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Do Stock Analysts Influence Merger Completion? An Examination of Postmerger Announcement Recommendations

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This paper investigates the effects of analyst recommendations issued after a merger announcement on deal completion. We find the probability of completion increases (decreases) with the favorability of acquirer (target) recommendations. Results from instrumental variables tests support causality running from recommendations to merger outcomes. Additional tests suggest that these relations are driven by target shareholders reassessing the merger offer in response to movements in acquirer and target valuations. We also find that favorably recommended firms in a proposed merger underperform following deal resolution, suggesting that investors overreact to postmerger announcement recommendations.

Keywords: mergers; analysts; merger success; valuation

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1. Introduction

One of the most important questions in finance is how information generated by financial markets impacts real economic decisions. One potentially important source of such information is securities analysts, who collectively produced over 29,000 stock recommendations and 196,000 earnings forecasts in 2012 alone (Institutional Brokers' Estimate System (I/B/E/S)). Although these published opinions have been shown to move stock prices, their impact on corporate decisions and hence their real economic consequences remain largely unexplored.¹

This paper studies the impact of analysts on an important set of real decisions: whether companies complete announced mergers. Although most announced deals are ultimately completed, a substantial minority are terminated prior to conclusion by either the acquirer or target. After a merger is announced, stockholders and managers of acquirers and targets may continue to learn about the desirability of the transaction as new information arrives. Stock analysts, who continue to issue recommendations on

firms after they announce their intention to merge, are a potentially important source of such information. As analysts specialize in interpreting complex, value-relevant information, these postmerger announcement recommendations (PMARs) are likely to resonate with the parties involved. We analyze the relation between these recommendations and merger outcomes (completion versus termination).

Our analysis focuses on announced mergers involving publicly traded U.S. firms from 1993 to 2008. We begin by exploring the relation between PMAR favorability and merger outcomes. We define a PMAR as favorable (unfavorable) if it represents an upgrade (downgrade) relative to an analyst's previous recommendation or an initiation of coverage with a strong buy (hold, sell, or strong sell). Our main finding is that the probability of deal completion increases (decreases) with the number of favorable (unfavorable) acquirer PMARs and decreases (increases) with the number of favorable (unfavorable) target PMARs. Each additional favorable (unfavorable) PMAR on an acquirer's stock is associated with a 1.0%–1.1% increase (1.4%–1.9% decrease) in completion probability. Conversely, each additional favorable (unfavorable) target PMAR is associated

¹ Papers showing that recommendations move stock prices include those by Womack (1996), Barber et al. (2001), and Loh and Stulz (2011).

with a 1.2%–2.2% decrease (0.3%–1.7% increase) in completion probability. These magnitudes are substantial relative to the 14% unconditional probability of termination.

These results are open to multiple interpretations. On the one hand, they could indicate that PMARs impact merger completion decisions, revealing a previously undocumented channel through which analysts impact real economic outcomes. On the other hand, there are a number of other plausible interpretations of at least some of the relations we document based on omitted variables or reverse causality. We consider several of these explanations explicitly. Although ruling these alternative interpretations out is difficult because there is no truly exogenous variation in PMARs, we seek further evidence that causality runs from PMARs to merger completion using an instrumental variables (IV) approach. We employ two instruments for the number of favorable and unfavorable PMARs on a firm. The first is the percentage of favorable recommendations by analysts covering the acquirer or target on their other covered firms, excluding the acquirer or target. The second is the percentage of favorable recommendations issued by acquirer or target analysts' brokerage houses on all firms outside the industries of the merger parties. Merger outcomes continue to exhibit similar relations with recommendation favorability when we employ these instruments. We discuss the assumptions under which these instruments are valid and possible violations of these assumptions in detail.

We next explore two distinct, nonmutually exclusive, causal explanations for the relations we observe, which we term "feedback" and "valuation" explanations. The feedback explanation relates closely to arguments that firms treat financial market responses to their actions as feedback and recalibrate their actions accordingly (Bond et al. 2010). Managers and shareholders may treat favorable (unfavorable) PMARs on their own firm as positive (negative) signals of their expected benefits from a proposed transaction, increasing (decreasing) the likelihood of ultimately approving the deal. This leads to a positive predicted relation between merger completion probability and the favorability of both acquirer and target PMARs. This is consistent with our findings for acquirer PMARs but not for target PMARs. This does not imply that the feedback effect is invalid, but it suggests that if feedback affects merger outcomes, it does so by impacting acquirers' decisions to follow through on mergers.

The valuation explanation is based on the notion that the merger parties swap securities and that signals about the values of these securities affect the attractiveness of a proposed merger to each party. An increase in a target's perceived stand-alone value

makes a given offer less attractive to target shareholders but more attractive to the acquirer. In a merger where the acquirer pays target shareholders with a fixed number of its own shares (72% of the mergers in our sample), an increase in perceived acquirer value makes the offer more attractive to the target but less attractive to the acquirer. Although the parties can, in principle, undo the effects of valuation movements by renegotiating the number of shares to be exchanged, bargaining frictions may make such renegotiation costly. The valuation explanation then predicts a negative (positive) relation between a party's willingness to complete a deal and the favorability of PMARs on its own (the other party's) stock. Thus, the relation between PMARs and completion depends on whether they have a greater impact the acquirer's or target's value assessment. Our results are consistent with a valuation explanation based on the target rather than the acquirer being primarily influenced by PMARs.

We implement three tests to further evaluate each of the two explanations. In the first, we estimate a multinomial logistic model of merger outcomes where we treat termination by the acquirer and termination by the target as distinct outcomes. A target is less (more) likely to terminate a merger following favorable (unfavorable) acquirer PMARs and unfavorable (favorable) target PMARs. This is further evidence in support of a target-driven valuation explanation. The acquirer is also less likely to terminate following favorable acquirer PMARs, consistent with the feedback effect, though we observe no relation with the number of unfavorable acquirer PMARs.

In the second test, we examine offers including at least some acquirer stock ("stock offers") and those consisting only of cash ("cash offers") separately. The valuation explanation only leads to predictions about the relations between merger completion and acquirer PMARs in stock offers. The feedback explanation, however, should apply to both types of offers, as signals about merger gains to the acquirer provide feedback regardless of the consideration offered. We find that the positive relation between merger outcomes and acquirer PMAR favorability holds only in stock offers. This provides further support for the valuation explanation and is difficult to reconcile with the feedback explanation.

In the third test, we examine how the relation between merger outcomes and acquirer PMARs varies with a target's size relative to the acquirer. An analyst's recommendation on an acquirer should reflect her beliefs about the sum of the stand-alone value of the acquirer and the value of merger gains, relative to the acquirer's current stock price. Other things being equal, beliefs about merger gains should

play a bigger role in shaping an analyst's recommendation about an acquirer when the target is relatively larger. The feedback explanation predicts a stronger relation between acquirer PMARs and merger completion, at least as it pertains to the acquirer's decision to pursue the deal. Raising further doubts about the role of feedback, we find no evidence that relative size matters. Although not definitive, the results of these tests collectively provide support for the valuation explanation and little, if any, support for the feedback explanation.

Finally, we study the relation between postmerger resolution returns and PMAR favorability. Whereas PMARs may influence merger outcomes because they are informative about the fundamentals of the firms involved or expected merger gains, Rhodes-Kropf and Viswanathan (2004) and Edmans et al. (2012) present evidence that even nonfundamental components of value can impact merger decisions.² Consistent with PMARs affecting merger outcomes at least partly through their impact on nonfundamental value, we find that acquirers with relatively favorable PMARs underperform those with unfavorable ones by 12% over the first two years after merger completion or termination. Targets with relatively unfavorable PMARs, however, outperform those with favorable ones by 37% over the first two years after termination (note that a target's stock ceases to trade after merger completion).

Our results support the claim that analyst recommendations have real consequences for merger outcomes. More recent papers tend to focus on the effects of analyst coverage (as opposed to the tenor of the recommendations) on real firm decisions. Doukas et al. (2008) document a positive relation between analyst coverage and firm investment, arguing that firms with more analyst coverage face fewer information asymmetries and therefore a lower cost of capital. Derrien and Kecskes (2013) document similar results using broker closures and mergers as exogenous sources of variation in analyst coverage. Degeorge et al. (2013) and Chen et al. (2015) show how analysts' preferences for certain types of corporate policies (e.g., investment, financing, payout, governance) influence the decisions of firms that they cover. He and Tian (2013) find that more analyst coverage results in less patenting and argue that this is driven by the pressure analysts exert on managers to focus on the short run. Ours is the first paper that we are aware of to examine the impact of analyst opinions on merger outcomes and to assess the real consequences of the favorability of analyst opinions.³

² Shleifer and Vishny (2003) study a theoretical model in which misvaluation drives merger decisions.

³ Bradshaw et al. (2006) show that decisions to issue equity and repurchase shares are related to the optimism of analysts' forecasts

Our results also contribute to the literature connecting valuation and merger decisions. Edmans et al. (2012) show that a lower stock price increases the likelihood that a firm is acquired, using mutual fund redemptions to instrument for firm price. Rhodes-Kropf et al. (2005) find evidence that overvaluation of a firm's stock is an important driver of its decision to become an acquirer. These papers relate to the decision to pursue a merger. Our results suggest that information about firm values affects the decision to complete a proposed merger as well.

2. Data and Sample Selection

2.1. Merger Sample

To test an association between PMARs and deal completion, we create a set of completed and terminated U.S. mergers and tender offers.⁴ We collect all deals between 1993 and 2008 from Thomson/SDC Mergers and Acquisitions database (SDC), where both the acquirer and target are publicly traded. Because the Global Research Analyst Settlement (GRAS) was implemented in 2002, we exclude 407 deals announced or resolved in that year. GRAS, which was intended to address conflicts of interest within investment banks, resulted in numerous recommendation changes that likely had little to do with changes in analysts' perceptions of firm value.⁵

We also exclude non-U.S. and private acquirers or targets, divisions, divestitures, spin-offs, leveraged buyouts, liquidations, nonmerger observations (i.e., majority interest), unit trusts, real estate investment trusts, and American Depositary Receipts, and we retain only deals where the form was merger or acquisition. This yields an initial sample of 5,811 announcements. In transactions involving competing bids, analysis of a specific acquirer's takeover attempt is complicated by the possibility that a different

and recommendations. Bates et al. (2012) find that reductions in information asymmetries as a result of analyst coverage cause a positive relation between analyst coverage and cash holdings. However, the decisions studied in these papers are financial rather than real.

⁴ Tender offers constitute only 10% of the sample. Because most of transactions are mergers, we use the term "merger" to refer to all transactions in our sample (Officer 2003, Moeller et al. 2004).

