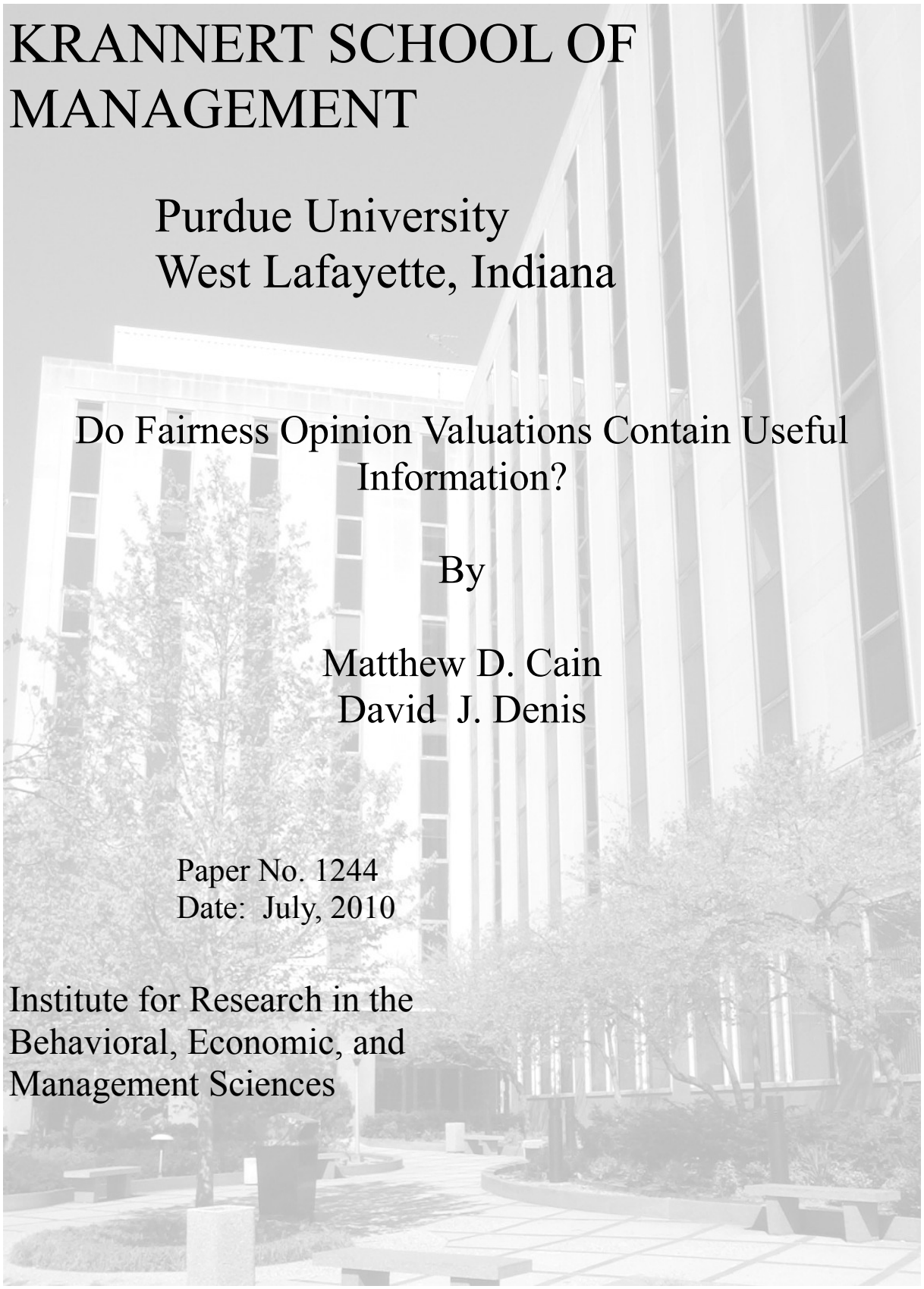

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Do Fairness Opinion Valuations Contain Useful Information?

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Paper No. 1244
Date: July, 2010

Institute for Research in the Behavioral, Economic, and Management Sciences

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July, 2010

[*] This paper is adapted from a portion of Matthew Cain's Ph.D. dissertation completed at Purdue University. We thank an anonymous referee, Mark Bagnoli, Diane Denis, Fernando Diaz, Ken Harden, Antonio Macias, Rodolfo Martell, John McConnell, Raghu Rau, Alessio Saretto, Gohar Stepanyan, session participants at the American Finance Association meetings in New Orleans, LA and the Financial Management Association meetings in Orlando, FL, and seminar participants at Indiana University, Penn State University, the University of Arizona, the University of North Carolina at Chapel Hill, the University of Colorado at Boulder, the University of Florida, the University of Georgia, the University of Kentucky, the University of Notre Dame, the University of Oregon, the University of Pittsburgh, and Virginia Tech.

Do Fairness Opinion Valuations Contain Useful Information?

Abstract

We analyze target firm valuations disclosed in the fairness opinions of negotiated mergers between 1998 and 2005. On average, acquirer advisors exhibit a greater degree of valuation optimism than do target advisors. Top-tier advisors produce more accurate valuations than lower-tier advisors, but valuation accuracy is unrelated to the contingency structure of advisory fees. The stock price reactions to merger announcements and to the public disclosure of fairness opinions are positively related to the difference between target firm valuations contained in the fairness opinion and the merger offer price. We conclude that fairness opinions contain information not previously available to market participants.

1. Introduction

Fairness opinions are a ubiquitous feature of negotiated mergers. In our sample of mergers between 1998 and 2005, over 96% of the transactions utilize a fairness opinion on either the target or the acquirer side. These opinions state whether the proposed offer price is "fair" to the client firm's shareholders "from a financial point of view," though the terms "fair" and "from a financial point of view" are never formally defined. In addition to the bottom-line opinion, fairness opinions presented to corporate boards typically also include a "board book" that provides details of the valuation analyses conducted by the opinion provider in arriving at the overall opinion of financial fairness [see Davidoff (2006)]. Since the *Smith v. Van Gorkum* decision in 1985, courts have generally allowed target directors to rely on fairness opinions as a primary component in the satisfaction of fiduciary duties in recommending mergers to shareholders.

Despite their ubiquity, fairness opinions have been widely criticized in the legal community on the grounds that their valuation analyses are overly subjective, methodologically flawed, and tainted by conflicts of interest because opinion providers are also paid advisory fees that are contingent on the successful completion of the merger. Under this view, fairness opinions contain no incremental information. Elson (1992) goes so far as to conclude that a fairness opinion is "as necessary to valuation analysis as is the appendix to the human digestive system" and that it "produces no benefits to stockholders." An alternative view, however, is that fairness opinions provide useful inputs to the acquisition process either because opinion providers enjoy access to higher quality information or because they have superior ability to process this information.

We provide evidence on these views by analyzing the valuation analyses included in 582 fairness opinions issued in conjunction with negotiated mergers between 1998 and 2005. From

the proxy mailings that contain fairness opinions, we record the valuation prices per share for each valuation method disclosed in each fairness opinion provided to acquirers and targets in a given merger. We then address four questions. First, to what extent do opinion providers issue biased fairness opinions? Second, is the extent of bias (if any) associated with possible conflicts of interest? Third, do fairness opinions increase the amount of information available to directors and to investors? Fourth, what factors, if any, affect the information content of fairness opinions?

Perhaps not surprisingly, we find strong evidence that acquirer-side investment banks tend to value targets significantly above offer prices (by 20% on average). Our evidence for target-side investment banks is more mixed. Although median valuations in target-side fairness opinions are significantly below offer prices, mean valuations do not differ significantly from the offer price. We further find that top-tier investment banks produce significantly lower absolute valuation errors, as do advisors with a pre-established relationship with the target. Thus, advisor rankings and relationship-based information appear to play a role in the accuracy of fairness opinion valuations. We find no evidence, however, that opinion providers provide less accurate valuations for mergers in which they are paid contingent fees.[1] Moreover, we find no evidence that unaffiliated third-party investment banks provide valuations that are more accurate than affiliated advisors. We conclude, therefore, that there is little evidence that fairness opinion valuations are driven by conflicts of interest.

In the second part of our analysis, we examine the information content of fairness opinions by conducting event studies at two different dates. The first date is the date on which the merger is first announced. Although fairness opinion valuations are not yet publicly available at this

[1] In different contexts, Rau (2000) and Calomiris and Hitscherich (2007) also find no relation between merger advisors' fee structure and the quality of their advisory services.

date, if fairness opinion valuations contain information about the intrinsic value of the target, we expect acquirer returns at the merger announcement date to be positively associated with the difference between fairness opinion valuations and the merger offer price. Consistent with this view, we find that acquirers' cumulative abnormal returns (CARs) around the announcement of the merger are positively related to fairness opinion valuations of target firms in excess of offer prices. This result is robust to controls for other determinants of the stock price reaction to merger announcements and is statistically stronger for target-sought opinions, where our sample size is much larger.

The second date that we analyze is the proxy mailing date; i.e., the date at which the fairness opinion valuations are first publicly revealed. If fairness opinions contain information that is incrementally informative beyond publicly available information, we expect market participants to update their priors about the valuation consequences of the merger for acquiring firm shareholders at this time. Consistent with this view, we find that acquiring firm abnormal returns around proxy mailing dates are positively related to fairness opinion valuations of target firms in excess of offer prices, but again the result is statistically significant only in target-sought opinions. That is, acquiring firm value increases (or decreases less) if target-sought fairness opinions indicate that the acquirer is paying less for a target than its true value.

Overall, our findings indicate that target-side advisors produce fairness opinions valuations that are informative to market participants. The findings also cast doubt on the claim that investors suffer when investment banks face a potential conflict of interest arising from contingent fee payments. This type of compensation scheme does not appear to significantly influence investors' perception of the informativeness of fairness opinion valuations. Investors respond to valuable information in target-side fairness opinions regardless of investment banks'

fee structure. One caveat, however, is that our data does not permit us to evaluate whether the cost of obtaining fairness opinions (i.e., advisory fees, diversion of managerial effort, delayed bids) outweighs the benefits of doing so. Future work is necessary to shed light on the ultimate cost/benefit tradeoff associated with fairness opinions. At a minimum, however, our findings indicate that fairness opinions contain information that is useful to corporate boards and to investors.

The remainder of the paper proceeds as follows: Section 2 provides an overview of fairness opinions and valuation methods, and places our study in the context of related literature. Section 3 describes the sample selection process and presents descriptive statistics on the sample of fairness opinions. Section 4 documents the extent of bias present in acquirer advisor and target advisor opinions. The information content of fairness opinion valuations is explored in Section 5. Section 6 draws conclusions.

2. Background on Fairness Opinions[2]

Fairness opinions are typically obtained by boards of directors at the time that they are considering corporate control transactions. Often, the fairness opinion is delivered orally in a meeting with the board and followed subsequently with a formal letter stating whether the opinion provider believes that the proposed offer price is "fair" to the client firm's shareholders "from a financial point of view." No objective metric has been established by the SEC, FINRA (formerly NASD), or the courts to determine what "fair" or "from a financial point of view" actually mean in the context of a fairness opinion.

[2] Much of this section is drawn from the thorough description of fairness opinions provided in Davidoff (2006).

In addition to the formal letter containing the bottom-line opinion, fairness opinions are typically accompanied by a "board book" that details the underlying analyses conducted by the investment bankers in arriving at their opinion. Opinion providers utilize a variety of analytical methods, including discounted cash flow techniques, recent transaction multiples, recent transaction premia, comparable firm multiples, net asset valuation techniques, and sum-of-parts analysis, to arrive at a range of potential values for the target firm. An offer price is deemed fair to target (acquirer) shareholders if it falls within or above (below) the valuation range(s) of the advisor's analysis. Note, however, that a "fair" verdict does not indicate whether the offer price is the best price a target could fetch or the lowest price an acquirer could accomplish in a competitive auction framework.

Figure 1 summarizes a typical timeline of fairness opinions and the merger negotiation process. Fairness opinions are normally presented to the board of directors ($t = 0$) shortly before the merger is publicly announced ($t = 1$). As Figure 1 indicates, the median gap between these events is just one day in our sample. The written, dated opinions and summaries of the advisors' valuation analyses are also included in proxy statements mailed to shareholders for voting approval of the merger. The opinions are thus made publicly available once proxy statements are mailed and submitted electronically to the SEC ($t = 2$). Opinions are occasionally presented or updated after the merger announcement, which can occur if the offer price is subsequently revised. However, the majority of fairness opinions (84% in our sample) are dated prior to public merger announcements.

