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On the information role of stock recommendation revisions ☆

Oya Altınkılıç [a], Robert S. Hansen [b,*]

[a] Joseph M. Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA 15260, USA
[b] A.B. Freeman School of Business, Tulane University, New Orleans, LA 70118, USA

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ABSTRACT

We examine the information transmission role of stock recommendation revisions by sell-side security analysts. Revisions are associated with economically insignificant mean price reactions and often piggyback on recent news, events, long-term momentum, and short-run contrarian return predictors, typically downgrading after bad news and upgrading after good news. However, the revisions are usually information-free for investors. The findings go against the long-standing view that recommendations are an important means by which analysts assimilate information into stock prices. They disagree with the view of policymakers that analysts' stock picks materially impact stock prices.

1. Introduction

In an informationally perfect market, stock prices reflect all available information, indicating to investors the expected return on their investments. In reality, information is rarely perfect, and this allows economic agents to improve

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* Corresponding author. Tel.: +1 504 865 5624.
E-mail address: rob.hansen@tulane.edu (R.S. Hansen).

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information efficiency by profiting from costly information discovery and incorporating their information into security prices (Grossman, 1976, 1995; Grossman and Stiglitz, 1980).[1] In this study, we focus on the information role of security analysts through their recommendations to buy, hold, and sell stocks (sometimes called stock picking). In the information role, if analysts believe markets are reasonably efficient then they revise their recommendations based on new price-to-value comparisons built from private information and the belief in their superior ability to create information by processing public information. A widely accepted view is that analysts are information agents and they convey negative information through revision downgrades (e.g., revising a buy to a hold) and positive information through revision upgrades (e.g., revising a hold to a buy). Studies show that stock prices fall over 4% at downgrades and rise over 3% at upgrades. In the information role view, such returns are evidence of better stock picking that rewards analysts' reputations and yields career opportunities.

Although the analyst information role is widely accepted, there are reasons to call into question the interpretation of revisions in the information role and the revisions evidence. Because revisions provide the same information to all watchful investors at the same time, they are unlikely to be of much value to any single investor. This suggests that revisions could be an inefficient method for brokerages to profit from their information discovery effort, given their other means for profiting on their valuable information. Second, the evidence suggests that the value of the information transmitted through revisions is inordinately large. Simple calculations show the yearly value of revision stock returns, per brokerage, tops $100 billion, which exceeds brokerage equity value. Third, over a third of the revisions are contrary to the measured returns (see Conrad et al., 2006). Fourth, extant research questions the importance of the information role by advancing other purposes for revisions, which we collectively call the marketing role. These include influencing brokerage–client relations through exchange of revisions for management information or other quid pro quos (Schipper, 1991; Francis and Philbrick, 1993); building reputation for stock picking in analyst rankings crafted by *Institutional Investor* (I/I) and the *Wall Street Journal* (WSJ) (Stickel, 1992); promoting brokerage investment banking business (Lin and McNichols, 1998; Michaely and Womack, 1999; Ljungqvist et al., 2006; Kolasinski and Kothari, 2008); and boosting brokerage trading revenue (Jackson, 2005; Irvine et al., 2007). Both the information role and the marketing role are consistent with the fact that brokerages annually spend large sums for analysts' research.

This paper reports new evidence of stock-returns behavior around revision announcements that overturns prior revisions evidence. Prior findings often use daily or overnight stock returns to measure the value of analyst information transmission. We show that almost 80% of the revisions are in response to corporate events, which frequently release firm-specific information about earnings and investments a few hours before revisions are announced. Thus, the daily and overnight return measures for analyst information have a basic identification problem as they contain reaction to the events, making them prone to erroneous inferences. To avoid this identification problem, we measure revision returns using a narrow return intervals around daytime revision announcements, similar to the approach of Graham et al. (2006) for identifying daytime dividend announcement returns from other event returns. We find the mean 40 minutes revision announcement returns are economically unimportant (−0.03% for downgrades and 0.03% for upgrades). These results are robust to wider windows of one hour and two hours and they agree with growing evidence showing that stock prices react in minutes to new information (Dann et al., 1977; Barclay and Litzenberger, 1988; Kim et al., 1997; Busse and Green, 2002; Chordia et al., 2008).

Moreover, we report revision pre-returns, from the day before and until the revision announcement, are economically large and agree with the revisions, on average (−3.7% before downgrades and 1.1% before upgrades). Our analysis suggests the pre-returns are triggered by followed firm events.

Revision post-returns trend in the direction of the revisions on average, falling 65 basis points (bps) after downgrades and rising 47 bps after upgrades. However, up to two-thirds of the post-return can be explained by the pre-return, pre-events, and known predictors of long-term momentum and short-run return reversals. The 19–20 bps residual post-return is economically small and below round-trip transaction costs. Although the residual could reflect analyst information, it is also true that it could reflect additional predictors of future returns and changes in expected returns that are allied with the corporate news and events.

A central question raised by our findings is as follows: Why is there so much news just before analysts announce their revisions? Perhaps analysts' leak their information just before revising. Because the news is mostly about corporate operations, management is a likely source for analysts' information. However, because of Reg FD, after October 2000 management is barred from selectively disclosing privileged information to analysts. Thus, if analysts systematically leak their information, then more revisions should follow corporate events before Reg FD than after. Yet, we find the opposite. Moreover, many revisions are contrary to the news. Events and news give analysts rich opportunities to apply their superior skills to process news into new information. However, although such processing can occur, we find revisions are typically information-free. A third possibility is that analysts, in pursuit of their careers, strategically piggyback revisions on events, returns, and future return predictors, to better align their revisions with recent and future returns. This can improve analyst stock picking reputation and spur trading, boosting brokerage revenues and analyst income, and reducing the chance of job loss. The accepted WSJ analyst rankings, for example, which rely partly on picked stock returns measured from before to

[1] Bekaert and Harvey (2000), Shleifer (2000), and Basak and Croitoru (2006) provide detailed discussions of speculators and risk arbitrageurs as information agents.

Table 1
Daily and multi-day announcement returns at recommendation revisions reported in earlier studies.