⁵ Kadan et al. (2009) identify five days where at least one brokerage firm (for a total of eight firms) did a rescale. We identify at least 21 days in 2002 where the number of daily recommendation revisions by firms exceeded the mean of three by 10 standard deviations. Not all brokerage firms had mandatory GRAS transition dates; therefore, the migration to more conservative recommendations is difficult to pinpoint for many firms. We have verified that our results are qualitatively unchanged if we include these 407 mergers. Moreover, we split the sample into pre- and post-GRAS samples and obtain quantitatively similar results to our main analyses.

acquirer may take over the target. To be conservative, we eliminate 430 deals in which we observe multiple acquirers for the same target. Our final sample consists of 5,381 announced mergers, including 4,625 completed and 756 terminated deals.

From SDC we gather information on mergers, including the names, CUSIP numbers, ticker symbols, acquirer and target Standard Industrial Code (SIC) codes, deal form (merger or tender offer), merger outcome (completed or terminated), days to resolution, deal value, consideration offered, whether a collar offer is made, bid revisions, and the number and names of merger advisors and advisory fees. Because of the incompleteness of SDC data, we supplement information on merger status, deal value, collar type, announcement and resolution dates, consideration offered, termination reason, advisors, and fees using data from LexisNexis, Factiva, the Dow Jones Newswire, Security Exchange Commission (SEC) filings, and the Mergers and Acquisitions database. We attempt to match each acquirer and target to Center for Research in Security Prices (CRSP) and Compustat by CUSIP number first and then by ticker symbol. We verify the accuracy of matches by comparing company names, and if we are unable to obtain a match using CUSIP numbers or ticker symbols, we hand-match by company name. We are able to correctly match 5,034 acquirers and 4,649 targets. We obtain financial variables from Compustat and stock return data from CRSP. Although our initial tests rely on the full sample of 5,381 announced deals, we note our main analyses encompass 3,601 deals where all data are available for both acquirers and targets. Table 1 details merger characteristics.

Of the 5,381 announced mergers in our sample, 4,625 (86%) are ultimately completed and 756 (14%) are terminated. Of these 756 terminated deals, 168 (22%), 279 (37%), and 76 (10%) are terminated by acquirers, by targets, and for regulatory reasons, respectively.⁶ We are unable to assign the exact cause of termination for the remaining 233 terminated deals. In many of these cases, accounts indicate that the two sides came to a mutual agreement to terminate.

The acquirer offers at least some stock in 76% of transactions and all stock in 41% of transactions. The majority (95%) of offers including at least some stock have fixed exchange ratios (i.e., a certain number of acquirer shares for each share of a target's stock). The remaining 5% have fixed dollar amounts (i.e., a certain dollar amount of acquirer stock at prevailing prices for each share of the target's stock). Of the stock offers in our sample, 11% include collars that

Table 1 Descriptive Statistics: Merger Sample

	Full	Completed	Terminated
<i>N</i>			
Number of mergers	5,381	4,625	756
Pure cash financed	1,310	1,172	138
Pure stock financed	2,200	1,908	292
Tender offers	551	506	45
Cash tender offers	387	361	26
Fixed dollar amount	190	149	41
Bid revisions	260	218	42
Collared deal	431	404	27
Acquirer merger program	2,060	1,857	203
Horizontal mergers	1,778	1,552	226
Termination reason			
Acquirer			168
Target			279
Regulatory			76
Indeterminate			233
Average			
Days to resolution	130	132	116
Deal value (in millions \$)	1,153	1,126	1,352
Premium (%)	45.01	45.82	37.51
Acquirer run-up (%)	2.99	3.16	1.91
Target run-up (%)	6.23	6.71	3.19
Acquirer announcement return (%)	−0.84	−0.76	−1.36
Target announcement return (%)	19.07	19.83	14.24

Notes. The table provides descriptive data for our sample of public mergers announced and resolved between 1993 and 2008, excluding mergers in 2002. Merger variables, including method of payment, merger program, horizontal mergers, tender offers, cash tender offers, whether a fixed dollar amount is set, bid revisions, collars, merger window, deal value, premium, and returns, are presented. Hand-collected data on reasons for termination are also presented. Data are collected from SDC and SEC filings, as well as Factiva, LexisNexis, and the Dow Jones Newswire.

constrain the dollar value of the merger offer if the acquirer's stock price moves outside of preset bounds; 260 (5%) of the offers are revised at some point prior to resolution, although we note that bid revision data are likely to be underrepresented in SDC. In addition to merger offers, our sample includes 551 tender offers, representing about 10% of the transactions in the sample.⁷

The average transaction value is \$1.15 billion, and the acquirer offers an average premium of 45% relative to the target's price four weeks prior to announcement as reported by SDC. Consistent with prior studies (e.g., Betton et al. 2008), targets experience positive announcement returns (three-day cumulative abnormal returns (CARs)) of nearly 19%. On average, acquirers experience a negative 1% announcement return (*p*-value of 0.03), but there is a run-up in acquirer stock price of approximately 2% between 30 and 5 days prior to the deal announcement

⁶ As the regulatory terminations are unlikely to be related to analyst recommendation revisions, we remove these 76 transactions as a robustness check, and our results are qualitatively unchanged.

⁷ We obtain almost identical results throughout our analysis if we exclude offers with fixed dollar values, offers with collars, offers where the initial bid is revised, tender offers, and any combination of these cases.

(p -value of 0.01). On average, 130 days elapse between the merger announcement and resolution.

2.2. Analyst Recommendations

We obtain analyst recommendations from the I/B/E/S database (Thomson Financial) from 1993 to 2008 and retain a firm's CUSIP number, ticker symbol, name, brokerage house, analyst name, date of current and prior recommendations, and standardized current and prior recommendation codes (1 = strong buy, 2 = buy, 3 = hold, 4 = sell, and 5 = strong sell). As with the CRSP and Compustat data, we use CUSIP numbers, ticker symbols, and company names to match firms between SDC and I/B/E/S. We collect all recommendations on the firms involved from 50 days before the merger announcement through the resolution (completion or termination). Our main analyses focus on PMARs, which are all recommendations issued on either an acquirer or a target from the first day after an announcement (day 1) until resolution.

Since we are interested in how innovations to recommendations impact merger outcomes, we focus on recommendation changes (e.g., upgrades and downgrades) as well as initiations rather than recommendation levels. Upgrades (e.g., from hold to buy) and initiations with a strong buy are considered "favorable" recommendations, whereas downgrades (e.g., from hold to sell) and initiations with a hold, sell, or strong sell are "unfavorable" recommendations.⁸ Recommendations that do not fall into the standard ratings system are eliminated.

Of the 5,381 deals in our sample, 3,332 acquirers and 2,124 targets have at least one PMAR change or initiation. Table 2 details PMAR characteristics and three-day cumulative abnormal returns. In computing recommendation returns (only), we exclude PMARs for the first five days after a merger announcement to avoid contamination from returns associated with the deal itself.⁹ Preannouncement recommendations (issued 50 days to 1 day *before* a merger) are shown for comparison.

Recommendation changes are presented in panel A of Table 2, and initiations of coverage are presented in panel B. From the day after a merger announcement through its resolution, acquirers receive 3,670 upgrades, 3,398 downgrades, 1,128 favorable initiations, and 1,291 unfavorable initiations. Targets

receive 813 upgrades, 1,559 downgrades, 158 favorable initiations, and 378 unfavorable initiations.

Prior studies document analyst recommendations tend to move stock prices in general (Stickel 1995, Womack 1996, Barber et al. 2001). Since our study focuses on how PMARs affect merger outcomes through their impact on the valuations of the acquirer and target, it is important to note that these particular recommendations affect acquirer and target stock prices beyond the announcement effect. If recommendations were simply a response to a deal announcement, the information content and expected return should be low. Consistent with prior studies, we observe significantly positive returns for favorable PMAR changes (1.51% for acquirers and 0.55% for targets) and significantly negative returns for unfavorable ones (−2.89% for acquirers and −0.60% for targets). Similar results are obtained if we examine postmerger announcement (PMA) initiations (Table 2, panel B).¹⁰

Figure 1 displays the timing of PMARs relative to the announcement date both in absolute number of days (panel A) and as a percentage of days elapsed between the announcement and resolution (panel B).¹¹ There is a clear spike in both acquirer and target recommendations immediately after a merger announcement, regardless of the panel examined. Since a prospective deal has important implications for the firms involved, analysts are likely to reevaluate stocks shortly after announcement. We obtain similar figures if we exclude deals resolved within 20 days, suggesting that the patterns in Figure 1 are not driven by quickly resolved transactions.

To better understand the basis for PMARs, we analyze full-text research reports for firms involved in a randomly selected sample of approximately 300 deals from 1999 to 2008 from Thomson Reuters' Thomson ONE database.¹² We only examine the subset of deals where both acquirers and targets have analyst coverage and randomly draw 30 transactions per year. If a report on either merger party was unavailable between the announcement and resolution, the observation was replaced with another drawn from the same year, but not previously used. If multiple reports were available in the window, one was randomly

⁸ We exclude 1,487 initiations with a buy (Dunbar et al. 1999) and 1,644 reiterations (Barber et al. 2001) because their direction is ambiguous. Although GRAS was designed to shift the distribution of recommendations away from buy to hold, recommendations only partially adjusted, and for most of our sample, buys were implicitly considered to be hold recommendations (Kadan et al. 2009).

⁹ We obtain qualitatively similar results if we include these five days.

¹⁰ Although multilevel changes are less frequent than single-level revisions, they represent a considerable portion of all recommendation changes, and they generate a larger price response on average (i.e., acquirer returns for changes from strong buy to buy are −3.04% ($N = 936$) compared with −4.01% ($N = 731$) for strong buy to hold revisions and are significantly different at the 5% level).

¹¹ See Figure 2 in Malmendier et al. (2012) for a similar approach.

¹² Because of limited sample availability prior to 1999, we constrain our sampling window between 1999 and 2008. We further note that the sample is not truly random because we require that reports exist for both acquirers and targets.