We are interested in determining whether fairness opinions provide incremental information to boards of directors and to investors about the value of the proposed acquisition. As noted earlier, one view is that fairness opinions fail to provide incremental information

because of conflicts of interest between the opinion providers and the firms soliciting the opinions. Because over 75% of acquirer advisors and 80% of target advisors receive fees that are contingent on merger completion, "unfair" verdicts might jeopardize a substantial portion of these investment banking fees. Thus, critics claim that fairness opinions are merely "rubber stamps" on deals, adding no apparent value to the merger negotiation process (Elson, 1992; Carney, 1992). Moreover, even when opinion providers are not advisors to the acquisition itself, they may have the incentive to issue pro-management opinions in a desire to secure future M&A business with the client firm.[3] Under this view, therefore, fairness opinions do not provide incremental information to either the board of directors or investors.

An alternative view is that, because fairness opinion providers have access to financial forecasts and synergy estimates on both sides of a negotiated merger transaction (Bruner, 2004), they are able to generate new private information when conducting the due diligence and fairness opinion process. This information is communicated to the board and investors through the detailed valuation analyses contained in the fairness opinion's 'board book.' This view has some support in the Delaware Chancery Court.

> "Courts must be candid in acknowledging that the disclosure of the banker's 'fairness opinion' alone and without more, provides stockholders with nothing other than a conclusion, qualified by a gauze of protective language designed to insulate the banker from liability. The real informative value of the banker's work is not in its bottom-line conclusion. But in the valuation analysis that buttresses that result."[4]

[3] See R. Fink, "All's Fair in M&A? Judges and regulators are taking aim at conflicted "fairness" opinions", CFO Magazine, April 1, 2006.

[4] See Vice Chancellor Strine's opinion in Pure Resources, Inc., Stockholders Litigation 808 A. 2d 449 (Del. Ch. 2002) as quoted in Davidoff (2006).

Similarly, Davidoff (2006, p. 10), in discussing the valuation analyses contained in the 'board book' argues that "It is in these actual analyses that the meaning and worth, if any, of a fairness opinion lies."

Whether fairness opinions provide useful information to the board and to investors is, therefore, an empirical question. To our knowledge, ours is the first study to directly address this issue. Related studies by DeAngelo (1990), Bowers and Latham (2006) and Kisgen, Qian, and Song (2009) provide indirect evidence. DeAngelo (1990) analyzes a large sample of fairness opinions and a small sample of detailed investment bankers' working papers in management buyouts and finds that advisors' valuations predominantly rely on accounting-based information to determine fair value of the target. She argues that an advisor's independent determination has the potential to be more impartial and informative than any valuation conclusions reached by management or directors. However, she does not test this argument. Bowers and Latham (2006) analyze the determinants of the use of fairness opinions in mergers and tender offers and conclude that fairness opinions are more likely to be sought when legal risk, information asymmetry, and valuation uncertainty are greater.

Kisgen, Qian, and Song (2009) explore whether the presence of fairness opinions on the target or acquirer side influences characteristics of the transaction. They find no significant relation between the use of fairness opinions on the target side and transaction premia, the probability of transaction completion, or acquirers' announcement period abnormal returns. On the acquirer side, they find that fairness opinions are associated with lower transaction premia, a higher probability of deal completion, and lower announcement period abnormal returns.

In providing direct evidence on the information content of fairness opinions, our study is related to prior studies of the behavior of securities analysts and the information content of their

recommendations and reports. While a thorough review of this literature is beyond the scope of this study, we note that although analysts tend to issue optimistically biased research on firms with which they are affiliated or with which they seek to be affiliated (Michaely and Womack, 1999; Easterwood and Nutt, 1999; Cliff, 2007), recommendation changes, earnings forecasts, and target price revisions by analysts are positively associated with abnormal market returns (Jegadeesh, Kim, Krische, and Lee, 2004; Francis and Soffer, 1997; Brav and Lehavy, 2003). Thus, an identifiable conflict of interest among analyst subgroups does not appear to preclude the production of new and useful information. Our study seeks to determine whether fairness opinions can be characterized in the same manner.

3. Sample Selection and Descriptive Statistics

The Securities and Exchange Commission (SEC) requires firms to disclose all material information to shareholders when issuing a proxy solicitation for purposes of obtaining a shareholder vote.[5] Because the SEC considers fairness opinion valuations to be material information if they are presented to boards of directors during the process of approving a merger, fairness opinion details must be disclosed in merger proxy statements. Negotiated mergers always require a shareholder vote from target shareholders; therefore target-side fairness opinions are always observable in these cases. However, negotiated mergers do not always require a vote of approval from acquirer shareholders. The NYSE, AMEX, and NASDAQ require listed firms to obtain shareholder approval only when issuing new shares that amount to at least 20% of the existing number of outstanding shares.[6] Thus, if an acquirer issues more than

[5] This requirement stems from Item 14(7)(b)(6) of Schedule 14A. We thank Steven Davidoff for this clarification.

[6] See: NYSE Listed Company Manual, Section 312.03 (c); Amex Company Guide, Section 712 (b); Nasdaq Marketplace Rule 4350 (i)(1)(C).

20% of new equity to finance a merger, the firm must issue proxy solicitations and disclose the presence of fairness opinions. Otherwise, in mergers in which an acquirer shareholder vote is not mandated, acquirers are not required to disclose the presence of fairness opinions.

With this regulatory framework in mind, our sample begins with all negotiated mergers identified on the Securities Data Corporation (SDC) database involving publicly traded U.S. firms (acquirers and targets) between 1998 and 2005. We exclude banking and financial firms because opinion providers are also financial advisory firms. We also require that acquirers seek 100% of the targets' shares. Tender offers are excluded because (1) tender offer targets must disclose the usage of fairness opinions, but not the valuation analyses in the opinions, and (2) acquirers are not required to disclose the usage of fairness opinions unless they issue a proxy solicitation to approve the issuance of at least 20% new equity to finance the tender offer – and this rarely occurs.[7] Thus, in tender offers, acquirer-side fairness opinions are usually unobservable and target-side opinion valuation data are not disclosed.[8,9]

This process results in a sample of 582 mergers, including both completed (95%) and withdrawn (5%) transactions. The frequency of completed transactions in our sample is greater than the 85% completion rate for the SDC population. This is not surprising since, in order to be included in the sample, each transaction must have progressed to the stage at which proxy

[7] See Regulation M-A, Section 1012 (b) for disclosure requirements in tender offers.

[8] Disclosure requirements are much more burdensome in going-private transactions. For an example of the detailed fairness opinion disclosure of valuations in a recent going-private proposal, refer to the Schedule 13e-3 filing of Lear Corporation, filed with the SEC on 3/20/2007.

[9] Because acquirers are not always required to disclose the presence of fairness opinions (even if they are obtained), this imparts a potentially serious sample selection bias on studies in which a key variable is an indicator denoting whether or not acquirers or targets obtain a fairness opinion supporting the transaction. For example, since a proxy solicitation is required only when at least 20% new equity is issued, it is likely that the set of mergers in which acquirer-side fairness opinions is observed represents transactions of larger size relative to the acquirer. If the short-run or long-run market performance of acquirers of relatively large targets differs from that of acquirers of small targets, studies might falsely attribute the performance difference to the observed fairness opinion.

statements are mailed to shareholders. We also observe that the time profile of the sample transactions is quite similar to that of the SDC population (not reported in a table).

Firm-level accounting data and market value information are obtained from Compustat and CRSP, respectively. We collect fairness opinion data from merger proxy statements mailed to shareholders and filed electronically with the SEC.[10] These data include the number of fairness opinions obtained by acquirers and targets, fairness verdicts, fairness opinion valuation methods and corresponding valuation ranges, the fees paid to opinion providers, the contingency structure of these fee payments, and other pre-existing relationships of financial advisors with client firms. For purposes of illustration, Appendix 1 contains the full text of a fairness opinion provided by Lehman Brothers to The Titan Corporation in May, 2005. Titan was the target firm in merger negotiations with L-3 Communications Corporation.

Table 1 provides descriptive statistics for the sample of negotiated mergers and compares these statistics with those for (i) a subsample of mergers containing joint proxy statements issued by acquirers and targets (i.e. those for which both the target and acquirer may disclose a fairness opinion), and (ii) all public mergers in the SDC database meeting the sample selection criteria. The data indicate that mergers that include a joint proxy solicitation are larger on average than the full sample, as measured by transaction value or target market value of equity. The acquirers are smaller, however, so the resulting relative size of the target to the acquirer is much greater for mergers containing a joint proxy solicitation. The median relative size is 58% for the joint proxy subsample, compared to only 10% for the full sample. This pattern supports the idea that acquirers require shareholder approval of transactions that are larger in relative size, often

[10] Proxy statements are most commonly filed under DEFM14A filings (68% of sample), but also under DEF 14A (18%), DEFS14A (4%), DEFR14A (2%) and other filings.

accompanied by the issuance of a substantial amount of new equity. We also observe lower offer premiums in the joint proxy subsample than in the full sample.

Table 2 provides summary data on the observed fairness opinions. As shown in Panel A, virtually all targets (96%) utilize at least one fairness opinion in negotiated mergers. Approximately 8% utilize two opinions, and almost 1% obtain three opinions in a given merger. On the surface, acquirers appear to seek opinions much less frequently – in only about 28% of transactions. However, as noted earlier, firms are required to disclose the presence of fairness opinions only if they issue proxy solicitations to shareholders in negotiated mergers. This is always the case for targets in mergers, but acquirers frequently do not require shareholder approval of acquisitions. The most common trigger for this rule occurs when acquirers issue at least 20% of new equity to finance mergers. To explore the impact of this selection issue, the data in Panel B partitions the sample by the type of proxy solicitation: joint proxy solicitations vs. target-only proxy solicitations. In joint proxy solicitations, where selection bias is not a problem, acquirers obtain at least one fairness opinion in 83% of mergers. In target-only proxy solicitations, acquirer-sought fairness opinions are observed in fewer than 2% of the mergers, confirming the existence of a severe selection bias. The use of target-side fairness opinions is similar across the sortings in Panels A and B; thus, selection bias is not an issue on the target-side. In our subsequent empirical tests, we control for selection bias on the acquirer-side by analyzing matched transactions in which there is a fairness opinion on both the target and the acquirer side.

As noted in Panel C of Table 2, every fairness opinion in the sample deems the respective transaction "fair." According to industry practitioners, many "unfair" deals are either

renegotiated or withdrawn before proxy statements are mailed to shareholders.[11] Nonetheless, the absence of any "unfair" verdicts in the sample is striking. Panel C also shows that the majority of opinions (84% to 88%) are dated on or before the merger announcement date. The remaining cases typically represent opinions that have been updated to reflect revisions in offer prices. In other words, boards of directors typically have access to the information contained in the fairness opinion prior to the announcement of the merger. Thus, it is not the case that the fairness opinion valuations are influenced by the market's reaction to the merger announcement.

In Panel D we report data on the fee structure for the investment banks and their prior affiliation (if any) with the client firm. On average, opinion-providers earn 46% of total fee revenue from advisory services related to the fairness opinion process; about 15% of investment banks earn 100% of revenues from the rendering of a fairness opinion. Approximately 79% of acquirer advisors and 82% of target advisors receive additional fees contingent on the final outcome of a transaction. Contingent fees include "percentage fees" – fees based on a percentage of the transaction value, and "success fees" – flat fees paid upon successful consummation of the merger.

Finally, Panel E documents that 20% of acquirer advisors and 13% of target advisors provide past financing to the client firm or arrange a portion of financing necessary to close the current transaction (i.e., "staple financing"). About 22% of acquirer advisors and 36% of target advisors have no pre-existing business relationship with the merging firms, which would include prior M&A advisory services, IPO or SEO business, or other investment banking services. Of the firms seeking two fairness opinions, it is more often the case that both advisors have a pre-existing relationship with the firms, indicating that firms rarely add an unaffiliated second

[11] Source: Private conversations with fairness review board members at investment banks.

opinion-providing advisor. Appendix 2 lists the top 30 advisory firms based on the total number of fairness opinions provided to targets during the sample period.

Table 3 provides univariate statistics on the range of high minus low prices per share determined through various valuation techniques. To calculate the "average" we take the average range for all methods reported by a given advisor and then report the distribution across firms. The distribution of ranges reveals significant valuation estimate variability in both acquirer-sought and target-sought fairness opinions. The average (median) range is $16 ($10) per share for acquirer-sought average valuations, and $11 ($7) per share for target-sought average valuations. The maximum range for acquirer-sought opinions is $225, while the maximum range for target-sought opinions is $325, both found in the public firm multiples technique. This implies a striking degree of uncertainty regarding target value. The target-sought fairness opinion containing this $325 range indicated a low and high target value of $26.98 and $351.62 per share, respectively.