Study (sample source)	Sample period	Relative days	Downgrade		Upgrade	
			Returns (%)	*N*	Returns (%)	*N*
Elton et al. (1986), Table 3 (Bankers trust)	1981–1983	−10 to +10	−0.56	1637	1.91	496
Womack (1996), Table 3 (I/I)	1989–1991	−1 to +1	−4.30	570	3.30	694
Francis and Soffer (1997), Table 2 (Investext)	1988–1991	−1 to +1	−2.41	53	0.75	49
Mikhail et al. (2004), Table 1 (Zacks)	1985–1999	−2 to +2	−2.92	68,472	1.14	61,014
Ivkovic and Jegadeesh (2004), Table 5 (I/B/E/S)	1990–2002	0 to +2	−6.20	53,542	3.80	42,971
Asquith et al. (2005), Table 1 (I/I)	1997–1999	−2 to +2	−6.60	125	4.50	262
Green (2006), Table 2 (I/I)	1998–2001	0 to +1	−8.81	4450	5.74	2727
Chang and Chan (2008), Table 3 (First call)	1997–1999	−1 to +1	−4.70	15,084	2.02	12,324

Reported are sample periods and stock-return measures computed around downgrade and upgrade recommendation revisions, where the announcement day is day 0, from selected studies (with recommendation sources). While downgrades (upgrades) are lowered (raised) recommendations, not all samples involve simple downgrades or upgrades as in this study. Elton et al. (1986) report monthly returns for 496 recommendation changes to a buy and 1637 changes to neutral (as computed from their Table 1). Womack (1996) examines extreme downgrades or upgrades. The (Asquith et al., 2005; Green, 2006) samples are built from *First Team All American* rankings in *Institutional Investor* (I/I). I/B/E/S = Institutional Brokers' Estimate System.

after the revision day, raise rank for larger announcement returns and better future return prediction.[2] Our findings are consistent with this piggybacking explanation. Thus, piggybacking on the news can explain the appearance of large price reactions before revision announcements.

We report new revisions evidence showing analyst revisions are typically information-free, contrary to the information role. Analysts appear instead to piggyback revisions on news of pre-events, pre-returns, and future return predictors, whose impact the market has already assimilated within a matter of minutes. Thus, the stock market is informationally more efficient than previously believed. The finding may be important in related literatures in which revision returns are a measure of analyst information, or serve as prima facie evidence of widespread informational inefficiency. It raises concerns with the usefulness of stock-return-driven practitioner measures of analyst stock picking performance. Moreover, Securities and Exchange Commission (SEC) reforms, such as Reg FD, rely in part on the presumption that analyst opinions in the form of recommendations materially impact stock prices. We note, however, that our findings do not rule out the notion that analysts' are information agents in other ways, as presaged by Grossman (1976, 1995) and Grossman and Stiglitz (1980). The findings broaden understanding of analyst behavior and could attach greater importance to the marketing role than is now recognized.

The rest of the paper proceeds as follows. Section 2 reviews the associated literature. Section 3 describes the sample and shows stock returns around revisions and their informativeness. Section 4 considers pre-returns and pre-events. Section 5 investigates possible sources of error in the announcement returns. Section 6 examines the post-returns. Section 7 concludes the paper.

2. Associated research and our related results

That revision announcements are information-free on average is a clear reversal of the finding reached in many studies that sell-side analyst revisions cause large absolute returns (Table 1). The studies usually measure the revision reaction with a multi-day return centered on the announcement day (henceforth, centered return) and record large losses at downgrades and large gains at upgrades across a variety of data sources. Because daily abnormal returns around revisions can stem from piggybacked events, pre-returns, and predicted future returns, the findings are not unambiguous evidence of revisions in the information role. Kim et al. (1997) and Juergens (1999) study the recommendation initiation, an analyst's first recommendation for a firm. These studies reach conflicting conclusions on whether revisions transmit information. Green (2006) reports typical overnight returns to night revisions by all-star analysts using value weights and large absolute returns using equal weights. These findings do not generalize to revisions because revisions are not defined for initiations and revision return reactions cannot be identified from overnight returns due to confounding events.[3]

The centered daily revision announcement return is a proxy for analyst information provision and performance in cross-sectional studies (Stickel, 1995; Mikhail et al., 2004). Authors report positive correlation between performance measures built from the centered return and analyst reputation for earnings forecast accuracy, and brokerage marketing capability.

[2] Both I/I and WSJ improve analyst ranking when revision calendar-year returns are higher (Emery and Li, 2009). The rankings are discussed in Wall Street Journal (1999, 2001, 2003), and http://statcheck.firstcall.com/dvt/methodology. Empirical studies relating to stock picking reputation include Stickel (1992), Krigman et al. (2001), and Leon and Wu (2007).

[3] A priori it may not be possible to unambiguously credit piggybacking or analyst information with daily or overnight abnormal returns around revisions. However, Appendix A notes findings that support piggybacking over the information role, under the assumption that brokerages maximize profit.

However, our results suggest the return is often a reaction to piggybacked events. Thus, the cross-section results could be spurious. Analogously, measures of abnormal trading around revisions are likely to be confounded with abnormal trading triggered by events and news (Irvine, 2000; Jackson, 2005; Juergens and Lindsey, 2006).

We find short-run returns after revisions share determinants with post-earnings announcement drift (PEAD) and guidance drift (Ball and Brown, 1968; Bernard and Thomas, 1989; Patell, 1976; Penman, 1980), which agrees with piggybacking. Piggybacking also suggests the returns could reflect omitted changes in expected returns. Perhaps good (bad) news on which upgrades piggyback jointly signals an increase (decrease) in the firm's expected return that is unaccounted for. Fama (1998) notes event momentum could be traced to event-driven changes in expected returns, and Ditmar et al. (2007) report price–momentum results from changes in expected returns.[4] Although we do not investigate post-revision long-run returns, authors report long-run abnormal returns follow revisions and suggest they reflect a behavioral underreaction to information released by analysts' revisions (Jegadeesh et al., 2004; Barber et al., 2001).[5] In agreement, studies use those returns to proxy for analyst information value (Mikhail et al., 2004; Loh and Mian, 2006; Barber et al., 2007; Fang and Yasuda, 2008). However, underreaction does not seem to explain short-run returns after revisions. Underreaction requires an initial reaction to the information (Fama, 1998) and that short-run returns are inversely related to announcement returns, which we do not find.