Table 2 Acquirer and Target PMARs and Returns

Panel A: Recommendation revisions						
	Acquirer			Target		
	Upgrade	Reiteration	Downgrade	Upgrade	Reiteration	Downgrade
Preannouncement	2.09% ^a (1,204)	−0.01% (465)	−2.14% ^a (1,098)	3.27% ^a (519)	0.74% (209)	−4.15% ^a (617)
Postannouncement	1.51% ^a (3,670)	0.10% (1,240)	−2.89% ^a (3,398)	0.55% ^a (813)	−0.30% (404)	−0.60% ^a (1,559)
Panel B: Recommendation initiations						
	Acquirer			Target		
	Strong buy	Buy	Sell	Strong buy	Buy	Sell
Preannouncement	1.18% ^a (452)	0.47% (515)	−0.30% (475)	2.50% ^a (161)	5.88% (204)	−0.70% (193)
Postannouncement	1.12% ^a (1,128)	0.08% (1,302)	−0.44% ^a (1,291)	0.42% (158)	−0.07% (185)	−0.09% (378)

Notes. This table presents a summary of analyst recommendations and three-day cumulative abnormal returns for acquirers and targets. Panel A displays the recommendations returns and the total number of upgrades, reiterations, and downgrades (in parentheses) for acquirers and targets made prior to the merger announcement (−50 days to −1 day) and following the merger announcement (the 5th day through its resolution). Panel B provides the total number of strong buy, buy, and sell (including hold, sell, and strong sell initiations) for acquirers and targets over the same time periods as noted in panel A. Recommendation data are collected from I/B/E/S, announcement and resolution dates are collected from SDC, and returns are collected from CRSP.

^aIndicates significance at the 1% confidence level.

selected. Panel A of Appendix Table A.2 provides details on the reports.

Mergers are at least mentioned in 93% of the acquirer reports, and the possible consequences are discussed in the context of the analyst's recommendation on the firm in 57% of acquirer reports; 80% of acquirer reports provide some discourse on possible synergies or fit with the target, whereas 26% adopted a tone (positive or negative) on the price being offered. Very few (2%) mentioned the possibility of competing bids.

Similarly, in 95% of target reports, mergers are mentioned. Many of the remaining 5% appear to be boilerplate analyses of firm fundamentals that do not consider other factors; 61% discuss merger consequences in the context of an analyst's recommendation. In many, although not all, cases, analysts appear to automatically change the target recommendation to neutral to reflect the fact that a transaction is likely to close, and the stock price has already adjusted to the offer price. Given that the average analyst rating is generally more favorable than neutral, this causes the average change to be a downgrade. Initiations on the target also tend to be neutral (which is less favorable than average initiations overall) for the same reason.

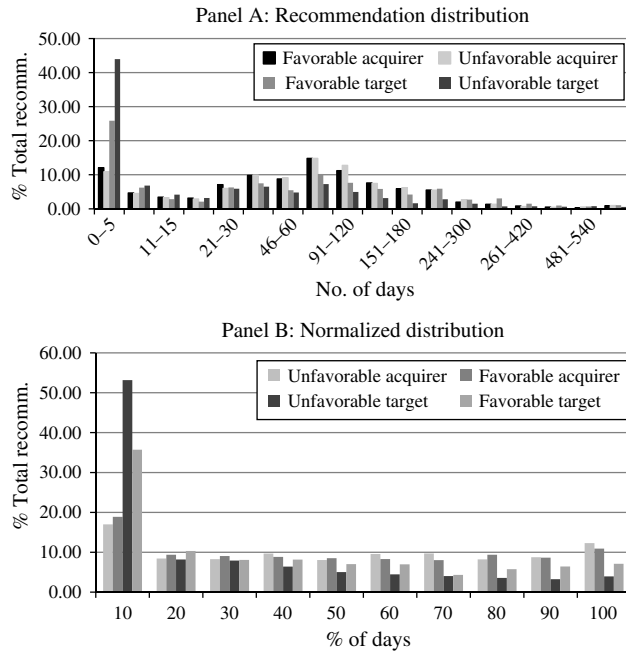
Possible synergies and fit are also discussed in 55% of target reports. Virtually all of these involve deals in which the acquirer offers at least some stock (i.e., target shareholders will own stakes in the acquirer postmerger). Only 7% adopt any tone on the price being offered, and again, very few (3%) mention the

possibility of competing bids. We refer back to some of these details later in our assessment of the effects of PMARs on merger completion decisions.

3. Postannouncement Analyst Recommendations and Merger Completion

In this section, we investigate the effect of PMAR favorability on the completion of announced mergers. A merger announcement represents either the signing of a merger agreement between the acquirer and target or the initiation of a tender offer by the acquirer. Fulfillment of a merger agreement (or tender offer) always requires target shareholders to approve the merger in a vote (or tender shares), and in some cases, it also requires acquirer shareholders to approve it as well. In addition, management may elect to terminate a merger.

Regardless of the transaction type, shareholders, managers, or both of either the acquirer or target can effectively prevent completion. A party presumably terminates a deal if it expects a higher payoff in the absence of the merger than if completed. PMARs could alter this calculation for any of the parties involved by changing beliefs about the merger benefits and hence could influence deal completion. In this section, we assess the relations between merger completion probability and acquirer and target PMARs. In §4, we consider two specific explanations why

Figure 1 Distribution of Recommendation Revisions from Announcement Through Resolution

Notes. This figure shows the distribution of the acquirer's and target's favorable and unfavorable recommendations from the merger announcement date through either completion or termination. Panel A shows the number of days that have passed from the merger announcement date relative to the percentage of total recommendations split by upgrade and downgrade for acquirers and targets by time bucket (i.e., 43.7% of all target downgrades occur within days 0 to 5 from the merger announcement date). Panel B provides a normalized depiction using methodology in Malmendier et al. (2012), where the merger horizon is normalized to our average of 130 days. Recommendation data are collected from I/B/E/S, and completion and termination dates are collected from SDC.

PMARs might impact outcomes through their influence on the parties involved.

3.1. Analyst Recommendations and the Probability of Merger Completion

To analyze the relation between the favorability of PMARs and likelihood of merger completion, we estimate a sequence of logistic regressions in which the dependent variable is an indicator taking a value of 1 if a deal is completed and 0 if it is terminated. We include four primary explanatory variables in all specifications: the number of favorable and unfavorable PMARs separately for the acquirer and target. We further control for the number of analysts covering an acquirer and target to remove the potentially contaminating effects of coverage amount. All models include year and industry indicators. Table 3 shows the results.

In this and later regressions, we report marginal effects evaluated at the means of the explanatory variables as well as p -values based on standard errors

Table 3 Modeling the Probability of Completion

Variable	Model 1		Model 2		Model 3	
	M.E.	p	M.E.	p	M.E.	p
<i>Favorable_Acq_Recs</i>	1.11	0.06 ^c	1.01	0.04 ^b	0.97	0.04 ^b
<i>Unfavorable_Acq_Recs</i>	-1.94	0.00 ^a	-1.36	0.00 ^a	-1.40	0.00 ^a
<i>Favorable_Tgt_Recs</i>	-2.15	0.00 ^a	-1.24	0.02 ^b	-1.24	0.02 ^b
<i>Unfavorable_Tgt_Recs</i>	1.65	0.01 ^a	0.34	0.42	0.29	0.47
<i>Num_Acq_Analysts</i>	1.74	0.00 ^a	0.82	0.01 ^a	0.81	0.01 ^a
<i>Num_Tgt_Analysts</i>	-1.13	0.01 ^a	-0.62	0.15	-0.33	0.39
<i>Acquirer_Advisors</i>			2.82	0.00 ^a	0.01	0.93
<i>Target_Advisors</i>			8.07	0.00 ^a	1.55	0.14
<i>Merger_Program</i>			2.08	0.01 ^a	2.26	0.01 ^a
<i>Days_to_Resolution</i>			0.01	0.18	0.01	0.28
<i>Log_Transaction_Value</i>			-1.67	0.00 ^a	-1.92	0.00 ^a
<i>100%_Cash</i>			-0.21	0.87	0.25	0.84
<i>Cash_Tender_Offer</i>			3.60	0.00 ^a	2.92	0.02 ^b
<i>100%_Stock</i>			0.85	0.35	0.75	0.43
<i>Acq_Run-up</i>			3.37	0.13	3.99	0.08 ^c
<i>Acq_Ann_Return</i>			6.40	0.12	7.68	0.07 ^c
<i>Tgt_Run-up</i>			5.39	0.00 ^a	5.17	0.00 ^a
<i>Tgt_Ann_Return</i>			3.16	0.06 ^c	2.56	0.13
<i>Acq_Fee</i>					4.49	0.02 ^b
<i>Tgt_Fee</i>					18.45	0.00 ^a
Additional controls	No		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	
Observations	5,388		3,601		3,601	
Pseudo- R^2	0.09		0.19		0.21	

Notes. This table presents marginal effects (M.E.; in percentages) from logistic regressions on the probability of a merger completion. Predictors of merger completion include recommendation and analyst characteristics, merger characteristics, and indicator variables for merger and acquisition advisory fees. Models 2 and 3 include variables for the number of advisors, log transaction value, method of payment, days to resolution, acquirer and target run-up and announcement returns, and an indicator and merger programs. Additional controls for the total number of recommendations, the average recommendation level, whether same analyst was used for the acquirer and target, collar type, and an indicator for horizontal mergers are included in the regressions (Models 2 and 3) but are suppressed for exposition. z -Statistic p -values are reported. Huber-White robust standard errors are used and are clustered at the acquirer level. Pseudo- R^2 values are also provided for each model. Variables are defined in Table A.1 of the appendix.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

clustered at the acquirer level to account for possible correlation in residuals for repeat acquirers.¹³ In the first model, we include the number of favorable and unfavorable acquirer and target PMARs and the total number of analysts covering the acquirer and target. The marginal effects of the number of favorable acquirer and unfavorable target PMARs are significantly positive, whereas those of the number of unfavorable acquirer and favorable target PMARs are both significantly negative. Since these explanatory variables are count variables, the marginal effects

¹³ We alternatively cluster on acquirer industry, target industry, acquirer industry-year, or target industry-year and obtain qualitatively similar results.

represent the estimated effect of one additional PMAR of the relevant type on the probability of deal completion. One additional favorable (unfavorable) acquirer PMAR is associated with a 1.11% increase (1.94% decrease) in completion probability, and one more favorable (unfavorable) target PMAR is associated with a 2.15% decrease (1.65% increase) in completion probability. These associations are economically important relative to the unconditional probability of termination of 14% in our sample.

We also find that the likelihood of merger completion increases (decreases) significantly with the number of analysts covering the acquirer (target). Although not the focus of our paper, one possible explanation for the effect of the number of acquirer analysts could be that more analyst coverage reduces information asymmetry, increasing the likelihood that both parties accept a transaction. However, with reduced information asymmetry, more visible targets potentially have more outside options, which is consistent with the negative effect for target coverage.

In Model 2 of Table 3, we include additional controls (detailed in Appendix Table A.1). Merger characteristics include deal size (log of transaction value); number of acquirer and target advisors; days until resolution; run-up and announcement period returns; and indicators for the method of payment, cash tender offers, fixed or floating collars, horizontal deals, and merger programs. Analyst/recommendation controls include the average recommendation levels for targets and acquirers, total number of preannouncement and PMARs (nondirectional), and whether the same analyst provides recommendations for the acquirer and target. In this expanded model, the marginal effects of some of the acquirer and target PMAR favorability variables decrease slightly in magnitude but retain their signs, and all except the marginal effect of unfavorable target PMARs remain statistically significant at the 5% level.