The mean (median) range is 76% (48%) of the offer price for acquirer advisor opinion valuations, and 60% (36%) for all target advisor opinion valuations. The range is 57% (35%) for target opinions contained in joint proxy solicitations, very similar to the ranges for the full target-side sample. For a hypothetical offer price of $20 per share, the median acquirer advisor opinion would reach a range of target values of $9.6, while the median target advisor opinion would reach a range of $7.2 around the offer price. The average level of uncertainty revealed in the valuation prices seems significant given the supposedly "expert" status of fairness opinion providers. Nonetheless, the statistics in Table 3 show that while some advisors disclose extremely wide valuations of targets, others reach very precise price ranges. We later explore

whether this price dispersion influences the information content of the fairness opinion conclusions.

4. Are Fairness Opinion Valuations Biased?

In this section, we analyze whether the target valuations contained in fairness opinions are biased relative to market-based estimates of the target's intrinsic value. We explore whether this bias (if any) is related to whether the opinion provider is hired by the target or acquiring firm and to various characteristics of the investment bank and the contract between the bank and the firm seeking the fairness opinion.

4.1. Valuations relative to offer prices

We begin our analysis of fairness opinion valuations by comparing the valuations of advisors hired by acquiring firms with those of advisors hired by targets. As indicated in Panel A of Table 4, the valuations of acquirer advisors exceed those of matched target advisors by 29%, on average. This tendency of acquirer advisors to reach valuations that exceed those reached by target advisors persists across all valuation methods for the sample of transactions in which both target and acquirer advisors employ the same valuation methodology. While the excess valuation is not positive in all transactions, it is positive almost 80% of the time, with the mean percentage statistically greater than zero at the 1% level for the average valuation and at the 5% level for all individual valuation methods.

Panel B of Table 4 and Figure 2 summarize valuation midpoints as a percentage premium over initial offer prices. As Figure 2 indicates, on average, and in most valuation techniques, acquirer advisors tend to value targets above offer prices, while target advisors tend to value

targets at or below offer prices. The univariate statistics in Panel B show that in the full sample, acquirer advisors produce a positive mean and median valuation premium; both are statistically different from zero and economically large (mean = 20%; median = 8%). The average valuation premium for target advisors is not significantly different from zero (mean = -2%), but the median (-8%) is different from zero at the 1% level. The acquirer advisors' valuation premium is positive about 69% of the time, while the target advisors' valuation premium is negative about 68% of the time.

4.2. Valuation accuracy

If offer prices represent an unbiased measure of target value, the data in Panel B of Table 4 indicate that acquiring firm advisors systematically overvalue targets while target advisors slightly undervalue the target, on average. One criticism of this interpretation, however, is that prior studies have shown that acquiring firms overpay, on average, for targets.[12] Thus, a simple comparison of valuation estimates with offer prices is potentially a misleading measure of the valuation accuracy of fairness opinion providers. That is, it will be biased towards concluding that fairness opinions understate the value of the target.

To address this issue, Table 5 reports a more refined calculation of advisor valuation accuracy in which we compare acquirer shareholder wealth changes that are predicted by the fairness opinion valuations with actual shareholder wealth changes in acquiring firms. The intuition of this measure is as follows. When the true value of the target differs from the offer price, acquiring firm shareholders gain or lose by the aggregate value of this difference. Thus, the wealth change that is predicted by a given fairness opinion valuation is equal to the

[12] See, for example, Moeller, Schlingemann, and Stulz (2004).

difference between the valuation in the fairness opinion and the offer price, multiplied by the number of target shares being acquired (excluding any acquirer toeholds in the target), plus the product of toehold shares in the target owned by the acquirer and the updated valuation of these shares based on the potential merger:

$$Predicted\ Change = (target\ valuation - offer\ price) * (target\ shares - toehold) + (target\ valuation - target\ price_{t=-3}) * toehold \quad (1)$$

We then compare this predicted wealth change with the actual change in shareholder wealth from two days prior to the merger announcement through merger completion.[13] We cumulate the difference between the acquirer's raw return in the event window and that of the return predicted by the Fama-French (1993) 3-factor model. We multiply this abnormal return by the acquirer's market value of equity three days prior to the merger announcement (t= -3) to obtain an estimate of the abnormal dollar change in acquiring shareholder wealth.[14] We label this variable *Actual Change* in Table 5.

We subtract the *Actual Change* from the *Predicted Change* in acquirer wealth to form a raw prediction error in millions of dollars, labeled *Raw Error*. We then scale this error by dividing it by the transaction value and winsorizing the result at the 5% and 95% levels. We report the median valuation error, labeled *Scaled Error* and the median absolute value of the scaled error, |*Scaled Error*|. The *Scaled Error* measures the directional bias of valuations while the |*Scaled Error*| measures the overall accuracy of valuations regardless of directional errors.

[13] Alternatively, we could measure the actual change in shareholder wealth around the merger announcement. However, this stock price reaction understates the expected wealth effect of the merger because it incorporates the probability that the offer will be withdrawn. By contrast, our *Predicted change* variable implicitly assumes that the offer will be completed.

[14] This variable is similar to the acquirer wealth effects measured by Malatesta (1983), who focuses on the abnormal dollar return cumulated over time.

Although these measures of valuation accuracy have the advantage of incorporating any systematic overpayment by acquirers, we note several potential caveats that suggest caution in interpreting the data as true valuation errors. First, they implicitly attribute any negative acquirer abnormal returns to overpayment. To the extent that negative acquirer returns are attributable to other causes (e.g. signaling), these measures will bias us towards concluding that fairness opinions overstate the value of the target. Second, measured valuation errors might also be affected by unexpected costs of integrating the merging firms and market anticipation of the merger. Finally, our measure implicitly assumes that market prices at the time of the merger approval represent unbiased estimates of long-term value.[15]

We report the results for all transactions in Panel A and for the subset of matched transactions in Panel B. Means are reported in [ ], medians are in { }, and p-values from Wilcoxon signed-rank tests are given in ( ).[16] The results in Panel A indicate that at the median, the fairness opinions of acquirer advisors overestimate the value of the target by a statistically significant 7% while those of target advisors underestimate the value by a statistically significant 15%.

In the matched sample for which fairness opinions are disclosed by both acquirer and target advisors (Panel B), we continue to find that acquirer advisors have positive median valuation errors, but these errors are no longer statistically significant. We find no evidence that the valuation errors of target advisors are statistically different from zero. It is possible that the reduced sample size of 67 matched transactions renders the tests of significance less powerful

[15] Several studies find long-run underperformance for certain categories of acquirers, including those using stock financing (Loughran and Vijh, 1997) and "glamour" acquirers (Rau and Vermaelen, 1998). However, Mitchell and Stafford (2000) show that after correcting for cross-correlation of event-firm returns, this abnormal performance virtually disappears.

[16] We choose to report p-values from the nonparametric Wilcoxon tests because as Panel C in Table 5 shows, the distribution of scaled errors is skewed. However, we find that (unreported) statistical significance results from t-tests are qualitatively similar.

than those on the larger sample in Panel A. However, the Panel B results show a significant difference between the valuation errors of target and acquirer advisors. The median difference between acquirer and target advisors' valuations is a statistically significant 8.5%. The median 5.3% valuation error from acquirer advisors exceeds the median error of 1.4% from target advisors; thus, we conclude that acquirer advisors exhibit a greater degree of valuation optimism than do target advisors.[17]

Why do acquirer-side and target-side investment banks exhibit different levels of valuation bias? Even apart from a contingent fee structure, investment banks might have an incentive to issue pro-management fairness opinions in the hope of gaining lucrative M&A advisory or other business from the acquiring firm in the future [see, e.g., Bebchuk and Kahan (1989), Fink (2006)]. Since it isn't possible to gain future investment banking business from a target that is acquired, target-side opinion providers do not exhibit this conflict of interest.[18]

4.3. Advisor characteristics and valuation accuracy

Table 6 analyzes whether valuation accuracy is systematically related to advisor characteristics. We partition the data according to whether or not opinion providers are paid additional fees contingent on merger success, whether they have any prior business relationship with either the target or acquirer, and whether or not the opinion provider is from a top-tier investment bank (i.e., the top ten investment banks in Appendix 2). We report median valuation

[17] Our findings are robust to alternative measures of scaled error that account for differences in the volatility of the acquirer's returns. Specifically, in untabulated results, we divide scaled errors by the standard deviation of returns over the interval from two days prior to announcement through the merger effective date. We compute this measure using both winsorized and unwinsorized data. We also compute scaled errors using unwinsorized data. In all cases, our findings remain qualitatively unchanged; scaled errors are significantly smaller for target-sought fairness opinions.

[18] This argument is similar to that in Jegadeesh, Kim, Krische, and Lee (2004) who document that analysts have an economic incentive to bias their recommendations towards stocks with characteristics that make for attractive investment banking clients.

errors in Panel A and median absolute valuation errors in panel B. The far-right columns of each panel report p-values from Wilcoxon rank-sum tests of difference of medians between the indicated subgroups.

We find little evidence in Panel A that valuation errors are associated with fee structure or advisory relationships. Although valuation errors are higher when advisors are paid non-contingent fees or when the advisor does not have any prior business relationship with either the target or acquirer, none of these differences is statistically different from zero at the 0.10 level.[19] Our finding that valuation errors are not significantly related to the advisor's fee structure is consistent with other studies that offer a benign view of advisors' fee structure in negotiated mergers (Rau, 2000; Calomiris and Hitscherich, 2007). In fact, target advisor errors are actually lower if the advisors are paid contingent fees than if they are paid flat fees. We do note that acquirer advisors' valuation errors are significantly lower from top-tier investment banks relative to lower-tiers, significant at the 5% level.

The results in Panel B provide some evidence that both acquirer and target advisors produce significantly lower absolute valuation errors for transactions in which they have had previous business experience with either the target only or both the acquirer and target. This evidence supports the view that prior business relationships produce information that is useful in the producing more precise fairness opinion valuations. This calls into question the potential benefits from proposals that advocate the procurement of fairness opinions by unaffiliated third-party advisors (Bebchuk and Kahan, 1989).

Regarding fee structure, target advisor errors are again smaller when the advisors receive contingent fees than from those earning non-contingent fees. Similarly, we find that that the

[19] This conclusion holds if we estimate multivariate regressions of valuation accuracy as a function of fee structure, prior business relationships and advisor rank. The lone exception is that in such regressions, the coefficient on a dummy variable denoting no prior business relationships is significantly negative at the 10% level.

valuations of top-tier advisors have lower absolute valuation errors than those of lower-tier banks. The difference is significant at the 2% level for both acquirer-side and target-side advisors.

5. The Information Content of Fairness Opinion Valuations

In this section, we analyze whether (despite possible biases) the valuation data contained in fairness opinions provide incremental information to acquiring firm directors and to investors about the target's unobservable acquisition value. We do so by conducting stock price event studies at two dates: (i) the first announcement of the merger, and (ii) the date on which the proxy containing the fairness opinion is mailed to shareholders. If fairness opinions contain incremental information, then, all else equal, we expect a positive association between the stock price reaction at announcement (and proxy mailing) and the premium of the fairness opinion valuation over the offer price. However, if investment banks are so biased that fairness opinions contain no meaningful information, or if advisors simply do not serve an information dissemination role through the provision of fairness opinions, then acquirer shareholder reactions should be uncorrelated with opinion data.

5.1. Fairness opinion valuations and the stock price reaction to merger announcements

Our first test analyzes the association between fairness opinion values (relative to offer prices) and the stock price reaction to the initial merger announcement. Recall that as of the merger announcement date ($t = 1$ in Figure 1), fairness opinions have been presented to the board of directors, but have not yet been publicly disclosed. Thus, the stock price reaction to the merger announcement reflects the market's assessment of the shareholder wealth impact of the

merger conditional on the offer price approved by the acquiring firm directors. If fairness opinions contain information that is useful to directors in assessing the market's view of the intrinsic value of the target, we expect a positive association between the stock price reaction to the merger announcement and the premium of the fairness opinion valuation over the offer price. Under the alternative hypothesis of no information content, we expect fairness opinion valuations and stock price reactions to merger announcements to be unrelated.

Panel A of Table 7 reports cumulative abnormal returns (CARs) for acquiring firms in the five-day window centered on the merger announcement. CARs are computed as the difference between the stock return of the acquiring firm and that of the CRSP equal-weighted index.[20] Consistent with the prior literature, the data indicate that merger announcements are met with a significant negative abnormal stock price reaction. Acquiring firm mean CARs are negative in all fairness opinion provider subsamples, but only significantly so in subsamples containing at least one acquirer-sought fairness opinion. This is likely due to the fact that mergers in which the transaction size is small relative to the acquirer often do not disclose an acquirer-sought fairness opinion.