Our finding of more downgrades (upgrades) as pre-returns fall (rise) resembles herding, in which some analysts follow other analysts' revisions. Authors recognize analyst herding in their earnings forecasts and in other reports, and often suggest it is a response to career concerns (Trueman, 1994; Graham, 1999; Scharfstein and Stein, 1990; Welch, 2000; Hong et al., 2000; Hong and Kubik, 2003; Gleason and Lee, 2003; Clement and Tse, 2003). Although the bunching of revisions we report may also reflect herding in response to career concerns, it may also reflect independent piggybacking, in which the typical analyst is more likely to revise, the bigger is the news.

Findings from our investigation could relate to SEC actions that bear on analyst recommendations. In October 2000, the SEC adopted Reg FD, a reform that requires managers to disclose material information simultaneously to analysts and investors, halting selective information disclosure to preferred parties. Reg FD should thus curb, if not halt, any analyst advantage from selective disclosure. Studies generally conclude that Reg FD reduced the amount of selective disclosure (Agrawal et al., 2006; Bailey et al., 2003; Gintschel and Markov, 2004; Goff et al., 2008). We do not find an obvious association between Reg FD and revision informativeness or piggybacking on pre-returns. In December 2002, the SEC reached agreement with leading investment banks in the Global Research Analyst Settlement (GRAS) to separate analyst research from investment banking, aiming to stop conflicts of interest (Jackson, 2005). Because our sample period extends only a year or two after these reforms, it is premature to draw broad conclusions for the reforms from our findings. The third SEC action relates to the debate over applicability of the fraud on the marketplace presumption to security analysts' opinions. The SEC argues the presumption, which relies on the assumption that analysts' opinions materially impact stock prices, applies to analyst reports. Chen et al. (2005) conclude that fraud on the marketplace presumption should not apply to recommendations. Our findings show revisions do not have a significant impact on price and investors typically are not influenced by revisions.

Ljungqvist et al. (2009) find Institutional Brokers' Estimate System (I/B/E/S) historical files that could hinder researchers' ability to reproduce previously reported results in earlier time periods. The inability to replicate earlier results does not appear to be a major concern in this study. Like all the studies in Table 1, which focus on earlier time periods, we show the revision announcement return measured over a multi-day period is large in absolute value. This result is replicated for a large sample, in various subsamples, and in every calendar year.

In summary, for more than two decades, empirical studies typically have measured return reactions to analyst revisions with a multi-day return centered on the revision announcement day, and they have reported large negative returns for downgrades and large positive returns for upgrades. The findings have been influential and widely accepted as evidence that analyst revisions play an important information transmission role in capital markets. Other studies report cross-section results that use a centered daily revision abnormal return as a measure of analyst information transmission. Authors also attribute post-revision long-run abnormal returns to the correction of underreaction to revision information transmission, and they use the returns to proxy for revision performance.

3. Revisions and stock returns

Our initial focus is on daily stock returns immediately around and at the revision announcement identified with *First Call* time stamps, which reveal the analyst's brokerage house but not the analyst. Daily stock prices are from the Center for Research in Security Prices (CRSP) and intraday stock prices are from the Transactions and Quotations file (TAQ). Information reported by I/B/E/S and Securities Data Company (SDC) is used to identify earnings as well as merger or equity

[4] For early discussion of how expected return changes can explain drift, see Ball et al. (1993), Foster et al. (1984), and Bernard and Thomas (1989). For discussion of how fundamental changes can impact expected returns see McDonald and Siegel (1985), Lucas and McDonald (1990), Berk et al. (1999), Gomes et al. (2003), Kogan (2004), Carlson et al. (2004, 2006), Zhang (2005), Cooper (2006), and Pástor and Veronesi (2005).

[5] For behavioral theory rationales, see Daniel et al. (1998), Barberis et al. (1998), and Baker and Wurgler (2002). Brandt et al. (2008) shows earnings announcement returns partly drive earnings momentum and Chordia and Shivakumar (2006) find earnings momentum explains price momentum.

issuance events. The sample period is 1997–2003. Monetary variables are expressed in December 2003 dollars using the consumer price index.

3.1. The revisions sample

Table 2 reports features of the revisions and the daily mean and median abnormal returns around their announcement. Much of our analysis focuses on the daytime revisions because we seek to isolate the revision announcement return from prior event news. In the case of nighttime revision announcements, returns for the lengthy overnight period (from the prior close at 16:00 to the open at 9:30) include the reaction to the revision announcement and the reaction to confounding events announced in the night. Hence, the return reaction to the revision announcement cannot be identified. Although a majority of the 1,12,475 revisions are announced during nighttime hours, the TAQ sample includes by construction daytime revisions only and is composed of 82.1% of the entire daytime sample (Panel A). The tendency for downgrades to

Table 2
Sample statistics.

	All	Downgrades	Upgrades
Panel A: all revisions			
All	112,475	62,869 [56%]	50,052 [44%]
Nighttime	68,868	37,705 [55%]	31,163 [45%]
Daytime	43,607	24,718 [57%]	18,889 [43%]
TAQ daytime	35,803	20,300 [57%]	15,503 [43%]
TAQ revision days	28,794	15,803 [55%]	12,991 [45%]

New recommendation	Prior recommendation				
	Strong buy	Buy	Hold	Sell	Strong sell
Panel B: revision transition matrix					
Strong buy	–	5645	3164	90	33
Buy	6560	–	5056	198	82
Hold	4883	6875	–	820	300
Sell	181	240	872	–	115
Strong sell	71	132	377	109	–