Another possible driver of deal completion is the incentives of the investment banks that advise the merger parties. Almost all investment banks employ stock analysts, who in many cases cover one or both of the merger parties. Several papers, including Rau (2000), find that the advisor market share (a function of deal count) impacts bank reputation, and banks primarily charge contingency fees to capitalize on completion.¹⁴ To test whether advising banks' incentives influence deal outcomes, we hand-collect data on acquirer and target advisor fees and include two

fee indicators as explanatory variables in the third model (our base model for the remainder of the paper).

The marginal effects of the target and acquirer fee variables are positive and statistically significant at the 5% level or better. This is consistent with banks taking more actions to facilitate deal completion when their compensation is explicitly linked to completion (McLaughlin 1992, Rau 2000). This is further reinforced by the fact that the marginal effects of acquirer and target recommendations, while retaining the same statistical significance as in Model 2, decrease slightly when fee variables are included.

3.2. Instrumental Variables Approach

Although merger outcomes exhibit robust relations with PMARs, these relations need not reflect the effect of PMARs on outcomes. We focus on three other explanations that may account for at least some of the relations. The first is that a greater likelihood of a competing bid reduces the likelihood that a merger is completed, and analysts may be less inclined to downgrade a target to neutral if they expect competing bids. This prediction would explain a negative relation between merger completion probability and target PMAR favorability. The second is that positive signals from other sources about merger gains may cause analysts to upgrade an acquirer and increase the likelihood that an acquirer elects to complete the merger.¹⁵ This prediction would explain the positive relation between merger completion probability and acquirer PMAR favorability. The third is that a positive signal about deal completion probability could cause analysts to positively update acquirers that they believe will gain from the merger. This prediction would also explain the positive relation between merger completion probability and acquirer PMAR favorability.

Ruling out these and other alternative explanations based on omitted variables or reverse causality is difficult. Recommendations represent analysts' conscious choices, so there is no truly exogenous source of variation in PMARs. We seek further evidence that PMARs affect merger outcomes using an instrumental variables approach. However, as we discuss below, it is difficult to find good instruments, and concerns about the validity of the instruments we use limit our ability to draw strong conclusions.

There are four endogenous variables for which we need to instrument, the number of favorable and unfavorable acquirer and target PMARs. The order

¹⁴ In addition to merger fees, investment banks may also derive financing fees in completed deals. To capture these effects, we collect data on financing arrangements; however, in only 4% of our mergers was a financing agreement disclosed and in almost no instance was the actual financing fee disclosed.

¹⁵ As recommendations are based on differences between the analyst's assessment of a company's true value and its current stock price, this explanation requires that the market fails to correctly impound such information.

condition for the validity of instrument variables requires that the number of instruments be at least as great as the number of endogenous variables. The first instrument, *AA*, is the percentage of favorable (versus unfavorable) recommendations of all analysts covering the acquirer or the target for all other firms they cover, excluding the acquirer or target. The definition of favorable and unfavorable recommendations is the same as for PMARs (upgrades and initiations at strong buy are favorable; downgrades and initiations at hold, sell, or strong sell are unfavorable). If individual analysts exhibit systematic optimism or pessimism in their recommendations, then an analyst's recommendation regarding one firm will be correlated with his or her others.

The second variable we use as an instrument, *BA*, is the average recommendation favorability of the brokerages of all analysts issuing PMARs on a firm for all firms outside the acquirer's and target's industries. If brokerages exhibit systematic optimism or pessimism, then an analyst's recommendation should be related to other analysts' recommendations issued by the brokerage firm. *AA* and *BA* are measured as changes in recommendations from six months prior to the merger announcement until the deal resolution.¹⁶ We measure *AA* and *BA* separately for the acquirer and target, giving us four instruments in total. Thus the order condition is satisfied.

We use a two-stage least squares approach. In a series of first-stage regressions, we predict the number of favorable and unfavorable acquirer and target PMARs using ordinary least squares (OLS) regressions. The explanatory variables in the first-stage regressions are the instruments, along with all of explanatory variables in Model 3 of Table 3, excluding the PMAR variables. In the second stage, we estimate a linear probability model analogous to Model 3, replacing favorable and unfavorable PMARs with the predicted number of favorable and unfavorable PMARs from the first stage. Table 4 presents results from first- and second-stage regressions.

The first four columns of Table 4 detail results from the first-stage regressions. All three instruments exhibit independent predictive power over at least one of the dependent variables. More importantly, at least two of the instruments predict each of the dependent variables, suggesting that the relevance condition for instrumental variables is satisfied.

The fifth column of Table 4 presents results from the second-stage regression. The signs, magnitudes,

and *p*-values of the marginal effects are similar to those shown in Table 3. Estimated at the means of the variables, the marginal effect of one extra predicted favorable (unfavorable) acquirer PMAR is a 0.91% increase (1.36% decrease) in the probability of merger completion, whereas the marginal effect of one extra favorable target PMAR is a 1.52% decrease in the probability of merger completion.

The validity of the instrumental variables approach requires that the "relevance condition" and "exclusion restriction" both be satisfied. The relevance condition requires that the instruments be correlated with the explanatory variables of interest and can be checked by the statistical significance of the coefficients in the first-stage regressions. The dependent variable in each of the first-stage regressions is related to at least one of the instruments at a statistical significance level of 10% or higher, suggesting that the relevance condition is satisfied. The Cragg–Donald Wald *F* statistic for weak identification testing is 13.54. Based on weak identification test critical values from Stock and Yogo (2005), this implies that the maximal bias of our IV estimates relative to OLS estimates is less than 5% (critical value equals 10.27).

The exclusion restriction requires the instruments not be related to the error term in the second-stage regression. Thus our IV approach assumes that *AA* and *BA* do not contain incremental information about factors (other than PMARs) that affect merger outcomes once we control for other observable acquirer, target, and transaction characteristics. Because the exclusion restriction cannot be tested, it is important to consider the likelihood that this assumption holds on theoretical grounds carefully.

One concern is that analysts tend to specialize in their coverage (e.g., by industry). *AA* could capture broader "sentiment" about firms of a given type, and such sentiment might positively affect the likelihood that a firm of that type completes a proposed deal, for example, through its impact on perceived synergy values. This would cause us to overestimate the effects of acquirer PMARs on merger completion probability and underestimate the effects of target PMARs. Brokerages could specialize to a degree as well, which could induce a direct relation between *BA* and merger completion. This is less of a concern, as brokerages tend to be large and cover multiple industries. We note, though, that *AA* has stronger predictive power over PMARs than *BA* does. Although the IV regressions provide some additional support for PMARs affecting merger outcomes, we cannot rule out violations of the exclusion restriction, and therefore we refrain from drawing strong conclusions about causality based on this test.

¹⁶ We also consider instruments based on recommendation levels rather than changes, as average levels may also predict given recommendation revisions. For instance, if the average analyst recommendation level is close to a strong buy (i.e., coded as 1), then it is more likely that future revisions will be negative (downgrades).

Table 4 Modeling the Probability of Completion: Instrumental Variables Approach

Variable	First stage								Second stage	
	Acquirer				Target				Model 3	
	Favorable		Unfavorable		Favorable		Unfavorable		IV	
	Estimate	p	Estimate	p	Estimate	p	Estimate	p	M.E.	p
<i>Favorable_Acq_Recs</i>									0.91	0.07 ^c
<i>Unfavorable_Acq_Recs</i>									−1.36	0.00 ^a
<i>Favorable_Tgt_Recs</i>									−1.52	0.01 ^a
<i>Unfavorable_Tgt_Recs</i>									0.25	0.56
<i>Num_Acq_Analysts</i>	0.34	0.00 ^a	0.36	0.00 ^a	−0.00	0.79	−0.00	0.88	0.90	0.00 ^a
<i>Num_Tgt_Analysts</i>	−0.02	0.50	−0.02	0.33	0.19	0.00 ^a	0.58	0.00 ^a	−0.16	0.69
<i>Acquirer_Advisors</i>	−0.08	0.34	0.11	0.25	−0.13	0.04 ^b	−0.09	0.28	−0.13	0.91
<i>Target_Advisors</i>	−0.14	0.05 ^b	−0.07	0.35	−0.02	0.67	−0.01	0.90	1.52	0.16
<i>Merger_Program</i>	−0.10	0.09 ^c	−0.06	0.34	0.04	0.16	0.03	0.39	3.20	0.00 ^a
<i>Days_to_Resolution</i>	0.00	0.00 ^a	0.00	0.00 ^a	0.00	0.00 ^a	0.00	0.00 ^a	0.01	0.07 ^c
<i>Log_Transaction_Value</i>	0.18	0.00 ^a	−0.10	0.00 ^a	0.04	0.20	−0.03	0.42	−1.82	0.00 ^a
<i>100%_Cash</i>	−0.04	0.62	0.02	0.84	0.10	0.02 ^b	0.18	0.00 ^a	0.55	0.67
<i>Cash_Tender_Offer</i>	0.08	0.43	−0.12	0.30	0.04	0.56	−0.05	0.55	2.67	0.06 ^c
<i>100%_Stock</i>	0.07	0.32	−0.11	0.09 ^c	0.09	0.01 ^a	−0.09	0.04 ^b	1.04	0.27
<i>Acq_Run-up</i>	0.02	0.87	−0.60	0.00 ^a	−0.02	0.78	−0.04	0.69	3.34	0.17
<i>Acq_Ann_Return</i>	0.30	0.16	−0.65	0.01 ^a	0.09	0.48	−0.39	0.03 ^b	8.43	0.07 ^c
<i>Tgt_Run-up</i>	−0.09	0.39	−0.11	0.37	−0.13	0.00 ^a	0.11	0.11	5.39	0.00 ^a
<i>Tgt_Ann_Return</i>	−0.02	0.89	−0.06	0.57	0.05	0.37	0.21	0.00 ^a	2.62	0.13
<i>Acq_Fee</i>	−0.02	0.84	−0.10	0.42	0.13	0.09 ^c	0.06	0.53	4.62	0.02 ^b
<i>Tgt_Fee</i>	0.15	0.15	0.10	0.39	−0.02	0.82	0.05	0.52	19.54	0.00 ^a
<i>AA</i>	0.71	0.00 ^a	−0.80	0.00 ^a	0.46	0.00 ^a	−0.49	0.01 ^a		
<i>BA</i>	0.16	0.58	−0.47	0.10 ^c	0.20	0.18	0.40	0.07 ^c		
Additional controls		Yes		Yes		Yes		Yes		Yes
Year fixed effects		Yes		Yes		Yes		Yes		Yes
Observations		3,601		3,601		3,601		3,601		3,601
Adjusted- <i>R</i> ² /pseudo- <i>R</i> ²		0.64		0.63		0.59		0.77		0.19
Anderson test statistic										30.13
Cragg–Donald test statistic										13.54
Sargan test statistic										4.22

Notes. This table presents marginal effects (M.E.; in percentages) from a linear probability regression for the probability of a merger completion. First-stage OLS regressions model acquirer or target upgrades and downgrades using two instrumental variables. The first is the recommendation favorability for the predicting analyst (AA) for either the acquirer or target, and the second is the recommendation favorability for the brokerage house of the recommending analyst excluding all firms covered by the analyst or in the same industry as the acquirer or target (BA). Fitted values from these regressions are then used as instruments in second-stage linear probability regressions. Independent variables are the same as those reported in Table 3, Model 3. *p*-Values are reported. Huber–White robust standard errors are used and are clustered at the acquirer level. Adjusted-*R*² and pseudo-*R*² values are also provided for each model. Variables are defined in Appendix Table A.1.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

4. Explanations for Relations Between PMARs and Merger Outcomes

In this section, we explore two possible causal explanations for the relations between PMARs and merger outcomes documented in §3. Both are based on the idea that PMARs affect the perceived benefits to the acquirer and/or target of completing a proposed deal.