Panel B of Table 7 presents ordinary least squares (OLS) regressions of acquirer CARs around merger announcement dates on fairness opinion valuation data and interactions of these valuations with potential advisory conflicts of interest. We present the results separately for acquirer (columns 1-4) and target advisors (columns 5-8). Our primary variable of interest is *FO Valuation*, defined as the percentage difference between the advisors' valuation and the initial

[20] Following previous M&A studies, we use a five-day event window (i.e., Masulis, Wang, and Xie, 2007; Baker, Coval, and Stein, 2007; Fuller, Netter, and Stegemoller, 2002). Results are robust to use of alternative window lengths, including a three day window (-1, +1). Results obtained using a five day window are reported here in order to remain consistent with the five day window used around proxy mailing dates in Table 8. A five day window around proxy mailing dates is necessary because of uncertainty regarding the exact time at which proxy statements become publicly available.

offer price at the merger announcement date: (valuation implied value – initial offer price) / initial offer price.[21] We also control for the following potential determinants of the stock price reaction: *Target Size*, defined as log transaction value; *Acquirer Size*, the log market value of acquirer equity three days before merger announcement, to control for any size effects in announcement returns (Moeller, Schlingemann, and Stulz, 2004); *Relative Size*, defined as transaction value divided by acquirer market value of equity; *Target Tobin's q*, the ratio of market value of a target, measured as book value of total assets less book value of equity plus market value of equity, to the book value of its total assets; *All Equity Payment*, a dummy variable that equals one if the merger consideration is all stock, and zero otherwise. Standard errors are adjusted for heteroskedasticity and clustering of observations at the acquirer level. P-values are reported in parentheses below the coefficient estimates.

The results in Columns (1) and (5) indicate that acquirer announcement period CARs are positively related to acquirer-side fairness opinion valuation premiums but unrelated to target-side fairness opinion valuation premiums.

In Columns (2) and (6), we additionally control for the variability of advisors' price estimates and the relative size of the acquisition. Recall that advisors typically provide a range of target prices and that there is considerable dispersion in the variability of the prices. It is possible that fairness opinions are informative when they are presented within a narrow range, but uninformative when there is greater variability in the valuation estimates. Indeed, a high

[21] Our construction of this variable is analogous to the measurement of the offer premium used in several prior studies of bidder returns. (See, for example, Officer (2003) and Harford, Humphrey-Jenner, and Powell (2010)). Alternatively, since the dependent variable (CAR) is measured in units of the acquirer's market value of equity, we could scale the valuation premium measure by the acquirer's market value of equity. This alternative approach assumes that each additional dollar of valuation premium is associated with a dollar change in the payoff to acquiring firm shareholders. Our hypothesis is weaker in that it implies only that there is some information in the premium of the fairness opinion value over the initial offer price. Nonetheless, we later interact *FO Valuation* with the relative size of the acquisition.

range in valuation estimates could be an indication that the primary motive for the fairness opinion is what Kisgen, Qian, and Song (2009) refer to as 'legal protection only.' Thus, to explore whether this variability has an impact on the information content of the opinion valuation, we define the variable *Price Variance* as the variance of advisors' valuation prices, where each price is scaled by the advisors' average valuation. We then interact *Price Variance* with *FO Valuation* to test whether the information content of fairness opinions is attenuated when valuation estimates are less precise.

Once we control for variance, *FO Valuation* is significant in the target advisor sample and insignificant in the acquirer advisor sample. Moreover, the interaction of *Price Variance* and *FO Valuation* is significantly negative in the target advisor sample, which implies that there is significant attenuation in the *FO Valuation* coefficient when the dispersion in advisor's valuations is high. The interaction of *FO Valuation* and *Relative Size* is positive, but statistically insignificant for both the acquirer and advisor samples. Because the median value of *Price Variance* in the target sample is 8.9% and the median relative size is 7.1%, the marginal effect of the valuation coefficient in Column (6) is 2.3% – (1.3%*8.9%) + (10.8%*7.1%) = +3.0%, an economically meaningful effect for the median firm. Moreover, the marginal effect remains positive even at the 95th percentile value of price variance, which is 85.1%. Thus, even at very high values for price variance, fairness opinions appear to contain incremental information.

In Columns (3) and (7), we test whether the information content of fairness opinions is affected by whether or not the opinion provider has a pre-existing business relationship with the target or acquiring firm. The data show that the association between announcement CARs and *FO Valuation* is significantly stronger when acquirer-side investment banks have a prior working

relationship with both the acquirer and the target. One interpretation of this finding is that the prior business relationship allows the opinion provider to have access to superior information.

Finally, Columns (4) and (8) test whether the information content of fairness opinions is related to the stature and the independence of the opinion provider. We define two additional independent variables as follows. *Top-tier Advisor* is the sum of dummy variables that equal one if the advisor(s) are among the top ten most frequent providers of fairness opinions in the sample, as detailed in Appendix 2. (Recall that a given deal may have multiple fairness opinions on the acquirer or target side.) *Independent Advisor* is the sum of indicator variables that equal one if a given advisor is paid fees only for providing a fairness opinion in the transaction, and zero otherwise. The results show that neither 'top-tier' status nor the independence of the advisor has a positive impact on the association between acquirer CARs at the announcement of the merger and *FO Valuation*. Columns (4) and (8) do provide some evidence that fairness opinion valuations provided by both sets of advisors are more positively related to announcement returns when the transactions are more material to the acquirer, as measured by the interaction term *FO Valuation * Relative Size.*

Overall, therefore, the data in Table 7 provide evidence that the stock price reaction to merger announcements is positively associated with the valuation premium implied in the fairness opinions provided by target advisors. This association is attenuated when the valuation estimates are less precise, but is stronger for transactions that are larger relative to the size of the acquirer. These findings are consistent with the view that fairness opinions provided by target advisors have the potential to inform directors during merger negotiations. By contrast, there is, at best, only weak evidence that fairness opinion valuations provided by acquirer advisors are

informative, though we note that the small sample size in the acquirer advisor sample limits the power of these tests.

5.2. Fairness opinion valuations and the stock price reaction to proxy mailings

Although the findings in Table 7 imply that the fairness opinions of target advisors contain information that is potentially useful to *directors*, they are insufficient for determining whether fairness opinions contain incremental information for *investors*. Because fairness opinion valuation data are not publicly disclosed until merger proxy voting statements are mailed to shareholders, any private information contained in the valuations will not be assimilated by the market until that time.

To explore this issue, we analyze acquiring firm CARs in the five-day window centered on the earlier of the proxy mailing date and the date on which the proxy is posted on the SEC's Edgar website. CARs are calculated using the same methodology as in Table 7. As shown in Panel A of Table 8, acquiring firm CARs are not significantly different from zero, on average, over the (-2, +2) event window.

To analyze the information content of fairness opinions, we estimate ordinary least squares regressions of acquiring firm CARs around the proxy mailing date on *FO Valuation*, the implied premium of advisors' average valuation over the prevailing offer price at the time proxy statements are mailed: (valuation implied value – current offer price) / current offer price. Note that this definition of *FO Valuation* is slightly different than the one used in Table 7 in that it incorporates any changes in the offer price between the initial merger announcement and the proxy mailing. If fairness opinions contain valuable information for investors, we expect a positive association between CAR and *FO Valuation*.

The results are presented in Panel B of Table 8. We again estimate models separately for opinions provided by acquiring firm advisors (Columns 1-4) and those provided by target advisors (Columns 5-8). We find that CARs around the proxy mailing date are positively related to *FO Valuation* for target advisors, but not for acquirer advisors. The coefficient on the interaction of *FO Valuation* with *Price Variance* is negative for target advisors, but statistically significant only in Column (7). The marginal effect of *FO Valuation* for the median firm remains positive, though. For example, the marginal effect of FO Valuation in Column (7), for an acquirer with no prior business experience, is 2.5% – (0.7%*8.9%) – (0.4%*7.1%) = +2.4%.

In Columns (3) and (7), we again test whether the impact of *FO Valuation* is affected by prior business relationships between the opinion provider and either the target or acquirer (or both). We find that target advisors produce more informative valuations when they have prior experience with both parties to the transaction. We note also that once we control for such prior business relationships, the coefficient on *FO Valuation* continues to be significantly positive for target advisors and statistically insignificant for acquirer advisors. Finally, in Columns (4) and (8), we again test whether the information content of fairness opinions around the proxy mailing date is related to the stature and the independence of the opinion provider. We find that, if anything, fairness opinions of acquirer advisors are less informative if the advisor is independent.

On balance, therefore, these findings support the view that target advisor valuations contained in fairness opinions provide incremental information to investors. The greater is the difference between the fairness opinion valuation and the offer price, the larger is the stock price reaction to the merger announcement and to the proxy statements containing this new information. By contrast, we find little evidence that acquirer-sought fairness opinions provide

incremental information to investors, though again, we note that the small sample size of acquirer advisors reduces the power of our tests.

5.3. Robustness tests

It is possible that market reactions to target-sought fairness opinion valuations represent behavioral responses to useless valuations rather than rational reactions to new information. To examine this possibility, we document long-run returns to investing in different acquiring firm portfolios based on target-sought fairness opinion valuations. We sort acquirers on the basis of the target advisor *FO Valuation* variable: average fairness opinion target valuation premium over prevailing offer price at proxy mailing dates. We create portfolios based on *FO Valuation* terciles, with the bottom portfolio representing the most negative valuations, and the top portfolio representing the most positive valuations. Following the calendar-time portfolio method advocated by Mitchell and Stafford (2000), firms are added to the respective portfolios one month after a new proxy statement is mailed to shareholders containing fairness opinion valuations, and remain in the portfolios for a holding period of six months to three years. Portfolios are rebalanced monthly on either an equal-weighted or value-weighted basis. Monthly portfolio excess returns are then regressed on the three factors from Fama and French (1993). Results from these regressions (unreported) produce an insignificant intercept for both the high valuation and low valuation portfolios. Thus, the initial market reactions to the fairness opinions appear to be unbiased.

As noted in Table 1, approximately 5% of the sample mergers are ultimately withdrawn. If the probability of withdrawal is systematically associated with our *FO Valuation* variable, this can produce biased coefficients in our regressions. Therefore, as an additional robustness check,

we cumulate acquirer abnormal returns over the period extending from two days prior to the initial announcement of the merger through merger completion. By construction, therefore, this variable excludes withdrawn transactions and allows us to focus only on those observations for which the probability of completion equals one during the stock returns window. We then re-estimate the Table 8 regressions. Our results (results not reported in a table) support those in Tables 7 and 8. Specifically, valuations provided by acquirer advisors are not significantly associated with acquirer returns; however, valuations provided by top-tier acquirer advisors and valuations provided by acquirer advisors with previous business experience with both the acquirer and target firms are positively related to acquirer returns. Target advisor valuations continue to be positively related to acquirer returns, and this relation is attenuated by the variance of these valuations. Valuations from top-tier target advisors are more strongly related to acquirer returns as well.

6. Conclusions

Although fairness opinions are pervasive, they are frequently criticized as being biased and, therefore, of little value to directors or investors. We provide evidence on these claims by analyzing the valuations contained in fairness opinions and the stock price reactions to the revelation of these opinions. Although we find that acquirer advisors exhibit a significantly greater degree of valuation optimism than to target advisors, we find no evidence that valuation accuracy is related to the contingency structure of advisory fees. In addition, we find that valuations of top-tier investment banks exhibit significantly lower absolute valuation errors, as do those of advisors with a pre-established relationship with the target.

We further show that fairness opinion valuations provided by target advisors are significantly related to the stock price reaction to the merger announcement. Specifically, acquiring firm CARs around the merger announcement date are positively related to fairness opinion valuations of target firms in excess of the merger offer price. In addition, acquiring firm CARs around the mailing of the proxy statement containing the fairness opinion are also positively related to fairness opinion valuations in excess of the offer price. These associations are stronger for transactions that are larger relative to the size of the acquirer, but weaker when the range of fairness opinion values is wider.

Taken together, these findings imply that, although fairness opinion valuations cannot necessarily be taken at face value, they nonetheless appear to contain information that is useful to both directors and investors. All else equal, when opinion valuation data indicate that offer prices exceed (fall below) target acquisition value, acquiring firm value decreases (increases). As such, our findings provide support for the long-run survival of fairness opinions and for the historical reliance of the judiciary on fairness opinions in legal proceedings.

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Appendix 1

The following fairness opinion data was provided by Lehman Brothers as the advisor to The Titan Corporation, the merger target. It was presented to Titan's board of directors on May 31, 2005, and officially dated as of June 2, 2005, the same day as the public announcement of the merger with L-3 Communications Corporation. The fairness opinion and supporting valuation data were then disclosed and made publicly available in Titan's proxy statement mailed to shareholders on June 29, 2005 and their DEFM14A filing with the SEC on the same date. The offer price was $23.10 in cash per share of Titan stock.

Opinion of Lehman Brothers Inc.