Relative day	Downgrades			Upgrades		
	N	Mean	Median	*N*	Mean	Median
Panel C: daily abnormal returns for daytime revisions						
−5	24,718	−0.03	−0.11***	18,889	0.01	−0.02
−4	24,718	0.07***	0.07	18,889	−0.09***	−0.13**
−3	24,718	−0.29***	−0.12***	18,889	−0.08***	−0.14***
−2	24,718	−0.15***	−0.09***	18,889	−0.06**	−0.13***
−1	24,718	−1.25***	−0.54***	18,889	0.23***	0.24***
0	24,718	−3.62***	−1.63***	18,889	1.34***	0.87***
1	24,718	−0.38***	−0.36***	18,889	0.26***	0.24***
2	24,718	−0.13***	−0.17***	18,889	0.02	0.00
3	24,718	0.06***	−0.00	18,889	−0.03	−0.03
4	24,713	−0.17***	−0.07***	18,882	0.01	−0.07**
5	24,708	−0.06***	0.00	18,879	0.10[1]	0.12***
Panel D: daily abnormal returns for nighttime revisions						
−5	37,704	−0.06***	−0.10	31,164	0.18***	0.04
−4	37,704	0.00	0.00	31,164	0.03*	−0.08**
−3	37,704	−0.08***	0.00	31,164	−0.06***	0.00
−2	37,704	−0.35***	−0.20***	31,164	−0.06***	0.00
−1	37,704	−1.23***	−0.62***	31,164	0.46***	0.40***
0	37,704	−3.46***	−1.67***	31,164	1.85***	1.29***
1	37,704	−0.19***	−0.25***	31,164	0.22***	0.15***
2	37,704	−0.09***	−0.09***	31,164	0.21***	0.13**
3	37,704	0.00	−0.07	31,164	0.18***	0.07**
4	37,701	−0.10***	−0.11***	31,162	0.09**	0.00
5	37,699	−0.15***	−0.12***	31,157	0.07***	0.00

Reported are all stock recommendation revision frequencies, from *First Call*, and those also reported on TAQ, and the TAQ revision days (days with at least one revision), over 1997–2003. Downgrades (upgrades) are lowered (raised) revisions. Nighttime (daytime) revisions are after or before (during) trading hours. Downgrade and upgrade fraction is in brackets. Panel B reports the matrix of revision transitions from prior recommendation level to the new level. Panels C and D report value-weighted mean and median daily abnormal returns (raw return less the CRSP market return reported over the 10 days centered on revision announcement day 0), for all revisions. *** (**, *) indicates statistically significant at the 1% (5%, 10%) level for two-sided Student *t*-statistic.

predominate, making up from 55% to 57% in the night and the day samples, replicates a similar tendency reported in most large sample studies (Table 1). In contrast downgrade shares are well below 50% in the small sample studies of more elite analysts.

The daytime revision matrix shows 94% of the revisions transition between strong buy, buy, and hold (Panel B). Overall, there is a drop from the strong buy (down to 25% from 33%) and buy (down from 36% to 33%) recommendations, which is largely taken up by an increase in the holds (from 26% to 36%). There are no initiations or affirmations as the sample is revisions only.

3.2. Daily returns around revisions

Panels C and D of Table 2 report the mean daily abnormal returns. Because returns are measured over such a short period, daily expected returns are close to zero and daily abnormal returns are simply measured by the raw return less the market return, for each of the 11 trading days centered on the revision announcement day (day 0). For the daytime revisions, downgrades' mean abnormal return is initially flat and then falls on days −1 and 0 by 4.87%. Upgrades' mean abnormal return is also initially flat and then rises 1.57% on the two days before. Similar return patterns are present for the revisions in the night, as downgrades are associated with a 4.69% drop over days −1 and 0, and upgrades are associated with a 2.3% increase (Panel D). Median returns are qualitatively similar and smaller in absolute value.

The findings thus corroborate similar findings in earlier studies noted in Table 1. The conventional interpretation of these results is that revisions are informative, downgrades are associated with signaling falling value and upgrades are associated with signaling rising value.

3.3. Detailed returns around revisions

To examine returns around revision announcements more closely, we focus on the three days centered on the announcement day, which is a typical period in prior studies that rely on multi-day announcement returns (Table 1). The three days are divided into three periods. The pre-period is the day before and the first part of the revision day before the announcement period. The revision announcement period is the 40 minutes centered on the announcement time. The post-period is the last part of the revision day after the announcement period plus the next day. The respective returns are computed as

$$R(-1,0^{-}) = [P(0^{-})/P(-2)] - 1, \tag{1}$$

$$R(0^{-},0^{+}) = [P(0^{+})/P(0^{-})] - 1, \tag{2}$$

and

$$R(0^{+},+1) = [P(+1)/P(0^{+})] - 1, \tag{3}$$

where $P(-2)$ and $P(+1)$ denote CRSP closing prices on relative days −2 and +1; $P(0^{-})$ is the mean transaction price in the first 10 minute in the announcement period (if missing, then the next 10 minute mean, etc.); and $P(0^{+})$ is the last 10 minute mean price (if missing, then the prior 10 minute mean, etc.), where both are identified from TAQ.

Consider first returns for each period and their accumulation for all brokerages (Panel A, Table 3). For downgrades the mean pre-return is statistically and economically significantly negative, the mean announcement return is statistically significantly below zero but not economically significant, and the mean post-return is significantly negative and marginally economically significant. For upgrades the mean pre-return is large and significantly positive, the announcement return is significantly positive but not economically significant, and the positive mean post-return is economically modest. Collectively, revisions are preceded by economically large absolute returns in the direction of the revision, and their announcement is associated with a few basis points in the path of the revision.

Similar inferences apply to return behavior relating to revisions by top brokerage analysts and those at one of the GRAS banks (Bear, Stearns & Co. Inc.; Credit Suisse First Boston LLC; Goldman, Sachs & Co.; Lehman Brothers Inc.; J.P. Morgan Securities Inc.; Merrill Lynch; Pierce, Fenner & Smith Inc.; Morgan Stanley & Co. Inc.; Citigroup Global Markets Inc.; Salomon Smith Barney Inc.; and US Bancorp Piper Jaffray Inc.). However, the mean pre-return for top analysts is larger in absolute value than for the other analysts. This is consistent with top analysts being more selective by piggybacking proportionally more of their revisions on larger absolute returns. Because the GRAS banks are a subset of the top brokerages and their empirical results are similar, we report findings only for the top brokerages to economize on space. These findings are supported by median return reactions, which are virtually 0.0% for both downgrade and upgrade announcements, in all partitions.