The feedback explanation posits that PMARs influence merger outcomes by providing feedback to the parties involved on the merger decision. If, for example, analysts believe that the merger will create more value for acquirer shareholders than the current price of the acquirer reflects, they will upgrade their recommendations on the acquirer (or initiate coverage with a relatively favorable recommendation). If the acquirer treats PMARs as informative signals, this

should have a positive impact on its perceived benefits of completing the merger. The same could hold for the target as well.¹⁷

In general, then, the feedback explanation would suggest that more favorable PMARs on a party should increase its willingness to complete a proposed merger. This would explain the positive (negative) relation we observe between deal completion and the number of favorable (unfavorable) acquirer PMARs. The same logic applied to a target should lead to a positive (negative) relation between

¹⁷ Table 2 shows that stock prices react to PMARs, suggesting that they do influence beliefs, and our analysis of the text of analyst reports (see §2.2) shows that 57% of reports on acquirers and 61% of reports on targets mention the potential impact of a merger when discussing the rationale for the recommendation made.

merger completion and favorable (unfavorable) target PMARs, which is the opposite of what we find. There is no a priori reason, however, that feedback from analysts must influence the decisions of both acquirers and targets equally. Given the relations we observe, we focus primarily on feedback from PMARs into the acquirer's decision to complete a merger when further assessing the relevance of the feedback explanation.

The valuation explanation posits that PMARs impact merger outcomes by influencing each party's beliefs about the value of the consideration it is to give or receive in the merger. In a completed deal, target shareholders surrender claims on the target and, at least in stock deals (76% of our sample), receive ownership in the acquirer in exchange. Acquirer shareholders, however, gain ownership of the target and, again at least in stock deals, surrender an ownership stake in their own firm to target shareholders. Each party should be more inclined to agree to a merger when the perceived value of the consideration it is to receive (relinquish) increases (decreases). To the extent that each extra dollar of consideration received by one party reduces the value of the merger to the other party by one dollar, any movement in valuations as a result of PMARs could, in theory, have offsetting effects. However, there is again no a priori reason to believe that valuation considerations impact the decisions of both parties equally. If the effect is asymmetric, then the impact of PMARs on valuations could impact merger completion.

Reassessment by the target in response to a valuation shift explains the positive (negative) relation between acquirer (target) PMAR favorability and deal completion likelihood. Both of these findings, however, appear to be inconsistent with reassessment by the acquirer after valuation changes. If there is an increase in acquirer favorability, this could increase the value of the acquirer. As the majority of deals are fixed exchange offers, this would increase the value of the consideration offered to the target, thereby decreasing the probability of completion as the deal becomes less attractive to the acquirer. Motivated again by the observed relations, we focus on the valuation effects of PMARs on the target's merger decision when further assessing the empirical relevance of the valuation explanation.

Our focus then is on two specific explanations for the results in §3: a feedback explanation based on feedback to the acquirer and a valuation explanation based on the target's assessment of merger considerations. We next present three tests to further assess the relevance of each of these explanations. As a reference, Table 5 presents the predictions of both explanations for each of the tests. For completeness, it also details (in the first four rows) the predicted signs

of the relations between deal completion likelihood and acquirer and target PMAR favorability under each explanation based on both acquirer and target assessment.

4.1. Test 1: Identity of Party Terminating Merger

Either an acquirer or target can elect to terminate a deal. Our first test involves examining acquirer and target termination decisions separately. As noted, the feedback explanation relates to acquirer termination decisions and predicts that favorable (unfavorable) acquirer PMARs decrease (increase) the likelihood of acquirer termination. It makes no predictions about the impact of favorable or unfavorable target PMARs on acquirer decisions. The valuation explanation, on the other hand, relates to target termination decisions. It predicts that favorable (unfavorable) acquirer PMARs decrease (increase) target termination likelihood, whereas favorable (unfavorable) target PMARs increase (decrease) that likelihood. The second set of rows in Table 5 shows these predictions.

We test both of these sets of predictions by estimating a multinomial logistic model. The dependent variable is merger outcome, which can be completion, termination by the acquirer, or termination by the target. As Table 1 shows, acquirers and targets terminate mergers in 168 and 279 cases, respectively. We remove from this test any deals terminated for regulatory reasons and those where we cannot determine the cause of termination unambiguously. The explanatory variables of interest continue to be the number of favorable and unfavorable acquirer and target PMARs. Table 6 details results from this multinomial logistic estimation.

The base case is completion. The first column of Table 6 details marginal effects of the determinants of acquirer termination relative to the base case, and the second column reports the marginal effects of the determinants of target termination. Note that we are modeling the probability of termination rather than completion here, so the signs of the marginal effects have the opposite interpretation of those in Tables 3 and 4 (this is reflected in the predictions in Table 5).

The first column of Table 6 illustrates that acquirer termination is negatively related to the number of favorable (unfavorable) PMA acquirer (target) recommendations. Although the signs of these marginal effects are consistent with the feedback explanation, they are statistically insignificant and small in magnitude. The second column shows that target termination is negatively (positively) related to the number of favorable (unfavorable) acquirer PMARs. These relations are large and statistically significant at the 10% and 1% levels, respectively.¹⁸ They support a target's

¹⁸ These marginal effects are smaller than those in Table 3 because they represent the sensitivity of only one reason for termination to

Table 5 Feedback and Valuation Explanation Predictions

Feedback				Valuation			
Acquirer		Target		Acquirer		Target	
Favorable	Unfavorable	Favorable	Unfavorable	Favorable	Unfavorable	Favorable	Unfavorable
Probability of completion (see Table 3)							
Pos	Neg	Pos	Neg	Acquirer PMAR	Neg	Pos	Neg
				Target PMAR	Pos	Neg	Pos
Determinants of termination ^a (see Table 6)							
Neg	Pos			Acquirer terminates			
				Acquirer PMAR			
				Target PMAR			
				Target terminates			
				Acquirer PMAR		Neg	Pos
				Target PMAR		Pos	Neg
Method of payment (see Table 7)							
Pos	Neg			Stock merger			
				Acquirer PMAR		Pos	Neg
				Target PMAR		Neg	Pos
Pos	Neg			Cash merger			
				Acquirer PMAR			
				Target PMAR		Neg	Pos
Relative target size (see Table 9)							
Pos	Neg			Acquirer PMAR			
				Target PMAR			

Notes. This table describes the effects of favorable and unfavorable acquirer and target PMARs predicted by the feedback and valuation explanations. For the probability of completion (see Table 3), we examine the predictions based on both explanations from both the acquirer's and target's standpoint. "Pos" ("Neg") indicates a positive (negative) relation with the probability of deal completion. For the remainder of the tests, we focus on acquirer-driven feedback and target-driven valuation explanations.

^aPrediction of termination rather than completion.

merger completion decision responding to valuation movements in an acquirer as dictated by the valuation explanation. The signs of the marginal effects of target PMARs on target termination are consistent with the target's merger completion decision also responding to movements in the target's stock, although they fall short of statistical significance.

4.2. Test 2: Stock- vs. Cash-Based Transactions

In our second test, we examine the relation between merger completion and acquirer PMARs in stock and all-cash mergers separately. According to the valuation explanation, acquirer PMARs influence deal outcomes by altering a target's perception of the value of an acquirer's stock and hence the value of the offer. If the valuation explanation drives the relation between merger completion and acquirer PMARs,

then we should only observe this relation in transactions involving at least some stock. This explanation makes no set prediction about differences between stock and cash mergers in the relation of merger outcome to target PMARs, as target shareholders surrender their stock in the target in both cases.

It is less clear what differences, if any, the feedback explanation predicts between cash and stock mergers. One might argue an acquirer could learn from recommendations about the deal regardless of method of payment, and therefore the feedback explanation should predict no difference between the two. However, target shareholders share in any increases in expectations about postmerger acquirer value if a stock merger is completed, whereas such gains accrue solely to acquirer shareholders in a cash deal. Part of such gains then should impact target rather than acquirer valuation, and analysts might therefore react more mutedly to information about the anticipated effect of a merger on acquirer value. In contrast to the valuation explanation, the feedback explanation would appear then to, if anything, predict stronger relations between merger completion and acquirer

PMARs. In untabulated tests, we find similar relations between the likelihood of termination by an undetermined party and acquirer PMARs. This may indicate that the target is responsible for a majority of these unclassified terminations, though we have no way of verifying this.