In May 2005, Titan executed an engagement letter to formally engage Lehman Brothers to act as its co-financial advisor in connection with the merger. On May 31, 2005, Lehman Brothers rendered its oral opinion (subsequently confirmed both orally and in writing on June 2, 2005) to the Titan board of directors that as of that date, and based upon and subject to the matters stated in its opinion, the consideration to be received by the stockholders of Titan in the merger was fair, from a financial point of view, to Titan's stockholders.

The full text of Lehman Brothers' written opinion, dated June 2, 2005, is attached as Annex D to this Proxy Statement. Stockholders are encouraged to read Lehman Brothers' opinion carefully and in its entirety for a description of the assumptions made, procedures followed, factors considered and limitations upon the review undertaken by Lehman Brothers in rendering its opinion. The following is a summary of Lehman Brothers' opinion and the methodology that Lehman Brothers used to render its opinion. This summary is qualified in its entirety by reference to the full text of the opinion.

Lehman Brothers' advisory services and opinion were provided for the information and assistance of the Titan board of directors in connection with its consideration of the merger. Lehman Brothers' opinion is directed only to the fairness, from a financial point of view, of the merger consideration pursuant to the proposed merger, and does not address any other aspect of the merger or any related transaction. Lehman Brothers' opinion is not intended to be and does not constitute a recommendation to any stockholder of Titan as to how that stockholder should vote with respect to the merger. Lehman Brothers was not requested to opine as to, and the Lehman Brothers opinion does not address, Titan's underlying business decision to proceed with or effect the merger.

In arriving at its opinion, Lehman Brothers reviewed and analyzed, among other things:

- the merger agreement and the financial terms of the merger;
- publicly available information concerning Titan that Lehman Brothers believed to be relevant to its analysis, including Titan's Annual Report on Form 10-K for the fiscal year ended December 31, 2004 and Titan's Quarterly Report on Form 10-Q for the quarter ended March 31, 2005;
- financial and operating information with respect to the business, operations and prospects of Titan furnished to Lehman Brothers by Titan;
- a trading history of Titan's common stock from May 20, 2000 to May 31, 2005 and a comparison of that trading history with those of other companies that Lehman Brothers deemed relevant;
- a comparison of the historical financial results and present financial condition of Titan with those of other companies that Lehman Brothers deemed relevant;
- a comparison of the financial terms of the proposed merger with the financial terms of certain other transactions that Lehman Brothers deemed relevant;

- the results of Lehman Brothers' efforts to solicit indications of interest and definitive proposals from third parties with respect to an acquisition of Titan; and
- the financial terms of proposed legal settlements set forth in the Securities MOU and the Derivative MOU, the costs of which will be paid by Titan after it is acquired in the merger.

In addition, Lehman Brothers had discussions with the management of Titan concerning Titan's business, operations, assets, financial condition and prospects and undertook such other studies, analyses and investigations as Lehman Brothers deemed appropriate.

In arriving at its opinion, Lehman Brothers assumed and relied upon the accuracy and completeness of the financial and other information used by Lehman Brothers without assuming any responsibility for independent verification of that information. Lehman Brothers further relied upon the assurances of Titan's management that it was not aware of any facts or circumstances that would make such information furnished by Titan inaccurate or misleading. With respect to the financial projections of Titan, upon advice of Titan, Lehman Brothers assumed that such projections were reasonably prepared on a basis reflecting the best currently available estimates and judgments of Titan management as to the future financial performance of Titan. Accordingly, Lehman Brothers further assumed that Titan will perform substantially in accordance with such projections. In arriving at its opinion, Lehman Brothers did not conduct a physical inspection of the properties and facilities of Titan and did not make or obtain any evaluations or appraisals of the assets or liabilities of Titan. Lehman Brothers' opinion was necessarily based upon market, economic and other conditions as they existed on, and could be evaluated as of, and on the information made available to Lehman Brothers as of, June 2, 2005.

At the May 31, 2005 meeting of the Titan board of directors, Lehman Brothers made a presentation of certain financial analyses of the proposed merger.

The following is a summary of the material financial analyses used by Lehman Brothers in connection with providing its opinion to the Titan board of directors. **In order to fully understand the financial analyses used by Lehman Brothers, the summary of the analyses must be considered as a whole. Considering any portion of such analyses and of the factors considered, without considering all analyses and factors considered, could create a misleading or incomplete view of the process underlying Lehman Brothers' opinion.**

Comparable Company Analysis. Lehman Brothers reviewed and compared specific financial and operating data relating to Titan with selected publicly traded companies that Lehman Brothers deemed comparable to Titan. Lehman Brothers chose the companies used in the Comparable Company Analysis based on their general similarity to Titan in the mix and characteristics of their businesses, growth and returns. For Titan, Lehman Brothers included in its review of comparable companies the following companies:

- CACI International Inc.
- Anteon International Corporation
- SRA International, Inc.
- ManTech International Corporation
- MTC Technologies, Inc.
- SI International, Inc.
- Dynamics Research Corporation

Using publicly available information (including company filings and the Institutional Brokers Estimate System consensus estimates), Lehman Brothers calculated and analyzed each company's current stock price as a multiple of its projected earnings per share and each company's firm value as a multiple of certain historical and projected financial statistics including EBITDA. Lehman Brothers calculated and analyzed these multiples using both the closing price per share of each company's common stock on May 26, 2005 and the average of each company's common stock price for the 30 trading days ending on May 26, 2005.

Using publicly available information and projections provided by Titan management, Lehman Brothers also calculated and analyzed these multiples for Titan using both the average of Titan's common stock price for the 30 trading days ending on May 17, 2005 and the closing price per share of Titan's common stock on May 17, 2005 (the trading day prior to when speculation began in the press concerning a possible transaction involving Titan).

Due to the inherent differences between the business, operations and prospects of Titan and the business, operations and prospects of each of the companies included in the comparable companies, Lehman Brothers believed that it was inappropriate to, and therefore did not, rely solely on the quantitative results of the Comparable Company Analysis and accordingly also made qualitative judgments concerning differences between the financial and operating characteristics and prospects of Titan and the companies included in the Comparable Company Analysis that would affect the public trading values of each. Accordingly, using the mean and median multiples as a general guide, Lehman Brothers applied a range of multiples that it believed reflected the theoretical trading multiples for Titan on a non-controlled fully distributed basis.

Based on each of those selected multiples, Lehman Brothers calculated per share equity reference ranges for Titan common stock on a non-controlled fully distributed basis between $18.65 and $24.40 per share.

Comparable Transactions Analysis. Using publicly available information, Lehman Brothers reviewed and compared the purchase prices and multiples paid in eight acquisitions of companies that Lehman Brothers deemed relevant to arriving at its opinion. Lehman Brothers chose the transactions used in the Comparable Transaction Analysis based on the general similarity of the target companies in the transactions to Titan in the mix and characteristics of their businesses, growth and returns. Lehman Brothers included the following transactions:

- Acquisition of DynCorp by Computer Sciences Corporation;
- Acquisition of Veridian Corporation by General Dynamics Corporation;
- Acquisition of Affiliated Computer Services, Inc.'s Federal Government IT Business by Lockheed Martin Corporation;
- Acquisition of the Defense and Intelligence Group of American Management Systems by CACI International Inc.;
- Acquisition of DigitalNet Holdings, Inc. by BAE Systems North America Inc.;
- Acquisition of DynCorp by Veritas Capital, Inc.;
- Acquisition of The Sytex Group, Inc. by Lockheed Martin Corporation; and
- Acquisition of PEC Solutions, Inc. by Nortel Networks Inc.

Lehman Brothers considered the enterprise values as multiples of the then LTM EBITDA and the then forward twelve months EBITDA.

The reasons for and the circumstances surrounding each of the transactions analyzed were diverse and there are inherent differences in the business, operations, financial conditions and prospects of Titan, and the businesses, operations, financial conditions and prospects of the companies included in the Comparable Transaction Analysis. Accordingly, Lehman Brothers believed that a purely quantitative comparable transaction analysis would not be particularly meaningful in the context of the merger. Lehman Brothers believed that the appropriate use of the Comparable Transaction Analysis required qualitative judgments concerning the differences between the characteristics of these transactions and the merger which would affect the acquisition values of the acquired companies and Titan.

Using mean and median multiples as a general guide, Lehman Brothers applied a range of multiples to Titan's 2005 estimated EBITDA which it believed reflected the theoretical transaction multiples for Titan on a full change in control basis. Based on this range of multiples, the analysis indicates a range of equity values per share of $17.70 to $22.35. Lehman Brothers also noted the original purchase price of $22.00 per share offered by Lockheed Martin to Titan in September 2003 and the subsequently revised Lockheed Martin offer price of $20.00.

Discounted Cash Flow Analysis. Lehman Brothers performed a Discounted Cash Flow Analysis based on the projected financial information of Titan provided by its management for 2005-2009, and extrapolated financial information developed by Lehman Brothers in collaboration with, and approved by, Titan's management for years 2010-2014. Lehman Brothers discounted to present (August 31, 2005, an estimated closing date for the merger) value the projected standalone unlevered, after-tax free cash flow for the remaining portion of fiscal year 2005 and for fiscal years 2006 through 2014. To estimate the residual value of Titan at the end of the forecast period, or terminal value, Lehman Brothers applied EBITDA terminal value multiples of 7.0x, 8.0x and 9.0x to projected fiscal year 2014 EBITDA. These terminal multiples implied perpetuity growth rates of 1.5% - 3.3%.

Lehman Brothers used after-tax discount rates of 11.25% to 12.00% to calculate the present value of the cash flows and terminal values. This range was based on an analysis of Titan's weighted average cost of capital over the projection period.

Based on these discount rates and the selected range of terminal values, Lehman Brothers calculated the implied equity value per Titan share at approximately $18.76 to $24.58. Using the middle of the discount rate range (11.50% - 11.75%), which Lehman Brothers estimated to be most indicative of Titan's weighted average cost of capital over such period, the implied equity value was between $19.20 and $24.05.

Premiums Paid Analysis. Lehman Brothers compared the premium proposed to be paid in the merger with premiums paid in mergers and acquisitions transactions for domestic companies in the industrial sector that were announced or completed between October 18, 2001 and May 20, 2005 with transaction values greater than $250 million. Lehman Brothers calculated the premium per share paid by the acquirer compared to the share price of the target company prevailing (i) one day, (ii) one week and (iii) four weeks prior to the announcement of the transaction.

Based on the analysis, Lehman Brothers applied a premium range of 20% to 25% to Titan's average stock price for the 30 trading days ending on May 17, 2005, which yielded an implied equity value per share range of $21.58 to $22.48.

Leveraged Buyout Analysis. Lehman Brothers performed a leveraged buyout analysis to determine the potential implied equity value per share of Titan common stock that might be achieved in an acquisition of Titan in a leveraged buyout transaction based on current market conditions. In conducting this analysis, Lehman Brothers assumed EBITDA terminal value multiples of 8.0x, 9.0x and 10.0x and assumed that acquisition financing could be obtained in the high yield market and bank finance markets in an amount not in excess of 5.0x estimated August 31, 2005 LTM EBITDA. Lehman Brothers assumed that a minimum internal rate of return ranging from 25% to 30% on equity invested during a five-year period would be required by an acquirer. This analysis resulted in a range of equity values of Titan of $13.80 to $15.80 per share.

General. In connection with the review of the merger by the Titan board of directors, Lehman Brothers performed a variety of financial and comparative analyses for purposes of rendering its opinion. The above summary of these analyses does not purport to be a complete description of the analyses performed by Lehman Brothers in arriving at its opinion. The preparation of a fairness opinion is a complex process and is not necessarily conducive to partial analysis or summary description. In arriving at its opinion, Lehman Brothers considered the results of all of its analyses as a whole and did not attribute any particular weight to any analysis or factor considered by it. Furthermore, Lehman Brothers believes that the summary provided and the analyses described above must be considered as a whole and that selecting any portion of its analyses, without considering all of them, would create an incomplete view of the process underlying its analysis and opinion. In addition, Lehman Brothers may have given various analyses and factors more or less weight than other analyses and factors and may have deemed various assumptions more or less probable than other assumptions, so that the ranges of valuations resulting from any particular analysis described above should not be taken to be Lehman Brothers' view of the actual value of Titan.

In performing its analyses, Lehman Brothers made numerous assumptions with respect to industry performance, general business and economic conditions and other matters, many of which are beyond the control of Lehman Brothers or Titan. Any estimates contained in the analyses of Lehman Brothers are not necessarily indicative of future results or actual values, which may be significantly more or less favorable than those suggested

by those estimates. The analyses performed were prepared solely as part of the analysis by Lehman Brothers of the fairness to Titan's stockholders of the consideration to be offered to those stockholders in the merger, from a financial point of view, and were prepared in connection with the delivery by Lehman Brothers of its opinion to the Titan board of directors. The analyses do not purport to be appraisals or to reflect the prices at which Titan's common stock might trade following announcement of the merger.