Untabulated results verify the three return patterns: follow valuable news, information-free announcements, and small post-returns, in each year and month, on each trading day, and in each daily trading hour. Reg FD, which prohibits management information disclosures to selected analysts and requires such disclosures to be made public at the same time, does not appear to have had a significant impact on the informativeness of analyst revisions or on the large pre-returns, as the two return patterns are qualitatively the same before and after Reg FD. Similarly, GRAS has not had a

Table 3
Revision returns for sample TAQ firms.

	Downgrades					Upgrades				
	N	$R(-1, 0^-)$	$R(0^-, 0^+)$	$R(0^+, +1)$	$R(-1, +1)$	*N*	$R(-1, 0^-)$	$R(0^-, 0^+)$	$R(0^+, +1)$	$R(-1, +1)$
Panel A: brokerage type										
All brokerages	20,300	−3.68***	−0.03***	−0.65***	−4.49***	15,503	1.03***	0.03***	0.47***	1.54***
		[−1.58***]	[0.00]	[−0.54***]	[−2.45***]		[0.85***]	[0.00]	[0.21]	[1.18***]
Top brokerages	9147	−4.02***	−0.05***	−0.76***	−4.83***	6826	1.20***	0.04***	0.38***	1.62***
		[−0.99]	[−0.00]	[−0.49]	[−1.48]		[0.57]	[0.00]	[0.32]	[0.89]
GRAS banks	3332	−5.02***	−0.05***	−0.79***	−5.96***	2430	1.64***	0.02***	0.94***	2.70***
		[−1.48]	[−0.01]	[−0.47]	[−1.96]		[0.90]	[0.00]	[0.49]	[1.39]
Panel B: trending versus contrarian										
Trending	12,811	−7.08***	−0.03***	−0.73***	−7.84***	9466	4.02***	0.04***	0.55***	4.59***
		[−3.97***]	[0.00]	[−0.56]	[−4.81***]		[2.81***]	[0.01]	[0.36***]	[3.72***]
Contrarian	7489	2.96***	−0.04***	−0.64***	2.28***	6037	−3.63***	0.01***	0.34***	−3.28***
		[1.83***]	[−0.00]	[−0.47***]	[1.43***]		[2.02***]	[0.00]	[0.03]	[−2.14***]
Panel C: pre-event type										
Earnings	4004	−4.85***	−0.07***	−0.38***	−5.32***	3572	1.61***	0.03***	0.48***	2.13***
Earnings guidance	2772	−10.83***	−0.00***	−1.27***	−12.49***	796	0.99***	0.04***	0.71***	1.64***
Earnings and guidance	1278	−4.29***	−0.06**	−0.66***	−5.02***	941	2.36***	0.03***	0.75***	3.14***
Transactions	1550	−1.22***	−0.02	−0.54***	−1.77***	1308	0.77***	0.06***	0.55***	1.39***
Remainder	10,696	−1.59***	−0.02***	−0.68***	−2.34***	8886	0.96***	0.01***	0.36***	1.35***

The sample is described in Table 2. Panel A reports for revision types, mean [median] returns over the trading day before to 20 min before the revision announcement, $R(-1, 0^-)$; over the 40 min centered on the revision announcement, $R(0^-, 0^+)$; from 20 min after the revision announcement to the close of the next trading day, $R(0^+, +1)$; and their sum, $R(-1, +1)$. Downgrades (upgrades) are lowered (raised) recommendations. Top brokerages have over a thousand revisions. Global Research Analyst Settlement (GRAS) banks are the parties that first agreed with the SEC to the global research analyst settlement (Bear, Stearns; Credit Suisse First Boston; Goldman, Sachs; Lehman Brothers; J.P. Morgan Securities; Merrill Lynch; Pierce, Fenner & Smith; Morgan Stanley & Co.; Citigroup Global Markets; Salomon Smith Barney; and US Bancorp Piper Jaffray). Panel B reports returns for trending revision whose direction agrees with the pre-return direction, and contrarian revisions that disagree with the pre-return direction. Thus, all pre-returns are negative (positive) for trending (contrarian) downgrades. Panel C reports returns for major events; earnings, earnings guidance, and transactions, and the sample remainder. *** (**, *) indicates statistically significant at the 1% (5%, 10%) level for two-sided Student *t*-statistic (Wilcoxon sign-ranked test for the medians).

noticeable impact on the level and mix of revisions, as revisions score their third highest year and the downgrade-to-upgrade ratio hits its third lowest year, in 2003. We also examine return behavior around revisions formed into "revision days", where revision day returns count each firm's daily return once. In this sample, non-reported findings show the pre-return falls as the number of revision day downgrades rise, and it rises as the number of upgrades rise, suggesting that as prior news increases in value more analysts piggyback their revisions on the news. For example, the mean pre-return for one downgrade (upgrade) is −1.35% (+0.65%), and statistically significantly larger at −10.88% (+3.39%), with three or more downgrades (upgrades), yet announcement reactions differ by six basis points. This clustering phenomenon gives the empirical impression of herding, as similar revisions by different analysts can arise in a quick sequence (Trueman, 1994; Scharfstein and Stein, 1990; Graham, 1999; Welch, 2000). It also agrees with the view that more analysts are increasingly inclined to respond to larger price changes with a revision, independently of other what other analysts may be doing.

3.4. Trending and contrarian revisions

Another often overlooked dimension of analyst revisions, first noted by Conrad et al. (2006), is that although revisions can trend with the recent news, they are often contrary to the news. Panel B, Table 3, reports the returns for the trending and contrarian revisions. By construction, for trending downgrades (upgrades) all pre-returns are negative (positive), and for contrarian downgrades (upgrades) all pre-returns are positive (negative). Although trending predominates our sample (62.2% = (12,811+9466)/35,803), contrarians make up a substantial fraction, particularly more so for upgrades (44% = 7489/(9466+7489)) than for downgrades (32% = 6037/(12,811+6037)). Among trending revisions 50.2% are by top brokers while 45.8% of the contrarian revisions are by top brokers. Fig. 1 reports mean cumulated 10 minute interval returns starting 80 intervals before announcement interval zero and ending 80 intervals after (80 intervals is 13 hours or two trading days), conditioning on good news and bad news pre-returns that highlights these revision types.[6] The cumulative mean return shows that revisions are made after large price movements, noticeably more so for trending revisions, and thus soon after much information has been incorporated into stock prices. It does not appear to be the case that revisions produce large return reactions. The revisions are followed by mild price reactions in the direction of the revision, for both downgrades and upgrades, whether trending or contrarian. The figure also shows that the average result observed in past studies for all analysts does not apply equally to trending analysts that follow the market and contrarians who do not when making their revisions.