Table 6 Modeling Who Terminates

Variable	Acquirer terminates		Target terminates	
	M.E.	<i>p</i>	M.E.	<i>p</i>
<i>Favorable_Acq_Recs</i>	−0.10	0.11	−0.33	0.07 ^c
<i>Unfavorable_Acq_Recs</i>	0.03	0.59	0.48	0.00 ^a
<i>Favorable_Tgt_Recs</i>	−0.01	0.92	0.28	0.18
<i>Unfavorable_Tgt_Recs</i>	−0.08	0.19	−0.08	0.58
<i>Num_Acq_Analysts</i>	−0.03	0.44	−0.39	0.00 ^a
<i>Num_Tgt_Analysts</i>	0.06	0.20	0.11	0.37
<i>Acquirer_Advisors</i>	0.02	0.91	0.08	0.84
<i>Target_Advisors</i>	0.14	0.27	−0.74	0.10 ^c
<i>Merger_Program</i>	−0.33	0.02 ^b	0.03	0.95
<i>Days_to_Resolution</i>	0.00	0.08 ^c	0.00	0.05 ^b
<i>Log_Transaction_Value</i>	0.16	0.00 ^a	0.72	0.00 ^a
<i>Acq_Run-up</i>	−0.40	0.22	−1.10	0.19
<i>Acq_Ann_Return</i>	−1.14	0.06 ^c	−0.17	0.88
<i>Tgt_Run-up</i>	−0.62	0.01 ^a	−1.55	0.02 ^b
<i>Tgt_Ann_Return</i>	−0.08	0.74	−0.48	0.44
<i>Acq_Fee</i>	−0.48	0.07 ^c	−2.17	0.01 ^a
<i>Tgt_Fee</i>	−2.45	0.00 ^a	−4.69	0.00 ^a
Additional controls		Yes		Yes
Year fixed effects		Yes		Yes
Industry fixed effects		Yes		Yes
Observations				3,437
Pseudo- <i>R</i> ²				0.23

Notes. This table presents marginal effects (M.E.; in percentages) from multinomial logistic regressions on the probability of which party terminates an announced merger. The base case is completion. Predictors of merger termination are the same as those reported in Table 3, Model 3. *z*-Statistic *p*-values are reported. Huber–White robust standard errors are used and are clustered at the acquirer level. Pseudo-*R*² values are also provided for each model. Variables are defined in Appendix Table A.1.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

PMARs in cash mergers than in stock mergers. These predictions are shown in the third set of rows in Table 5.

To examine the relation between merger completion and PMARs in cash and stock mergers separately, we classify each merger as a stock deal if the offer includes at least some acquirer stock and a cash deal if it does not. We then rerun our base model (Model 3 of Table 3) using each of the resulting samples. Table 7 presents the results.

For stock deals (Stock (1) in Table 7), the probability of completion is positively (negatively) related to the number of favorable (unfavorable) acquirer PMARs, consistent with the results in Table 3. The relations for stock deals are similar if we remove offers involving fixed dollar values or collars (Stock (2)), where the valuation explanation should not apply. In pure cash deals, however, there is no significant relation between the probability of completion and the number of favorable or unfavorable acquirer PMARs. The results for stock-financed deals support the role of the

Table 7 Modeling the Probability of Completion: Cash vs. Stock Mergers

Variable	Stock (1)		Stock (2)		Pure cash	
	M.E.	<i>p</i>	M.E.	<i>p</i>	M.E.	<i>p</i>
<i>Favorable_Acq_Recs</i>	1.25	0.03 ^b	1.23	0.05 ^b	0.00	0.99
<i>Unfavorable_Acq_Recs</i>	−1.38	0.00 ^a	−1.27	0.00 ^a	−0.19	0.63
<i>Favorable_Tgt_Recs</i>	−1.58	0.04 ^b	−1.42	0.08 ^c	−0.74	0.45
<i>Unfavorable_Tgt_Recs</i>	0.22	0.69	−0.02	0.97	1.21	0.12
<i>Num_Acq_Analysts</i>	0.50	0.17	0.22	0.53	1.42	0.00 ^a
<i>Num_Tgt_Analysts</i>	−0.49	0.31	−0.45	0.35	−0.17	0.75
<i>Acquirer_Advisors</i>	0.10	0.94	0.00	0.99	−0.84	0.61
<i>Target_Advisors</i>	2.42	0.04 ^b	2.55	0.04 ^b	−1.58	0.27
<i>Merger_Program</i>	2.27	0.03 ^b	1.68	0.15	1.69	0.17
<i>Days_to_Resolution</i>	0.01	0.06 ^c	0.02	0.02 ^b	−0.01	0.09 ^c
<i>Log_Transaction_Value</i>	−1.45	0.00 ^a	−1.48	0.00 ^a	−1.87	0.00 ^a
<i>Acq_Run-up</i>	3.69	0.13	1.69	0.52	3.45	0.37
<i>Acq_Ann_Return</i>	10.85	0.02 ^b	10.09	0.04 ^b	−4.73	0.49
<i>Tgt_Run-up</i>	6.02	0.00 ^a	8.15	0.00 ^a	0.63	0.77
<i>Tgt_Ann_Return</i>	3.50	0.09 ^c	3.65	0.09 ^c	1.26	0.57
<i>Acq_Fee</i>	5.22	0.03 ^b	5.26	0.04 ^b	3.04	0.22
<i>Tgt_Fee</i>	16.59	0.00 ^a	16.20	0.00 ^a	34.33	0.00 ^a
Additional controls		Yes		Yes		Yes
Year fixed effects		Yes		Yes		Yes
Industry fixed effects		Yes		Yes		Yes
Observations		2,697		2,209		892
Pseudo- <i>R</i> ²		0.22		0.23		0.30

Notes. This table presents marginal effects (M.E.; in percentages) from logistic regressions on the probability of a merger completion by method of payment. Stock (1) includes all transactions with at least some stock financing, whereas Stock (2) excludes mergers with fixed dollar value offers or collars. Predictors of merger completion include independent variables that are the same as those reported in Table 3, Model 3. *z*-Statistic *p*-values are reported. Huber–White robust standard errors are used and are clustered at the acquirer level. Pseudo-*R*² values are also provided for each model. Independent variables are defined in Appendix Table A.1.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

valuation effect in driving relations between completion and the favorability of acquirer PMARs.¹⁹

As already noted, the valuation explanation does not apply in cash mergers. It also does not apply if the acquirer offers shares with a fixed dollar value rather than a fixed number of shares. It applies to a lesser degree if the merger offer includes a collar that restricts movements in valuation outside of preset bounds. To further assess the valuation explanation, we rerun the IV results (in Table 4) and multinomial logistic results (in Table 6) excluding cash offers, offers with fixed dollar values, and offers with collars. Table 8 presents the results. The IV results remain largely unchanged when we use the

¹⁹ One potential concern with this test is that there are considerably more stock than cash mergers in our sample. Thus, we may have more power to test the relation of merger outcomes to PMARs in stock deals than in cash deals. In an untabulated test, we construct a matched sample of stock and cash deals and obtain virtually identical results to those in Table 6 using this matched sample.

Table 8 Instrumental Variables and Modeling Who Terminates: Stock Deals Only

Variable	IV-ALL completion		Acquirer terminates		Target terminates	
	M.E.	<i>p</i>	M.E.	<i>p</i>	M.E.	<i>p</i>
<i>Favorable_Acq_Recs</i>	1.19	0.05 ^b	−0.13	0.08 ^c	−0.65	0.01 ^a
<i>Unfavorable_Acq_Recs</i>	−1.37	0.00 ^a	−0.13	0.24	0.41	0.03 ^b
<i>Favorable_Tgt_Recs</i>	−1.76	0.02 ^b	−0.01	0.57	0.22	0.05 ^b
<i>Unfavorable_Tgt_Recs</i>	0.16	0.78	−0.11	0.11	0.01	0.98
<i>Num_Acq_Analysts</i>	0.67	0.06 ^c	0.09	0.24	−0.31	0.04 ^b
<i>Num_Tgt_Analysts</i>	−0.39	0.44	0.22	0.05 ^b	0.19	0.35
<i>Acquirer_Advisors</i>	−0.16	0.90	−0.13	0.68	0.29	0.63
<i>Target_Advisors</i>	2.38	0.04 ^b	0.26	0.34	−1.26	0.05 ^b
<i>Merger_Program</i>	3.38	0.00 ^a	−0.77	0.06 ^c	0.17	0.76
<i>Days_to_Resolution</i>	0.02	0.02 ^b	−0.00	0.57	−0.01	0.02 ^b
<i>Log_Transaction_Value</i>	−1.51	0.00 ^a	0.33	0.01 ^a	0.38	0.07 ^c
<i>Acq_Run-up</i>	2.31	0.37	0.12	0.90	−0.54	0.63
<i>Acq_Ann_Return</i>	10.56	0.03 ^b	−2.56	0.15	−1.09	0.43
<i>Tgt_Run-up</i>	6.67	0.00 ^a	−2.51	0.00 ^a	−2.14	0.03 ^b
<i>Tgt_Ann_Return</i>	3.49	0.09 ^c	−1.40	0.09 ^c	0.54	0.40
<i>Acq_Fee</i>	5.45	0.02 ^b	−0.91	0.18	−2.61	0.09 ^c
<i>Tgt_Fee</i>	17.72	0.00 ^a	−5.81	0.04 ^b	−2.70	0.18
Additional controls	Yes		Yes		Yes	
Industry fixed effects	No		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Observations	2,209				2,083	
Pseudo- <i>R</i> ²	0.20				0.19	
Anderson test statistic	24.79					
Cragg–Donald test statistic	12.22					
Sargan test statistic	4.96					

Notes. This table presents marginal effects (M.E., in percentages) from linear probability regressions on the probability of merger completion using two instrumental variables detailed in Table 4 (IV-ALL). Fitted values from OLS regressions are used to capture acquirer and target recommendation favorability, and independent variables are the same as those reported in Table 4. The second and third columns present marginal effects (M.E.; in percentages) from multinomial logistic regressions on the probability of which party terminates an announced deal. Predictors of merger termination are similar to those in previous tables. Only deals in which at least some stock is used as a method of payment are included in this table, and mergers with fixed dollar value offers or collars are excluded. *z*-Statistic *p*-values are reported. Huber–White robust standard errors are used and are clustered at the acquirer level. Pseudo-*R*² values are also provided for each model. Variables are defined in Appendix Table A.1.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

restricted sample. In the termination decision test, target termination continues to be negatively (positively) related to the number of favorable (unfavorable) acquirer PMARs. In addition, target termination is now positively related to the number of favorable target PMARs (though it continues to be unrelated to the number of unfavorable target PMARs). This is consistent with the target becoming less willing to complete a proposed merger after a positive shock to its own valuation.

4.3. Test 3: Relative Target Size

In our third test, we examine how the relation between merger completion probability and PMARs

varies with the relative sizes of the target and acquirer. Other things being equal, the larger the target is relative to the acquirer, the larger the impact of the merger on the acquirer. Novel information about the value of the merger to the acquirer is, therefore, more likely to be material if the target is larger. The feedback explanation then would suggest that the sensitivity of merger completion to acquirer PMARs should be stronger when the target is larger in relative size. It is less clear what the valuation explanation would predict about variation with relative target size. One possibility is that firm size is correlated with the amount of information available and hence the impact of a recommendation on assessment of its value. We address this concern directly by accounting for absolute target size in our analysis. Thus, the fourth set of rows in Table 5 only shows predictions for the feedback explanation.