The consideration to be offered to Titan stockholders in the merger and other terms of the merger were determined through arms'-length negotiations between Titan and L-3 and were unanimously approved by the Titan board of directors. Lehman Brothers provided advice to Titan during those negotiations. However, Lehman Brothers did not recommend any specific price per share or other form of consideration to Titan or that any specific price per share or other form of consideration constituted the only appropriate consideration for the merger. The opinion of Lehman Brothers was one of many factors taken into consideration by the Titan board of directors in making its unanimous determination to approve the merger. The analysis of Lehman Brothers summarized above should not be viewed as determinative of the opinion of the Titan board of directors with respect to the value of Titan or of whether the Titan board of directors would have been willing to agree to a different price per share or other forms of consideration.

Lehman Brothers is an internationally recognized investment banking firm and, as part of its investment banking activities, is regularly engaged in the valuation of businesses and their securities in connection with mergers and acquisitions, negotiated underwritings, competitive bids, secondary distributions of listed and unlisted securities, private placements and valuations for corporate and other purposes. Titan's board of directors selected Lehman Brothers because of its expertise, reputation and familiarity with Titan and because its investment banking professionals have substantial experience in transactions comparable to the merger.

Lehman Brothers provides a full range of financial advisory and securities services. Lehman Brothers has performed various investment banking services for L-3 in the past and has received customary fees for such services. Titan understood and acknowledged that Lehman Brothers had performed such services for L-3 at the time Titan engaged Lehman Brothers with respect to the merger In the ordinary course of its business, Lehman Brothers actively trades in the debt and equity securities of Titan and L-3 for its own account and for the accounts of its customers and, accordingly, may at any time hold a long or short position in such securities. In addition, Lehman Brothers advised Titan that it has agreed to assist L-3 in financing the merger, including arranging necessary interim loans to L-3 and managing, as a joint bookrunner, L-3's proposed securities offerings, the proceeds of which are expected to be used to finance the merger, and Lehman Brothers expects to receive customary fees in connection with such assistance. Alan H. Washkowitz and Robert B. Millard, each of whom are Managing Directors of Lehman Brothers, serve in their individual capacities on the board of directors of L-3.

Pursuant to an engagement letter between Titan and Lehman Brothers, Titan agreed to pay a fee, a substantial portion of which is payable upon completion of the merger. Titan paid Lehman Brothers a fee of $1.0 million upon the delivery by Lehman Brothers of its opinion and has agreed to pay Lehman Brothers an additional fee of $8.7 million contingent on the closing of the merger. Titan also agreed to pay Lehman Brothers a fee of $250,000 upon the signing of the engagement letter that is fully creditable towards the fee payable on the closing of the merger. Titan also agreed to reimburse Lehman Brothers for reasonable out-of-pocket expenses incurred in connection with the engagement and to indemnify Lehman Brothers and its related parties from and against certain liabilities that may arise out of its engagement by Titan and the rendering of Lehman Brothers' opinion.

Appendix 2

Advisor Frequencies

Frequency distribution of fairness opinions provided by the top 30 advisory firms in negotiated mergers. Advisors are sorted in descending order by total number of opinions provided for targets from 1998 to 2005, as summarized in the "Advising Targets" column. When two or more advisors provide a single joint fairness opinion, each advisor is given credit 1/*n*, where *n* is the number of advisors providing the joint opinion.

	Advisor	Advising Targets		Advising Acquirers		Total Opinions	
1	Morgan Stanley	46.50	7.7%	18.50	10.5%	65.00	8.3%
2	Goldman Sachs	35.00	5.8%	14.33	8.1%	49.33	6.3%
3	Credit Suisse First Boston	31.50	5.2%	11.50	6.5%	43.00	5.5%
4	Salomon Smith Barney	28.50	4.7%	14.50	8.2%	43.00	5.5%
5	Merrill Lynch	24.00	4.0%	20.33	11.5%	44.33	5.7%
6	JP Morgan	22.33	3.7%	9.83	5.6%	32.16	4.1%
7	Lehman Brothers	19.00	3.1%	9.50	5.4%	28.50	3.6%
8	Bear Stearns	18.50	3.0%	3.00	1.7%	21.50	2.7%
9	U.S. Bancorp Piper Jaffray	17.00	2.8%	0.00	0.0%	17.00	2.2%
10	Lazard Freres & Co	16.33	2.7%	2.50	1.4%	18.83	2.4%
11	Houlihan Lokey Howard & Zufkin	15.00	2.5%	1.00	0.6%	16.00	2.0%
12	DLJ	14.50	2.4%	10.00	5.6%	24.50	3.1%
12	UBS	14.50	2.4%	3.50	2.0%	18.00	2.3%
14	Broadview International	14.00	2.3%	2.00	1.1%	16.00	2.0%
15	Cowen & Company	13.00	2.1%	0.00	0.0%	13.00	1.7%
16	CIBC Oppenheimer	11.00	1.8%	1.00	0.6%	12.00	1.5%
17	Deutsche Banc Alex Brown	9.00	1.5%	4.00	2.3%	13.00	1.7%
17	Raymond James & Associates	9.00	1.5%	0.00	0.0%	9.00	1.1%
19	Robertson Stephens	8.50	1.4%	3.00	1.7%	11.50	1.5%
20	Banc of America	8.00	1.3%	0.00	0.0%	8.00	1.0%
20	Chase H&Q	8.00	1.3%	2.00	1.1%	10.00	1.3%
22	Citigroup	7.00	1.2%	1.00	0.6%	8.00	1.0%
22	Jefferies & Co	7.00	1.2%	0.00	0.0%	7.00	0.9%
24	Dain Rauscher	6.00	1.0%	1.00	0.6%	7.00	0.9%
24	Needham & Company	6.00	1.0%	4.00	2.3%	10.00	1.3%
24	PaineWebber	6.00	1.0%	4.00	2.3%	10.00	1.3%
24	Wasserstein Perella	6.00	1.0%	1.50	0.8%	7.50	1.0%
28	Robert W. Baird	5.00	0.8%	1.00	0.6%	6.00	0.8%
28	Legg Mason	5.00	0.8%	1.00	0.6%	6.00	0.8%
28	Piper Jaffray	5.00	0.8%	0.00	0.0%	5.00	0.6%
28	Thomas Weisel Partners	5.00	0.8%	1.00	0.6%	6.00	0.8%
28	Warburg Dillon Read	5.00	0.8%	1.00	0.6%	6.00	0.8%

Table 1

Descriptive Statistics for Sample Mergers

Descriptive statistics on the fairness opinion merger sample, on a subsample comprised only of mergers containing joint proxy statements issued by acquirers and targets, and on the overall sample of U.S. public negotiated mergers in the SDC database. Each of these samples is comprised of negotiated mergers between public U.S. acquirers and targets from 1998 to 2005 in which the acquirer seeks to own 100% of target shares after merger completion. Both completed and withdrawn mergers are included. Financial firms are excluded. Acquirer and target market values are calculated as common shares outstanding times price per share three days prior to merger announcement. Initial offer premium, premium at proxy mailing date, and final offer premium are premia of prevailing offer price on announcement, at date of proxy statement mailing, and merger effective/withdrawn date, respectively, over target's trading price one day prior to merger announcement.

($'s in millions)	**Mean**	**St. Dev.**	**Min**	**Median**	**Max**
Fairness Opinion Merger Sample					
Transaction Value	$2,496.7	$8,578.4	$0.6	$280.8	$113,643.8
Acquirer Market Value	$24,542.7	$58,853.1	$7.8	$2,916.2	$517,357.4
Target Market Value	$1,898.5	$6,578.8	$1.5	$237.8	$67,226.8
Transaction / Acq. Mkt. Value	31.15%	46.33%	0.01%	10.49%	287.35%
Initial Offer Premium	36.18%	42.49%	-77.65%	27.27%	295.56%
Premium at Proxy Mailing Date	35.16%	39.31%	-78.26%	27.97%	295.56%
Final Offer Premium	35.80%	41.55%	-77.65%	27.78%	295.56%
Fairness Opinion Joint Proxy Subsample					
Transaction Value	$5,023.9	$13,135.1	$0.6	$829.9	$113,643.8
Acquirer Market Value	$8,011.0	$19,645.1	$18.9	$1,388.1	$141,369.3
Target Market Value	$3,693.3	$9,812.4	$7.3	$579.6	$67,226.8
Transaction / Acq. Mkt. Value	69.79%	54.54%	0.38%	58.33%	287.35%
Initial Offer Premium	33.80%	46.43%	-55.00%	23.58%	271.70%
Premium at Proxy Mailing Date	27.69%	33.90%	-55.00%	22.90%	216.57%
Final Offer Premium	32.23%	44.16%	-55.00%	23.39%	271.70%
SDC All Public Mergers					
Transaction Value	$2,025.9	$8,280.3	$0.001	$193.1	$164,746.9
Acquirer Market Value	$15,650.7	$45,177.0	$1.4	$1,681.8	$517,357.4
Target Market Value	$1,623.3	$6,023.3	$1.5	$212.0	$76,361.6
Transaction / Acq. Mkt. Value	42.87%	74.79%	0.00%	16.99%	1090.59%
Initial Offer Premium	35.90%	52.92%	-91.37%	25.40%	726.10%
Final Offer Premium	36.11%	55.10%	-91.37%	25.74%	726.10%

Table 2

Descriptive Statistics for Fairness Opinions

Summary of the number of observable fairness opinions provided by acquirer and target advisors for each transaction. Panel A provides the frequencies and percentages for the entire sample. Panel B reports the statistics for subsamples based on the type of proxy solicitation utilized in each merger: joint proxy issued by both target and acquirer vs. proxy issued only by target. Panel C summarizes the percentage of fair verdicts and percentage of fairness opinions provided to the board of directors prior to merger announcement dates. Panel D provides univariate statistics on fee structure between fairness opinion-providing financial advisors and their clients in negotiated mergers. Panel E summarizes the frequency with which advisors have disclosed business relationships with client firms. Previous business includes securities underwriting, prior M&A advisory services, or other investment banking services. Data are collected from firms' proxy statements filed with the SEC.

Panel A: Entire Sample

	Acquirer Opinions		**Target Opinions**	
Zero	416	71.5%	21	3.6%
One	146	25.1%	511	87.8%
Two	18	3.1%	46	7.9%
Three	2	0.3%	4	0.7%
	582	100.0%	582	100.0%

Panel B: By Proxy Solicitations

	Acquirer Opinions				**Target Opinions**			
Solicitation by:	Both (Joint)		Target Only		Both (Joint)		Target Only	
Zero	34	17.5%	382	98.5%	5	2.6%	16	4.1%
One	140	72.2%	6	1.6%	162	83.5%	349	90.0%
Two	18	9.3%	0	0.0%	25	12.9%	21	5.4%
Three	2	1.0%	0	0.0%	2	1.0%	2	0.5%
	194	100.0%	388	100.0%	194	100.0%	388	100.0%

Panel C: Opinion Verdicts and Dates

	Acquirer Opinions	**Target Opinions**
Verdict = "Fair"	100%	100%
Dated before Merger Announcement	88%	84%

Table 2, continued

Panel D: Fee structure

($'s in millions)	Mean	St. Dev.	Min	25%	Median	75%	Max
All Advisors Fee Structure							
Total Advisory Fees	$5.58	$7.61	$0.02	$0.80	$3.00	$7.40	$62.00
Fairness Opinion Fees	$0.79	$1.33	$0.00	$0.20	$0.40	$0.75	$10.00
Opinion Fees / Total Fees*	46%	37%	0%	15%	30%	100%	100%
Acquirer-Advisors Fee Structure							
Total Advisory Fees	$6.14	$6.91	$0.05	$1.30	$3.86	$9.80	$36.44
Fairness Opinion Fees	$1.00	$1.35	$0.00	$0.25	$0.50	$1.00	$7.50
Opinion Fees / Total Fees*	52%	38%	0%	18%	38%	100%	100%
Target-Advisors Fee Structure							
Total Advisory Fees	$5.43	$7.80	$0.02	$0.75	$2.88	$6.98	$62.00
Fairness Opinion Fees	$0.74	$1.32	$0.00	$0.18	$0.35	$0.75	$10.00
Opinion Fees / Total Fees*	44%	36%	0%	15%	27%	100%	100%
Target Advisors Fee Structure (Joint Proxies Only)							
Total Advisory Fees	$8.18	$10.34	$0.08	$1.59	$4.36	$10.00	$62.00
Fairness Opinion Fees	$1.16	$1.79	$0.00	$0.25	$0.50	$1.25	$10.00
Opinion Fees / Total Fees*	41%	33%	0%	17%	26%	59%	100%

Other Advisory Fee Type	Acquirer Advisors		Target Advisors	
Percentage Fee	25	15.7%	189	33.1%
Success Fee	100	62.9%	282	49.2%
All Contingent Fees	125	78.6%	471	82.2%
Flat Fee	9	5.7%	19	3.3%
No Other Fees	25	15.7%	83	14.5%
	159	100.0%	573	100.0%

* Does not include firms for which opinions fees are not separately disclosed.