4. The pre-returns and pre-events

We next examine how well the pre-returns can be attributed to events taking place soon before the revisions. As a rule, corporate events tend to associate with the large pre-returns before revisions. Panel C of Table 3, for example, reports stock returns for several accessible machine readable events, which we call major events: management earnings reports, earnings guidance, and financial transactions. Earnings reports are the most popular event, preceding 25% of the revisions in most years. A typical report releases for the first time portions of the firm's quarterly income statement, revealing sales, net income, and related figures about the current quarter's cash flow, often with little commentary. In the earnings guidance report, which precedes 16% of the revisions, management typically issues a statement noting how well or poorly the firm's earnings are likely to be in light of the existing earnings estimates from analysts. The guidance often reveals a range of expected earnings per share and how it could deviate from analyst estimates, and it offers significant information and discussion about other operating changes. Thus, while both reports are different, they similarly pertain to current and likely future earnings behavior. Management earnings guidance has become more popular over the sample period. Combined, the two earnings events associate with at least 40% of all revisions in most years. Transactions account for another 8% of the revisions and often refer to an ongoing sale of equity securities to raise capital or ongoing progress in a corporate restructuring.[7]

Skewness is noticeable in pre-returns and revisions across the events. Downgrades are far more common after earnings guidance than after the other events (78% versus 55%). Moreover, downgrade abnormal pre-returns are much worse after earnings guidance, confirming similar findings in earlier studies (e.g., Jennings, 1987; Rogers and Stocken, 2005). The asymmetries agree with a tendency for management to disperse good news as it is received and to harbor bad news, perhaps hoping the news will reverse or improve over time, resulting in a buildup of bad news by the release date. A perusal of examples from Factiva.com shows guidance reports often reveal greater exposure to significant changes in investment opportunities associated with unanticipated downsizing, such as an increased pace of industry downturns,

[6] The cumulative return is measured as $CAR(-80,T) = [P_{10}(T)/P_{10}(80)]-1$, $T = -80, -79, \ldots, 0, \ldots, +79, +80$, where $P_{10}(T)$ is the nearest transaction price (within nonoverlapping +5 and −5 minute) to interval T's 10 minute point (e.g., for 9:40 the interval is from 9:35 to 9:45), or the mean of multiple prices that are identically nearest, except at the more densely traded 9:30 market opening and 16:00 market closing points, where the nearest transaction price, or mean if multiple prices, in the respective first or last 5 minute is used. In the rare circumstance of no available transaction price within the 10-min interval, the prior interval price is used.

[7] While we account for significant events in approximately 80% of the revisions, we are not the first to point to such events (e.g., see Hansen and Zhou, 2005). However, studies typically identify smaller fractions of events: 17% (Stickel, 1995), 9% (Womack, 1996), 53% (Asquith et al., 2005), and 16% (Chen et al., 2005).