To test variation in the relation between merger outcomes and PMARs with relative target size, we first define *Absolute_Target_Size* and *Absolute_Acquirer_Size* as the market values of the target's and acquirer's equity computed as stock price three months prior to the merger announcement date multiplied by shares outstanding from CRSP if available and augmented by SDC when missing. We use this measure of size because it is the most comprehensive measure of target size available.²⁰ We then calculate *Relative_Target_Size* as

$$\text{Relative_Target_Size} = \frac{\text{Absolute_Target_Size}}{\text{Absolute_Target_Size} + \text{Absolute_Acquirer_Size}}.$$

We estimate the same three logistic models shown in Table 3 except that we add *Relative_Target_Size* and *Absolute_Target_Size* as well as their interactions with each of the analyst recommendation variables (including numbers of acquirer and target analysts).²¹ Table 9 presents the results of this test.

The marginal effects of the interactions of PMARs with relative target size are generally statistically insignificant. Although the sign of the marginal effect of the interaction with the number of unfavorable acquirer PMARs is consistent with the feedback explanation, the one with the number of favorable acquirer PMARs has the opposite of our predicted sign. Tests of differences in sensitivity of completion to acquirer PMARs with relative target size do not support the feedback explanation.

²⁰ Given that we do not impose a size restriction on our sample firms, using assets from Compustat as a measure of size would reduce our sample substantially.

²¹ The marginal effects of the interaction terms are corrected to account for problems with interaction effects in nonlinear models as discussed by Ai and Norton (2003).

Table 9 Modeling the Probability of Completion: Relative and Absolute Target Size

Variable	Model 1		Model 2		Model 3	
	M.E.	<i>p</i>	M.E.	<i>p</i>	M.E.	<i>p</i>
<i>Favorable_Acq_Recs</i>	−0.09	0.96	−1.09	0.44	−1.31	0.32
<i>Unfavorable_Acq_Recs</i>	−1.32	0.42	−1.97	0.18	−2.12	0.12
<i>Favorable_Tgt_Recs</i>	−9.96	0.00 ^a	−4.58	0.07 ^c	−3.97	0.10 ^c
<i>Unfavorable_Tgt_Recs</i>	4.32	0.11	4.04	0.06 ^c	3.97	0.06 ^c
<i>Num_Acq_Analysts</i>	2.26	0.11	3.52	0.00 ^a	3.53	0.00 ^a
<i>Num_Tgt_Analysts</i>	0.82	0.67	−2.94	0.07 ^c	−3.41	0.03 ^b
<i>Favorable_Acq_Recs</i> × <i>Relative_Target_Size</i>	−3.14	0.33	−2.66	0.23	−3.07	0.17
<i>Unfavorable_Acq_Recs</i> × <i>Relative_Target_Size</i>	−4.14	0.06 ^c	−2.16	0.18	−1.73	0.26
<i>Favorable_Tgt_Recs</i> × <i>Relative_Target_Size</i>	5.59	0.07 ^c	3.49	0.17	3.03	0.24
<i>Unfavorable_Tgt_Recs</i> × <i>Relative_Target_Size</i>	−3.13	0.20	−0.33	0.84	0.32	0.84
<i>Num_Acq_Analysts</i> × <i>Relative_Target_Size</i>	2.38	0.07 ^c	1.33	0.20	1.33	0.20
<i>Num_Tgt_Analysts</i> × <i>Relative_Target_Size</i>	0.87	0.60	−0.87	0.45	−1.25	0.28
<i>Favorable_Acq_Recs</i> × <i>Absolute_Target_Size</i>	0.38	0.24	0.42	0.09 ^c	0.45	0.05 ^b
<i>Unfavorable_Acq_Recs</i> × <i>Absolute_Target_Size</i>	0.14	0.57	0.21	0.34	0.21	0.29
<i>Favorable_Tgt_Recs</i> × <i>Absolute_Target_Size</i>	0.82	0.02 ^b	0.33	0.31	0.26	0.39
<i>Unfavorable_Tgt_Recs</i> × <i>Absolute_Target_Size</i>	−0.26	0.42	−0.46	0.07 ^c	−0.48	0.06 ^c
<i>Num_Acq_Analysts</i> × <i>Absolute_Target_Size</i>	−0.35	0.10 ^c	−0.52	0.00 ^a	−0.51	0.00 ^a
<i>Num_Tgt_Analysts</i> × <i>Absolute_Target_Size</i>	−0.19	0.46	0.40	0.05 ^b	0.49	0.01 ^a
Additional controls	No		Yes		Yes	
Year fixed effects	Yes		Yes		Yes	
Industry fixed effects	Yes		Yes		Yes	
Observations	2,743		2,743		2,743	
Pseudo- <i>R</i> ²	0.14		0.23		0.25	

Notes. This table presents marginal effects (M.E.; in percentages) logistic regressions on the probability of a merger completion by relative target size (target market value of equity scaled by the sum of the target and acquirer market value of equity) controlling for the target absolute size. Relative and absolute size measures are interacted with acquirer and target PMAR favorability variables and analyst coverage. Models 1–3 replicate those presented in Table 3. Furthermore, each model includes the relative and absolute size measures as additional controls. *z*-Statistic *p*-values are reported. Huber–White robust standard errors are used and are clustered at the acquirer level. Pseudo-*R*² values are also provided for each model. Variables are defined in Appendix Table A.1.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

Overall, the tests in this section provide significantly more support for the valuation explanation than for the feedback explanation. Of course, it is impossible to perfectly isolate the effects of each explanation. Nevertheless, our results provide consistent support for the argument that PMARs affect merger outcomes by altering the desirability of the

transaction from the target's standpoint through their impact on acquirer and target valuations.

4.4. Further Consideration of Alternative Explanations

In §3, we discussed three noncausal alternative explanations for the relations between merger outcomes and PMARs. We now further consider these explanations in light of the evidence in §4. The first is that the probability of merger completion decreases with the probability of a competing bid, which causes analysts to maintain more favorable target recommendations rather than automatically dropping them to neutral. This explanation focuses primarily on the relation between the target's decision to terminate a merger and target PMARs. It is difficult to reconcile this explanation with the lack of a relation between target termination decisions and target recommendations, shown in Table 6.

The second alternative explanation is that information about the value created by a merger drives both merger completion and PMARs. This would explain the positive relation between merger completion probability and acquirer PMAR favorability. It is unclear, however, why this would hold in stock but not cash mergers, as such information impacts the gains to the acquirer in both cases. Also, in contrast to our findings, it seems likely that the effect would be stronger when the target is relatively large, as such news has a bigger impact on acquirer gains.

The third alternative explanation is that information about the probability of merger completion more generally impacts both merger completion and PMARs. This would also explain the positive relation between merger completion probability and acquirer PMAR favorability, and it is also difficult to reconcile with the stock versus cash and relative target size results. Although still not definitive, these results help rule out at least some noncausal alternative explanations for the relations we find between PMARs and merger outcomes.

4.5. Analyst Recommendations and Postresolution Stock Performance

Our evidence suggests that PMARs affect the merger process at least in part through their impact on a target's perception of a deal's value. This could indicate that PMARs represent informative signals about the values of the merger parties. Alternatively, it is possible PMARs do not contain information even though the market responds as though they do. This would add to evidence that merger decisions are driven in part by movements in valuations unrelated to firm fundamentals (Rhodes-Kropf et al. 2005, Edmans et al. 2012). We assess the information content of PMARs by examining medium- to long-run stock returns after

a deal is completed or terminated. We focus on the postresolution period to remove the effects of the decision to complete or terminate a merger itself from returns.

The predicted relation between the favorability of PMARs and postresolution returns depends on whether the market impounds these recommendations into stock prices prerelation. If it does, we should observe no relation between PMAR favorability and postmerger returns. If it does not and these recommendations are informative, then stocks of firms with favorable PMARs should outperform those of firms with unfavorable PMARs. However, if the market overestimates the information contained in PMARs, then we should observe lower long-run returns in firms with favorable PMARs than in those with unfavorable ones. We consider firms to be favorably recommended if the percentage of favorable PMARs relative to total PMARs exceeds 50%.

We implement a calendar-time-based approach to compute long-run abnormal returns postmerger resolution advocated by Fama (1988) and developed formally by Mitchell and Stafford (2000). This involves, in each month, constructing an equal- or value-weighted portfolio of all firms experiencing an event in the past n months, where n is the number of months over which we measure abnormal returns. We then capture the intercept (α) from a regression of the abnormal returns of each month's portfolio on the Fama and French (1993) factors Mkt, SMB, and HML (where Mkt denotes the market risk premium, SMB denotes small minus big, and HML denotes high minus low). This approach accounts for cross-sectional correlation in returns in overlapping periods for different firms experiencing an event.²²

We compute calendar-time portfolio abnormal returns for firms involved in mergers with favorable and unfavorable recommendations separately over three-month, six-month, one-year, and two-year horizons postmerger resolution. Returns are calculated for acquirers for all deals, as well as completed and terminated mergers separately. We also examine targets in terminated deals (as a target's stock ceases to trade after a completed transaction). Table 10 details long-run abnormal returns for each group over each of the four postevent horizons.

Over six-month to two-year horizons, acquirers with favorable (unfavorable) PMARs earn negative

Table 10 Postresolution Performance

	Recomm.	<i>N</i>	3 months	6 months	1 year	2 years
Acquirer						
All	Fav.	1,739	0.05%	−0.84%	−6.09% ^a	−7.60% ^a
All	Unfav.	2,302	−0.60%	0.35%	0.48%	4.59% ^a
Difference			−0.65%	1.19%	6.57%	12.19%
<i>p</i>			0.5209	0.3789	0.0014	0.0001
Completed	Fav.	1,498	0.22%	−1.02%	−6.05% ^a	−7.24% ^a
Completed	Unfav.	1,952	−0.79%	0.46%	0.63%	4.93% ^b
Difference			−1.01%	1.48%	6.68%	12.17%
<i>p</i>			0.3047	0.2715	0.0013	0.0001
Withdrawn	Fav.	190	−6.19% ^c	−2.97%	−11.23% ^b	−16.72% ^c
Withdrawn	Unfav.	301	−1.32%	−3.31%	−3.57%	−1.06%
Difference			4.87%	−0.34%	7.66%	15.66%
<i>p</i>			0.3105	0.9270	0.4073	0.2219
Target						
All	Fav.	173	−2.07%	−2.82%	−7.51%	−18.79% ^c
All	Unfav.	287	−1.14%	5.06% ^c	9.10% ^c	17.72% ^b
Difference			0.93%	7.88%	16.61%	36.51%
<i>p</i>			0.8801	0.2399	0.0674	0.0045

Notes. This table examines whether analysts, through their recommendations, have the ability to predict postresolution performance. Postresolution returns are measured as calendar-time portfolio abnormal returns using the methodology presented in Mitchell and Stafford (2000) for three months, six months, one year, and two years following the resolution (either completion or termination) of the merger. Recommendations are delineated into favorable (percentage favorable > 50%) and unfavorable recommendations (percentage favorable ≤ 50%). Acquirers and targets are distinguished by whether or not the merger was completed. *p*-Values for difference of means tests between recommendation levels are also reported.