Table 2, continued

Panel E: Advisors' relationships with clients

	Acquirer Advisors		Target Advisors	
Advisory Relationships				
Provides Financing	14	8.0%	11	1.8%
Prev. Lending Relationship	21	12.0%	67	11.1%
No Related Financing	140	80.0%	525	87.1%
	175	100.0%	603	100.0%
Prev. Business w/ Target	7	4.0%	178	29.5%
Prev. Business w/ Acquirer	79	45.1%	37	6.1%
Prev. Business w/ Both	50	28.6%	174	28.9%
No Prev. Relationship	39	22.3%	214	35.5%
	175	100.0%	603	100.0%
First vs. Second Advisors: Any Prev. Business (PB)				
One advisor, has no PB	35	21.6%	188	34.0%
One advisor, has any PB	117	72.2%	323	58.4%
Two advisors, neither have any PB	0	0.0%	3	0.5%
Two advisors, one has any PB	2	1.2%	14	2.5%
Two advisors, both have any PB	8	4.9%	25	4.5%
	162	100.0%	553	100.0%

Table 3

Fairness Opinion Valuation Data

Univariate statistics on the range of high minus low target valuation prices per share for various valuation techniques, as concluded by target and acquirer advisors. Statistics on this difference as a percentage of the offer price are also reported. Sample includes 177 opinions provided to acquirers and 607 opinions provided to targets, and includes multiple opinions provided to the same acquirer or target, in a total of 582 negotiated merger transactions. The "average" for a given firm is calculated by averaging the valuation ranges across all methods reported by the advisor. The distribution across all firm-observations is reported below.

$ difference high – low price per share	**N**	**Mean**	**St. Dev.**	**Min**	**25th %**	**Median**	**75th %**	**Max**
Acquirer-Sought								
Average	152	$16.38	$20.36	$0.00	$5.44	$9.92	$20.15	$175.50
Disc. Cash Flows	121	$16.61	$16.35	$0.00	$6.49	$11.94	$21.86	$105.00
Trans. Multiples	66	$13.47	$21.51	$0.00	$4.72	$8.70	$13.65	$125.09
Trans. Premia	48	$12.06	$20.42	$0.22	$1.76	$4.42	$13.31	$126.00
Public Firm Multiples	91	$17.37	$30.16	$0.00	$4.60	$8.07	$16.00	$225.00
Net Asset Valuation	10	$7.00	$5.58	$1.17	$2.44	$6.71	$9.12	$19.26
Sum of Parts	9	$12.95	$7.85	$5.00	$7.00	$11.00	$21.24	$25.25
Target-Sought								
Average	541	$10.83	$15.09	$0.00	$3.12	$6.53	$13.00	$207.71
Disc. Cash Flows	436	$9.22	$8.75	$0.00	$3.04	$6.45	$12.93	$50.17
Trans. Multiples	289	$11.12	$19.78	$0.00	$2.60	$6.50	$12.00	$241.56
Trans. Premia	215	$11.94	$17.08	$0.03	$2.02	$5.24	$12.74	$93.32
Public Firm Multiples	318	$11.49	$23.51	$0.00	$2.51	$6.00	$13.12	$324.64
Net Asset Valuation	19	$4.06	$5.21	$0.00	$0.64	$2.64	$4.64	$22.69
Sum of Parts	21	$11.16	$7.95	$1.70	$4.00	$10.38	$17.00	$29.00

Difference as % of offer price	**N**	**Mean**	**St. Dev.**	**Min**	**25th %**	**Median**	**75th %**	**Max**
Acquirer-Sought Avg	152	76.0%	98.4%	0.0%	26.7%	48.3%	85.4%	820.9%
Target-Sought Avg	541	59.9%	137.1%	0.0%	22.9%	36.0%	58.7%	2,461.7%
Target-Sought Avg (Joint Proxies Only)	197	57.0%	125.8%	0.0%	21.6%	35.4%	53.5%	1,699.1%

Table 4

Acquirer-Sought vs. Target-Sought Valuations

Panel A summarizes the percentage difference between acquirer-sought valuations and target-sought valuations, when both advisors perform the same type of valuation method on target firms. The percentage difference for each type of valuation method indicated is calculated as: (acquirer-sought valuation midpoint minus target-sought valuation midpoint) / target-sought valuation midpoint. When more than one advisor is hired by the acquirer or target, average valuations are used to calculate midpoints in Panel A. Panel B reports univariate statistics on acquirer and target advisor valuation midpoints as a percentage of initial offer prices, for all transactions, and for matched transactions in which both acquirer and target advisors provide fairness opinion valuations. P-values are from t-tests of difference of means from zero and Wilcoxon signed-rank tests of difference of medians from zero.

Panel A: Percentage difference of acquirer-sought over matched target-sought valuation midpoints

	N	Mean	St. Dev.	p-value	Median	p-value	% Positive
Average	132	29.19%	49.39%	0.000	13.40%	0.000	78.8%
Disc. Cash Flows	93	30.16%	53.66%	0.000	16.45%	0.000	79.6%
Trans. Multiples	40	26.83%	72.15%	0.024	10.47%	0.003	70.0%
Trans. Premia	19	27.14%	46.52%	0.020	11.16%	0.010	79.0%
Public Firm Multiples	51	37.30%	86.85%	0.004	13.48%	0.000	80.4%

Panel B: Advisor valuation premia over initial offer prices

	N	Mean	St. Dev.	p-value	Median	p-value	% Positive
All transactions							
Acquirer Advisors	152	19.56%	50.68%	0.000	7.66%	0.000	69.1%
Target Advisors	541	-1.60%	68.26%	0.587	-7.57%	0.000	32.0%
Target Advisors (Joint Proxies Only)	197	-1.80%	59.84%	0.673	-6.93%	0.000	35.5%
Matched transactions							
Acquirer Advisors	132	19.87%	53.53%	0.000	6.98%	0.000	69.7%
Target Advisors	132	0.98%	70.96%	0.874	-8.60%	0.000	34.9%

Table 5

Valuation Errors

Sample medians of predicted wealth changes, actual wealth changes, and prediction errors for acquirer's equity. *Predicted Change* is given in equation (1) of the paper:

$$(target\ valuation - offer\ price) * (target\ shares - \ toehold) + (target\ valuation - target\ price_{t=-3}) * toehold$$

Actual Change is acquirer shares outstanding times acquirer price three days prior to merger announcement times cumulative abnormal return (CAR). CAR is measured from two days before merger announcement through merger effective date, and is calculated using the Fama-French (1993) 3-factor model. *Raw Error* is predicted wealth change minus actual wealth change. *Scaled Error* (i.e., median valuation error) is the raw error divided by transaction value, then winsorized at the 5% and 95% tails. |*Scaled Error*| is the absolute value of scaled error. Means are in [ ], medians are in { }, and p-values from Wilcoxon signed-rank tests are given in ( ).

	N	Predicted Change *($MM)*	Actual Change *($MM)*	Raw Error *($MM)*	Scaled Error	| Scaled Error |
Panel A: All transactions						
Acquirer Advisors	74	[$193.7]	[$726.9]	[-$533.2]	[9.1%]	[41.3%]
		{$17.7}	{-$20.4}	{$34.9}	{7.4%}	{23.1%}
				(0.172)	(0.074)	
Target Advisors	359	[-$158.2]	[$179.0]	[-$337.2]	[-19.5%]	[374.4%]
		{-$12.0}	{$22.2}	{-$34.9}	{-14.9%}	{101.3%}
				(0.020)	(0.072)	
Target Advisors (Joint Proxies Only)	99	[-$191.5]	[$257.2]	[-$448.7]	[2.8%]	[105.8%]
		{-$33.0}	{-$18.7}	{-$11.0}	{-1.1%}	{32.6%}
				(0.279)	(0.577)	
Panel B: Matched transactions						
Acquirer Advisors	67	[$187.0]	[$970.4]	[-$783.4]	[7.0%]	[42.4%]
		{$19.4}	{-$18.7}	{$17.1}	{5.3%}	{28.7%}
				(0.536)	(0.209)	
Target Advisors	67	[-$248.2]	[$970.4]	[-$1,218.7]	[-6.9%]	[37.5%]
		{-$33.0}	{-$18.7}	{$1.6}	{1.4%}	{28.1%}
				(0.156)	(0.480)	
Difference	67			[$435.2]	[13.9%]	[4.9%]
				{$82.9}	{8.5%}	{-0.0%}
				(0.000)	(0.000)	(0.410)

Panel C: Matched transactions – distribution of scaled error

	N	Mean	Min	25th %	75th %	Max
Acquirer Advisors	67	7.0%	-124.0%	-17.2%	36.9%	125.2%
Target Advisors	67	-6.9%	-132.5%	-30.5%	23.9%	68.5%

Table 6

Investment Bank Characteristics and Valuation Accuracy

Univariate sortings of investment banks' median valuation errors in Panel A, and median absolute valuation errors in Panel B. The construction of these errors is explained in Table 5. In the Fee Structure sorting, advisors in the "Contingent Fees" column are paid additional fees contingent on merger success, and columns (3) and (4) are subgroups of the "No Contingent Fees" group in column (2). The Advisory Relationships sorting is based on whether advisors have previous business experience with the acquirer ("PB-Acq"), target ("PB-Tar"), both ("PB-Both"), or neither ("No PB"). Advisor Rank is based on the number of target-side fairness opinions provided by investment banks from 1998 to 2005, as explained in Appendix 2. "Top-Tier" is top ten advisory firms by rank. P-values from Wilcoxon signed-ranks tests are given in parentheses; p-values from Wilcoxon rank-sum tests on unmatched data are in brackets.

Panel A: Valuation errors

	(1)	(2)	(3)	(4)				
Fee Structure	**Contingent Fees**	**No Contingent Fees**	**Flat M&A Advisory Fees**	**No Other Fees**	**Difference (1) – (2)**	**Difference (1) – (3)**	**Difference (1) – (4)**	**Difference (3) – (4)**
Acquirer Advisors	6.0%	18.5%	-16.0%	28.7%	-12.5%	22.0%	-22.7%	-44.7%
Valuation Error	(0.172)	(0.272)	(0.893)	(0.173)	[0.554]	[0.764]	[0.326]	[0.549]
Target Advisors	-11.9%	-28.9%	-89.8%	-18.2%	17.0%	77.9%	6.3%	-71.6%
Valuation Error	(0.445)	(0.295)	(0.383)	(0.547)	[0.263]	[0.096]	[0.676]	[0.202]

Advisory Relationships	**PB-Acq**	**PB-Tar**	**PB-Both**	**No PB**	**Difference (3) – (4)**	**Difference (1) – (4)**	**Difference (2) – (4)**	**Difference (1) – (2)**
Acquirer Advisors	20.8%	18.3%	-4.5%	9.1%	-13.6%	11.7%	9.2%	2.5%
Valuation Error	(0.161)	(0.225)	(0.741)	(0.212)	[0.282]	[0.964]	[0.760]	[0.594]
Target Advisors	-14.2%	-19.1%	-15.6%	4.5%	-20.1%	-18.7%	-23.6%	4.9%
Valuation Error	(0.567)	(0.030)	(0.099)	(0.343)	[0.158]	[0.923]	[0.058]	[0.383]

Advisor Rank	**Lower-Tiers**	**Top-Tier**	**Difference (1) – (2)**
Acquirer Advisors	25.2%	5.6%	19.6%
Valuation Error	(0.033)	(0.726)	[0.044]
Target Advisors	-11.9%	-17.5%	5.6%
Valuation Error	(0.770)	(0.046)	[0.750]

Table 6, continued

Panel B: Absolute valuation errors

	(1)	(2)	(3)	(4)				
Fee Structure	**Contingent Fees**	**No Contingent Fees**	**Flat M&A Advisory Fees**	**No Other Fees**	**Difference (1) – (2)**	**Difference (1) – (3)**	**Difference (1) – (4)**	**Difference (3) – (4)**
Acquirer Advisors	21.1%	34.7%	67.7%	32.5%	-13.6%	-46.6%	-11.4%	35.2%
Valuation Error					[0.295]	[0.182]	[0.694]	[0.739]
Target Advisors	91.1%	169.9%	379.0%	145.1%	-78.8%	-287.9%	-54.0%	233.9%
Valuation Error					[0.073]	[0.051]	[0.277]	[0.153]
Advisory Relationships	**PB-Acq**	**PB-Tar**	**PB-Both**	**No PB**	**Difference (3) – (4)**	**Difference (1) – (4)**	**Difference (2) – (4)**	**Difference (1) – (2)**
Acquirer Advisors	41.9%	18.3%	15.0%	36.9%	-21.9%	5.0%	-18.6%	23.6%
Valuation Error					[0.070]	[0.698]	[0.040]	[0.021]
Target Advisors	159.0%	77.2%	89.2%	124.8%	-35.6%	34.2%	-47.6%	81.8%
Valuation Error					[0.020]	[0.368]	[0.062]	[0.034]
Advisor Rank	**Lower-Tiers**	**Top-Tier**			**Difference (1) – (2)**			
Acquirer Advisors	37.1%	17.0%			20.1%			
Valuation Error					[0.018]			
Target Advisors	158.8%	73.6%			85.2%			
Valuation Error					[0.000]			