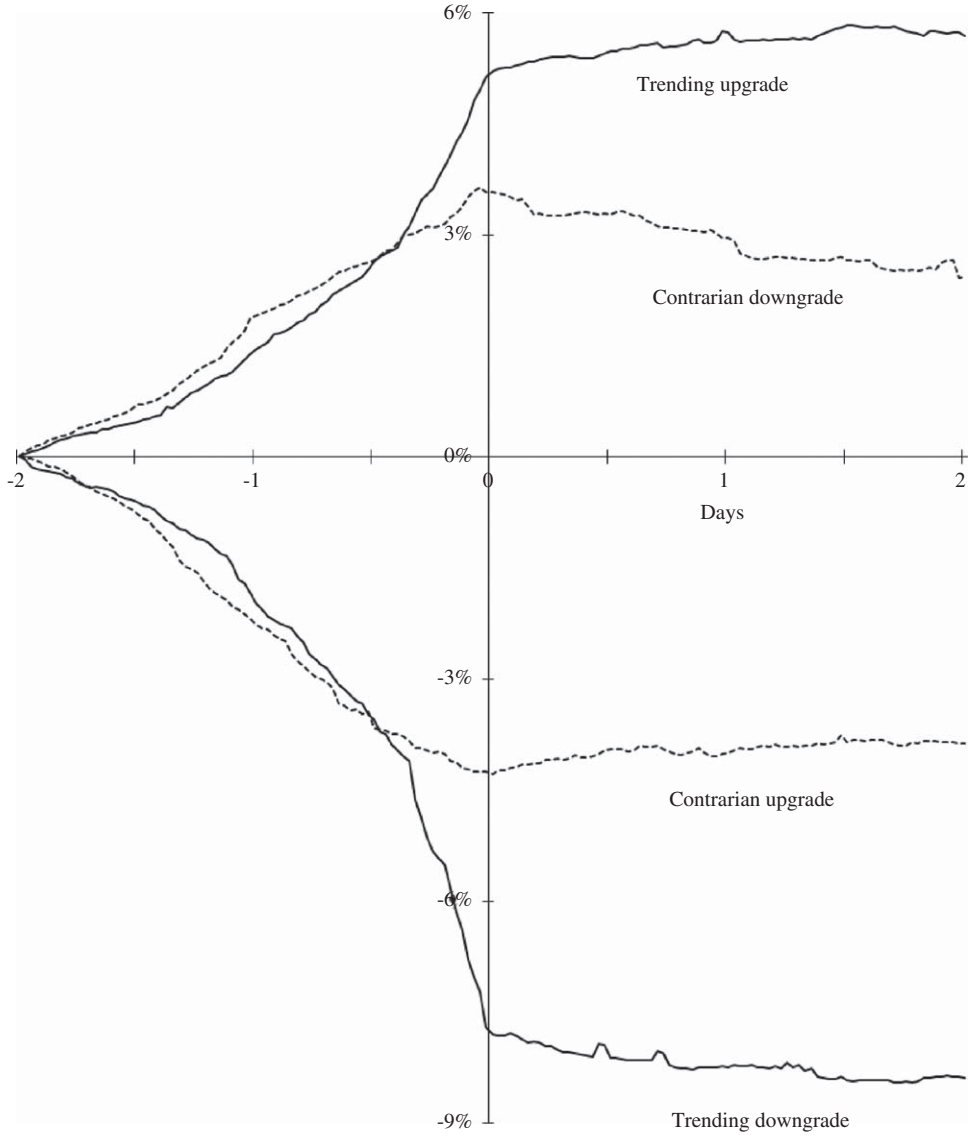

Fig. 1. Mean cumulative returns centered on the revision announcement time. The sample is described in Table 2. Pictured are mean cumulative returns from transaction prices for 161 10 minutes intervals, starting two trading days before through two trading days after the 10 minutes revision announcement interval 0. Downgrades (upgrades) are lowered (raised) revisions. By construction, returns over days −2 and −1 are positive before trending upgrades and contrarian downgrades, and negative before trending downgrades and contrarian upgrades.

a reduction in capital expenditures, increased cost-cutting programs, contract terminations, sales reductions, and deteriorating global demand. Conrad et al. (2006) also find asymmetric returns around downgrades and suggest they reflect analyst reluctance to downgrade due to a fear of management reprisal, which could pale when the firm encounters bad times.

Aligning the revisions in the respective daily event time shows that a majority of the revisions follow the event announcement day, with a large fraction announced on the days after the major event (Fig. 2). Relatively more revisions seem to be issued on guidance announcement days than the day before. For the other events, it is most common that analysts wait longer to announce their revisions. Given the generally larger absolute abnormal pre-returns associated with earnings guidance, this could reflect a tendency for analysts to announce revisions more quickly when the event news is more severe.

About one-third of the revisions are announced on the event day. To see how well these revisions follow significant events on the same day, we examine a representative sample. Revisions on earnings event days are sorted chronologically, and, for every 20th revision, Factiva.com is searched for the earnings announcement time. A similar process is followed for guidance events. Virtually all (96%) of these revisions are announced after the media report of the earnings-related event. Most of the other 4% that precede the earnings event are made after other significant news reports, occurring six hours

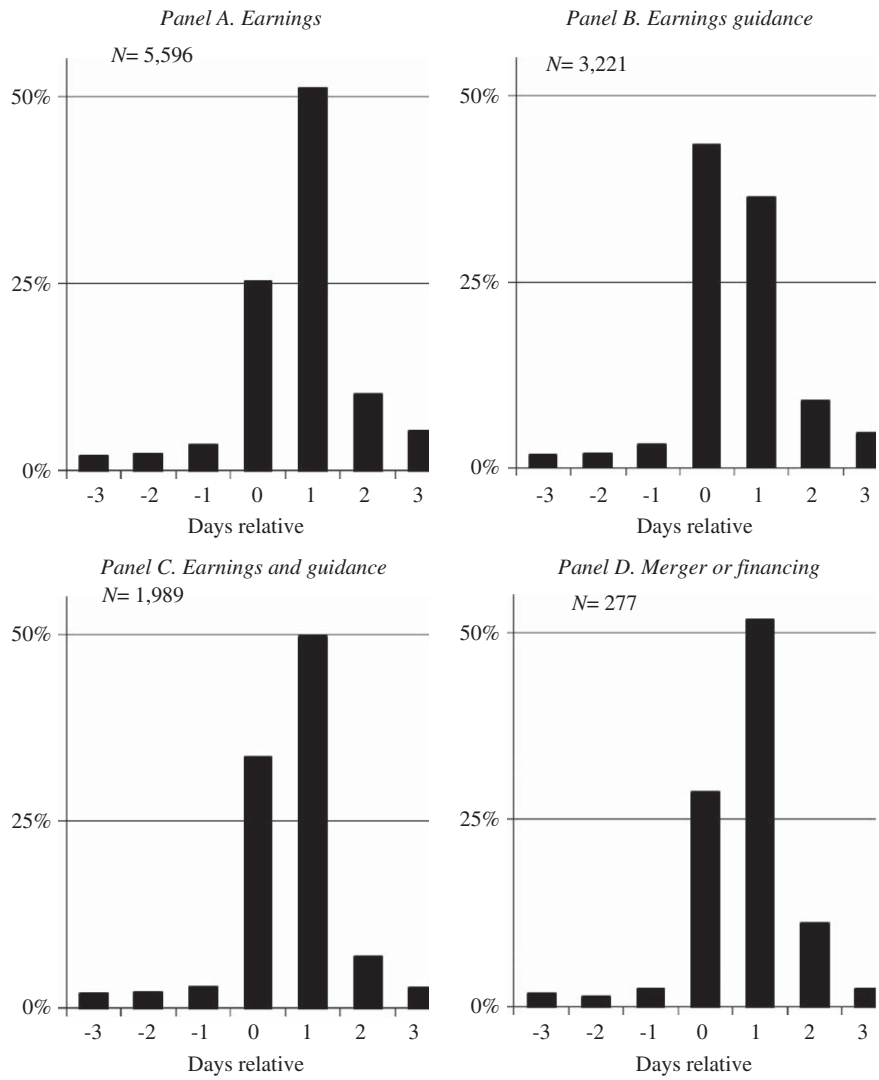

Fig. 2. Revision timing relative to selected corporate event dates. The sample is described in Table 2. Depicted are the daily fractions of the indicated number of revisions over the seven days centered on the announcement day of the respective corporate events: earnings, earnings guidance, and corporate transactions (mergers and equity financings) as reported by SDC.

after the event announcement, on average (median of 6.3 hours). Taken together, these results show that revisions are often made on a significant event day and overwhelmingly after the event is announced.