^a, ^b, and ^c indicate significance at the 1%, 5%, and 10% confidence levels, respectively.

(positive) abnormal returns. Although these returns are small and indistinguishable from zero in the six-month window, one- and two-year returns are large and statistically significant. Acquirers with favorable PMARs earn abnormal returns 6.57% and 12.19% lower than those of acquirers with unfavorable ones over one- and two-year postresolution horizons, respectively. These differences are both statistically significant at the 1% level and are similar in completed deals. Differences in abnormal returns for *targets* with favorable and unfavorable average PMARs are also statistically significant at the one- and two-year horizons and range between 16.61% and 36.51% (*p*-values of 0.07 and 0.01, respectively), even though the sample size is small (460 terminations).²³

²² An alternative approach is to compute buy-and-hold returns (BHARs) by calculating each firm's return over a period after a deal relative to returns over the same window for a benchmark set of firms (Lyon et al. 1999). Although some argue BHARs do not account for cross-sectional correlations in returns, this method is still commonly used (Fu et al. 2013, Savor and Lu 2009); Bessembinder and Zhang (2013) argue that the differences in the two methods are based on control firms selected.

²³ Using BHARs, the differences between abnormal postresolution returns of acquirers with favorable and unfavorable average PMARs are −0.46%, 0.49%, 4.20%, and 7.92% over three-month, six-month, one-year, and two-year horizons, respectively. Similar to the calendar-time portfolio approach, the differences are significant at the 1% level at the one- and two-year horizons. We also obtain similar results if we measure abnormal returns using BHARs with Fama–French industry adjustments, CARs, and CARs with Fama–French industry adjustments.

Overall, the results in this section, combined with returns around PMARs, indicate that investors overreact to PMARs. This suggests that the effect of PMARs on merger outcomes represents firms and/or shareholders reacting to valuation effects that are systematically biased.

5. Conclusion

This paper investigates the effect of stock analyst recommendations issued after merger announcements on completion decisions. Results based on a sample of U.S. public deals between 1993 and 2008 suggest recommendations impact deal outcomes by altering a target's assessment of the acquirer's and target's valuations, and hence the desirability of the offer. The probability of deal completion increases (decreases) substantially with the number of favorable acquirer (target) PMARs and decreases (increases) with the number of unfavorable acquirer (target) PMARs. Using an instrumental variables approach, merger outcomes continue to be related to recommendation favorability, consistent with PMARs having a causal effect on deal outcomes.

To clarify the causal relations between PMARs and merger outcomes, we explore two possible explanations: feedback and valuation. Using three tests to differentiate between these two explanations, we collectively provide support for valuation rather than feedback in driving the relations we observe between PMARs and merger completion. We also find that the stock market overreacts to these recommendations, as firms with favorable PMARs significantly

underperform those with unfavorable PMARs over various horizons.

Although a number of papers have examined how markets respond to analysts' opinions, few have examined the real economic implications of these recommendations on the decisions of firms and managers. Our results suggest managers and/or shareholders account for valuation implications of analyst recommendations around mergers, and these recommendations impact deal completion. Potential biases in recommendations, however, lead to possible mispricings of acquirers and targets in these transactions. This hints at the possibility that shifts in value for reasons unrelated to fundamentals play a role in determining the outcomes of proposed mergers.

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Appendix

Table A.1 Descriptions of Variables Used in Analyses

Variable	Description
<i>Favorable_Acq_Recs</i>	Number of favorable acquirer PMARs (upgrades or strong buy initiations)
<i>Favorable_Tgt_Recs</i>	Number of favorable target PMARs (upgrades or strong buy initiations)
<i>Unfavorable_Acq_Recs</i>	Number of unfavorable acquirer PMARs (downgrades and initiations below buy)
<i>Unfavorable_Tgt_Recs</i>	Number of unfavorable target PMARs (downgrades and initiations below buy)
<i>Num_Recs_Preann</i>	Number of opinions in the preannouncement period (days –50 to –1)
<i>Num_Recs_Ann</i>	Number of opinions from day +1 to resolution
<i>Average_Acq_Rec</i>	Average acquirer PMAR
<i>Average_Tgt_Rec</i>	Average target PMAR
<i>Acquirer_Advisors</i>	Number of M&A advisors to the acquirer
<i>Target_Advisors</i>	Number of M&A advisors to the target
<i>Num_Acq_Analysts</i>	Number of analysts making at least one acquirer PMAR in merger window
<i>Num_Tgt_Analysts</i>	Number of analysts making at least one target PMAR in merger window
<i>Same_Analyst_for_Acquirer_and_Target</i>	Indicator = 1 if an analyst makes a recommendation on both the acquirer and target on same day
<i>Acq_Fee</i>	Indicator = 1 if a fee is paid to the acquirer advisor
<i>Tgt_Fee</i>	Indicator = 1 if a fee is paid to the target advisor
<i>Merger_Program</i>	Indicator = 1 if acquirer makes three or more public deals over a five-year window
<i>Same_3-digit_SIC</i>	Indicator = 1 if target and acquirer have the same three-digit SIC code
<i>Merger_Completion</i>	Indicator = 1 if transaction is completed after announcement
<i>100%_Cash</i>	Indicator = 1 if transaction is a pure cash deal
<i>100%_Stock</i>	Indicator = 1 if transaction is a pure stock deal
<i>Tender_Offer</i>	Indicator = 1 if transaction is a tender offer
<i>Cash_Tender_Offer</i>	Indicator = 1 if transaction is a cash tender offer

Table A.1 (Continued)

Variable	Description
<i>Fixed_Dollar_Amount</i>	Indicator = 1 if transaction has a fixed dollar payment
<i>Fixed_Exchange_Ratio</i>	Indicator = 1 if number of shares exchanged between acquirer and target is fixed
<i>Fixed_Payment_Collar</i>	Indicator = 1 if transaction has a fixed payment collar
<i>Fixed_Exchange_Collar</i>	Indicator = 1 if transaction has a fixed exchange collar
<i>Collared_Deal</i>	Indicator = 1 if transaction has any form of collared offer
<i>Bid_Revisions</i>	Indicator = 1 if final price offered varies from initial offer price (SDC)
<i>Days_to_Resolution</i>	Number of days from deal announcement to completion or termination
<i>Log_Transaction_Value</i>	Natural log of value of the deal
<i>Absolute_Size</i>	Acquirer or target log market value of equity obtained from CRSP (price × shares)
<i>Relative_Size</i>	Absolute target size divided by sum of absolute target and acquirer size
<i>Premium</i>	Offer price to target stock price premium four weeks prior to announcement (SDC)
<i>Acq_Run-up</i>	Preannouncement returns for the acquirer (days −30 to −5)
<i>Acq_Ann_Return</i>	Announcement returns for the acquirer (day −1 to day +1)
<i>Tgt_Run-up</i>	Preannouncement returns for the target (days −30 to −5)
<i>Tgt_Ann_Return</i>	Announcement returns for the target (day −1 to day +1)
AA	Recommendation favorability by the recommending analyst on his or her coverage universe from the six months prior to the merger announcement through resolution
BA	Recommendation favorability at recommending analyst's brokerage firm excluding acquirer and target industries from the six months prior to the merger announcement through resolution

Note. M&A, merger and acquisition.

Table A.2 Content of Analyst Reports on Acquirer and Targets

Panel A: Summary of information in analyst reports		
Content	Acquirer (%)	Target (%)
Merger mentioned in report	93	95
Specific discussion of synergies/fit	80	55
Merger explicitly discussed with respect to recommendation or price target	57	61
Nonmerger fundamentals discussed with respect to recommendation or price target	98	65
Positive tone on transaction price	15	6
Negative tone on transaction price	11	1
Possibility of competing bids mentioned	2	3
Panel B: Veritas reports		
J.P. Morgan	“We believe that it is hard to make a case for buying VRTS as stand-alone equity at current levels, which now represents a premium to the group. We do not believe VRTS deserves a premium valuation given slowing growth, recent miss-execution and structural changes in the marketplace that will make it harder for VRTS to sustain growth longer term. We maintain our Neutral rating; however, there could be an acquisition premium given the recent announcement. We do believe that VRTS has more value as an acquisition, although we would obviously expect to see a premium in an acquisition, we believe that \$29.70 is probably on the inside of what VRTS could garner in a transaction.” (Holt et al. 2004)	
Fulcrum	“We are lowering our rating on VRTS to NEUTRAL (from BUY) primarily based on the stock's limited upside from the current level. We believe the merger with Symantec will go through. Although there are speculations of potential bidders with higher bids, we don't think speculation is a good reason for investors to buy the stock at the current level. Although we fail to see significant product-synergy between VRTS and SYMC, we would also see issues if a hardware vendor were to acquire VRTS—primarily being hardware channel conflict. Also, VRTS stock is likely to move in-synch with SYMC stock going forward (1.1242 share conversion); SYMC shares are down 30% this week, so we believe a rebound in SYMC stock could move VRTS stock upward. However, again, the upside could be limited from the current level.” (Chang 2004)	
CIBC	“We are downgrading the shares of VERITAS from Sector Outperformer to Sector Performer. . . . The company has agreed to be bought by Symantec for roughly \$13.5 billion, or between \$30–\$31 per share, which is just above our former target price of \$30. Although there is a chance a competing bid could emerge, we believe both the boards and management teams of both Symantec and VERITAS sound very committed to this deal, giving any competing offer a low chance of success. Absent this, the only alternative outcome, other than consummation, would be for the deal to break, which we believe would yield a negative return for investors.” (Shauger and DeVreker 2004)	
Credit Suisse	“We are assuming coverage of VERITAS because of the departure of the previous lead analyst. Given the pending merger with Symantec, we are assuming coverage with a Neutral rating and \$28 price target, as compared with an Outperform rating and \$25 price target previously.” (Winslow 2004)	

Notes. This table provides a summary on the information provided in a sample of 300 randomly selected acquirer and target analyst reports from Thomson ONE between 1999 and 2008. Panel A shows commonly delivered content in each report, and panel B provides excerpts of anecdotal reports from four analysts at Veritas Software Corporation (target) who received a bid from Symantec Corporation (acquirer) in 2004. CIBC, Canadian Imperial Bank of Commerce.

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