Table 7

Fairness Opinion Valuations and the Stock Price Reaction to Merger Announcements

Panel A summarizes acquirer cumulative abnormal returns (CARs) around merger announcements with an event window of (-2,+2). The CRSP equal-weighted index is used to form market-adjusted CARs. Panel B presents OLS regressions in which the dependent variable is acquirer announcement CARs. *Target Size* is log transaction value, *Acquirer Size* is log market value of acquirer equity three days before merger announcement, and *Relative Size* is the ratio of target to acquirer market value of equity. *Target Tobin's q* is the ratio of market value of a target, measured as book value of total assets less book value of equity plus market value of equity, to the book value of its total assets. *All Equity Payment* is a dummy variable that equals one if the merger consideration is all stock, and zero otherwise. *FO Valuation* is the implied premium of advisors' valuations over initial offer price at merger announcement date. *Price Variance* is the variance of advisors' valuation prices, where each price is scaled by the advisors' average valuation. *Prev. Business* is the sum of indicator variables that equal one if a given advisor has a pre-existing relationship with the target, acquirer, or both, and zero otherwise. *Independent Advisor* is the sum of indicator variables that equal one if a given advisor is paid fees only for providing a fairness opinion in the transaction, and zero otherwise. *Top-tier Advisor* is a variable that equals one if one of the advisor(s) is among the top ten most frequent providers of fairness opinions in the sample, as summarized in Appendix 2. Standard errors are adjusted for heteroskedasticity and clustering of observations at the acquiring firm level, and p-values are reported in parentheses below the coefficient estimates. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Acquirer Announcement-Period CARs

	N	Mean	St. Dev.	25th %	Median	75th %
Transactions with acquirer-sought opinion(s)	86	-4.19% ***	11.39%	-9.49%	-3.26%	1.65%
Transactions with target-sought opinion(s)	398	-0.58%	9.55%	-4.56%	-0.79%	3.30%
Transactions with both acquirer-sought and target-sought opinion(s)	82	-4.33% ***	11.40%	-9.49%	-3.27%	1.41%

Table 7, continued

Panel B: OLS Regressions	**Acquirer Advisors**				**Target Advisors**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	-0.120 **	-0.121 *	-0.097	-0.101	0.031	0.044 *	0.048 *	0.046 *
	(0.047)	(0.058)	(0.121)	(0.137)	(0.136)	(0.072)	(0.062)	(0.090)
Target Size	-0.042	-0.054	-0.054	-0.054	-0.013 ***	-0.012 ***	-0.013 ***	-0.013 ***
	(0.252)	(0.106)	(0.124)	(0.170)	(0.001)	(0.002)	(0.002)	(0.005)
Acquirer Size	0.049	0.061 *	0.059 *	0.059	0.006 **	0.004 *	0.004	0.004
	(0.199)	(0.083)	(0.099)	(0.127)	(0.025)	(0.088)	(0.181)	(0.121)
Relative Size	0.021	0.009	-0.003	-0.008	-0.022	-0.027	-0.032	-0.029
	(0.633)	(0.827)	(0.946)	(0.875)	(0.458)	(0.337)	(0.248)	(0.284)
Target Tobin's q	-0.001	-0.000	0.001	0.000	-0.000	-0.000	-0.000	-0.000
	(0.854)	(0.970)	(0.888)	(0.931)	(0.234)	(0.186)	(0.229)	(0.160)
All Equity Payment	-0.022	-0.034	-0.047	-0.052	-0.004	-0.003	-0.003	-0.006
	(0.528)	(0.394)	(0.279)	(0.229)	(0.759)	(0.837)	(0.862)	(0.716)
FO Valuation	0.059 ***	-0.023	-0.126	-0.074	-0.010	0.023 **	0.030 **	0.034 ***
	(0.009)	(0.737)	(0.299)	(0.532)	(0.343)	(0.042)	(0.034)	(0.001)
Price Variance		-0.000	0.025	0.015		-0.017	-0.015	-0.014
		(0.998)	(0.701)	(0.806)		(0.381)	(0.442)	(0.468)
FO Valuation * Price Variance		-0.011	-0.021	-0.025		-0.013 **	-0.016 **	-0.018 ***
		(0.831)	(0.719)	(0.713)		(0.011)	(0.022)	(0.001)
FO Valuation * Relative Size		0.309	0.406	0.520 *		0.108	0.127	0.166 *
		(0.181)	(0.160)	(0.054)		(0.274)	(0.262)	(0.080)
Prev. Business w/ Acquirer			-0.014				0.008	
			(0.699)				(0.483)	
Prev. Business w/ Target			-0.015				0.009	
			(0.700)				(0.534)	
Prev. Business w/ Both			0.032				-0.010	
			(0.447)				(0.624)	
FO Valuation * PB Acquirer			0.089				-0.064	
			(0.301)				(0.304)	
FO Valuation * PB Target			-0.276 *				0.019	
			(0.082)				(0.821)	
FO Valuation * PB Both			0.381 **				0.012	
			(0.019)				(0.909)	
Independent Advisor				0.006				-0.010
				(0.873)				(0.585)
FO Valuation * Independent				-0.141				-0.129 *
				(0.219)				(0.052)
Top-tier Advisor				-0.002				0.017
				(0.970)				(0.312)
FO Valuation * Top-tier				0.084				-0.020
				(0.403)				(0.793)
N	79	79	79	74	355	355	354	336
R^2	14.42%	18.81%	23.23%	26.61%	6.73%	9.53%	10.22%	11.86%

Table 8

Fairness Opinion Valuations and CARs around Proxy Mailing Dates

Panel A summarizes acquirer cumulative abnormal returns (CARs) around proxy statement mailing dates with an event window of (-2,+2). The CRSP equal-weighted index is used to form market-adjusted CARs. Panel B presents OLS regressions in which the dependent variable is acquirer proxy mailing date CARs. *Target Size* is log transaction value, *Acquirer Size* is log market value of acquirer equity three days before merger announcement, and *Relative Size* is the ratio of target to acquirer market value of equity. *Target Tobin's q* is the ratio of market value of a target, measured as book value of total assets less book value of equity plus market value of equity, to the book value of its total assets. *FO Valuation* is the implied premium of advisors' valuations over prevailing offer price at proxy statement date. *Price Variance* is the variance of advisors' valuation prices, where each price is scaled by the advisors' average valuation. *Prev. Business* is the sum of indicator variables that equal one if a given advisor has a pre-existing relationship with the target, acquirer, or both, and zero otherwise. *Independent Advisor* is the sum of indicator variables that equal one if a given advisor is paid fees only for providing a fairness opinion in the transaction, and zero otherwise. *Top-tier Advisor* a dummy variable that equals one if one of the advisor(s) is among the top ten most frequent providers of fairness opinions in the sample, as summarized in Appendix 2. Standard errors are adjusted for heteroskedasticity and clustering of observations at the acquiring firm level, and p-values are reported in parentheses below the coefficient estimates. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Acquirer Proxy Mailing-Period CARs

	N	Mean	St. Dev.	25th %	Median	75th %
Transactions with acquirer-sought opinion(s)	83	-0.49%	11.83%	-4.68%	-1.70%	2.35%
Transactions with target-sought opinion(s)	387	-0.32%	8.02%	-3.32%	-0.58%	2.35%
Transactions with both acquirer-sought and target-sought opinion(s)	79	-0.71%	12.05%	-4.78%	-2.05%	2.29%

Table 8, continued

Panel B: OLS Regressions	**Acquirer Advisors**				**Target Advisors**			
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Intercept	-0.048	-0.046	-0.065	-0.073	-0.014	-0.003	0.001	0.002
	(0.324)	(0.345)	(0.228)	(0.152)	(0.394)	(0.860)	(0.936)	(0.935)
Target Size	0.015	0.020	0.022	0.012	0.000	-0.001	-0.001	-0.002
	(0.476)	(0.426)	(0.390)	(0.698)	(0.948)	(0.872)	(0.829)	(0.500)
Acquirer Size	-0.007	-0.011	-0.012	-0.001	0.000	0.000	0.000	-0.000
	(0.769)	(0.664)	(0.655)	(0.976)	(0.911)	(0.995)	(0.966)	(0.931)
Relative Size	-0.013	-0.011	-0.008	0.001	0.023	0.023	0.026	0.023
	(0.714)	(0.763)	(0.848)	(0.986)	(0.262)	(0.264)	(0.199)	(0.288)
Target Tobin's q	-0.004 ***	-0.004 ***	-0.005 **	-0.005 **	0.000	0.000	0.000	0.000
	(0.005)	(0.008)	(0.012)	(0.024)	(0.773)	(0.743)	(0.714)	(0.542)
FO Valuation	0.010	0.062	0.086	0.084	-0.001	0.014 *	0.025 ***	0.016 **
	(0.701)	(0.314)	(0.322)	(0.296)	(0.900)	(0.056)	(0.001)	(0.048)
Price Variance		-0.013	-0.006	-0.015		-0.015	-0.016	-0.015
		(0.844)	(0.933)	(0.826)		(0.323)	(0.312)	(0.347)
FO Valuation * Price Variance		-0.018	-0.028	-0.038		-0.002	-0.007 *	-0.003
		(0.752)	(0.691)	(0.602)		(0.424)	(0.063)	(0.363)
FO Valuation * Relative Size		-0.094	-0.100	-0.061		-0.069	-0.004	-0.053
		(0.393)	(0.520)	(0.587)		(0.207)	(0.951)	(0.426)
Prev. Business w/ Acquirer			0.025				-0.004	
			(0.212)				(0.678)	
Prev. Business w/ Target			-0.006				-0.014 *	
			(0.833)				(0.087)	
Prev. Business w/ Both			-0.014				0.018	
			(0.652)				(0.183)	
FO Valuation * PB Acquirer			-0.032				-0.109 **	
			(0.598)				(0.032)	
FO Valuation * PB Target			-0.112				-0.049	
			(0.562)				(0.273)	
FO Valuation * PB Both			0.113				0.129 *	
			(0.622)				(0.069)	
Independent Advisor				0.014				0.006
				(0.576)				(0.657)
FO Valuation * Independent				-0.150 ***				0.003
				(0.002)				(0.931)
Top-tier Advisor				-0.010				0.017 *
				(0.740)				(0.059)
FO Valuation * Top-tier				0.010				-0.026
				(0.864)				(0.469)
N	76	76	76	71	346	346	345	327
R^2	9.03%	10.75%	13.38%	18.58%	1.08%	3.45%	5.39%	5.73%

Figure 1. Timeline

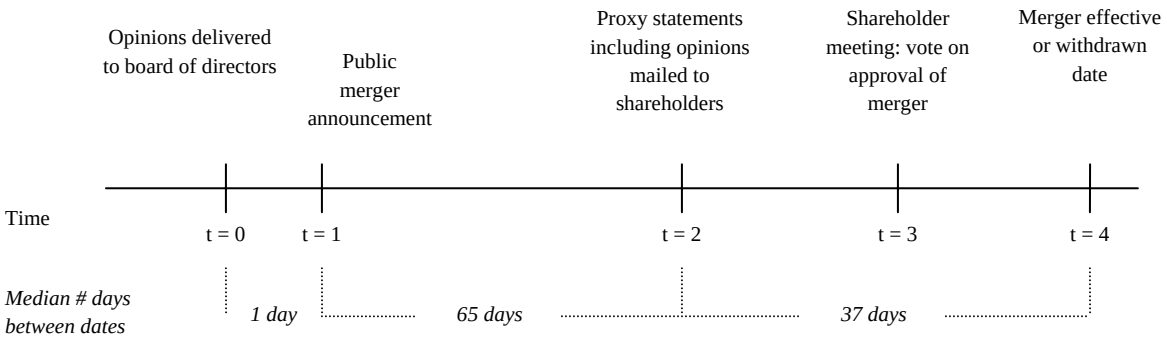

Figure 2. Valuations Relative to Offer Price

Median valuation midpoint premium over initial offer price. Valuations disclosed in fairness opinions issued by acquirer and target advisors. Only transactions with the matched valuation techniques employed by both acquirer and target advisors are included. If more than one advisor provides an opinion to the acquirer or target, the average valuation is used.