To further examine the remainder revisions that have no major event (Panel C, Table 3), these revisions were sorted chronologically and a sample of every 15th revision is drawn. For the 1305 revision sample, Factiva.com was searched for events on the day of and the two days before the revision announcement. Forty-five kinds of events are found (see Appendix B) for 822 (63%) of the revisions that are sorted into four media types: earnings, financings, business changes, and other events. Of these events, 72% are related to earnings, financings, and business changing news. The return patterns for each media type are similar to the patterns in the major event groups, and they reveal that a great deal of news is reflected in the pre-returns while little information is in the revision announcement (not reported). Thus, further broad evidence exists that revision announcements follow soon after significant corporate events.

A variety of significant corporate events precedes the vast majority of revision announcements by one to three days or by a number of hours on the announcement day. A rational best guess for the rate of media events for the sample remainder, 63%, predicts 6731 of the downgrades and 5592 of the upgrades follow a significant event. Pooling these predicted event cases with the major events, an estimated 80% of the revisions follow a significant event. Moreover, the revisions are not associated with a material price reaction regardless of the event type. Given the large abnormal pre-returns for each type of event, the information-free revision announcements, and the modest short-term drift, these results agree with the notion that pre-events account for the large pre-returns. Events are also announced for 44% of the nighttime revisions and are just as common as daytime events. Untabulated data also show the pattern of night events is similar to

the day pattern: 48% of day events are earnings announcements, 21% are management earnings guidance, 14% are both types of announcements, and 17% announce a transaction. The results indicate that much of the aggregate value that stems from the daily abnormal returns around revisions that has been shown in earlier studies can be attributed to significant economic consequences revealed in corporate event news, instead of to analyst revisions. The results are consistent with the view that revisions follow significant news and provide relatively little information, but they are inconsistent with the long-standing view that analyst recommendations are an important information transmission mechanism.

5. Announcement return measurement error and anticipation

5.1. Announcement window shortness bias

Although the evidence thus far agrees with the conclusion that revisions are information-free, on average, a natural concern is that revisions provide analyst information, yet because of measurement error or investor anticipation of that information, the information is impounded in the large pre-returns, leaving the announcement return information-free.

Here, we examine whether the 40-min revision announcement window is too short, biasing the measured announcement returns toward zero. We assess the shortness bias concern by expanding the window to one hour and then to two hours, while controlling for confounding events. The reported test uses revisions that have a guidance event announced on the revision announcement day. The sample, using the guidance time stamp reported by *First Call*, is partitioned into those revisions in which a guidance event announcement overlaps the revision announcement window and those revisions in which the guidance event is announced before the revision announcement window. Revisions announced in the early morning are included in the overlap sample due to confounding event bias.[8]

Panel A of Table 4 reports mean returns over the two trading days before and after the revisions, respectively, R(pre) and R(post), measured net of the announcement returns, and mean centered returns for one- and two-hour revision announcement windows, R(1 hour) and R(2 hours), respectively. When the guidance event overlaps the announcement window, the revision announcement return is large in absolute value and statistically significant, consistent with the presence of confounding event bias. In contrast, when the guidance event is before the announcement window, there is no material reaction to the revision announcement, whether measured over a one-hour window or a two-hour window, for both upgrades and downgrades. The results show that widening the announcement window does not have a material impact on the mean announcement return after controlling for confounding event bias. They show the announcement window shortness bias is not a significant issue.

To shed more light on the measurement window shortness concern another test compares revision announcement returns using all of the major events in the broader sample and two distinct revision groups that control for confounding event bias using event days. In the overlap group revisions are announced on the day a confounding major event is announced or in the first trading hour on the day after a confounding major event is announced. The non-overlap group contains all other revisions announced on the day after the confounding event day. Shortness bias predicts larger absolute announcement returns in both groups when the window is widened. Confounding event bias predicts larger absolute announcement returns only in the overlap group. Thus, the revision announcement return is not identifiable in the overlap group. We thus test for announcement window shortness bias in the non-overlap group. Revision centered announcement returns are built for wider one- and two-hour windows using the 10 minutes interval TAQ prices and are contrasted with the 40 minutes announcement returns.

In the overlap group widening the announcement window exposes the return to investor reaction to guidance events. For example, for downgrades announced soon after night events, there is a large −5.13% return before the revision announcement and a −1.81% reaction in the revision announcement hour. A corresponding pattern is present for upgrades. Revision announcement reactions are similarly overstated in the wider windows in each of the other overlapping samples. In the non-overlap group the one- and the two-hour announcement returns are not significantly different from the 40 minutes announcement return (compare Panel B of Table 4 with Panel A of Table 3). These results are confirmed for downgrades and upgrades. They agree with the notion that the 40 minutes announcement window is not so short that it significantly censors revision announcement returns. In unreported results these findings are confirmed individually for each of the different major events and the media events.

5.2. Do pre-returns anticipate revisions?

A mutually compatible story for the findings is that investors often learn analysts' information and incorporate it into stock price just before the revision is announced. Perhaps, for example, analysts systematically transmit their information

[8] It is tempting to simply widen the announcement window but this will increase the exposure of the measured announcement return to prior event reactions, which under piggybacking confounds the return measure, making revisions appear informative even when they are not. Unreported results confirm that confounding event bias often arises from nighttime events, making the 20-min opening return unusually large in absolute value due to the spillover of investor reaction to the night event.

Table 4
Revisions return reactions over one- and two-hour announcement windows relative to event announcements.

Revision	Sample	One-hour revision announcement window				Two-hour revision announcement window			
		N	*R*(pre)	*R*(1 hour)	*R*(post)	*N*	*R*(pre)	*R*(2 hour)	*R*(post)
Panel A: guidance event on the revision day									
Downgrade	Overlap	206	−7.50***	−2.45***	−0.29	230	−5.77***	−3.83***	0.16
	Non-overlap	537	−10.28***	−0.21***	−0.54***	513	−10.57***	−0.16**	−0.89***
Upgrade	Overlap	82	4.58***	0.21*	0.31***	93	4.87**	1.87**	0.88**
	Non-overlap	184	2.28***	−0.01***	0.92***	175	1.55***	−0.36*	0.62***
Panel B: key event on the day before the revision									
Downgrade	Overlap	2990	−5.13***	−1.81***	−1.01***	2990	−4.38***	−2.67***	−0.89***
	Non-overlap	1670	−5.75***	0.02	−0.91	1670	−5.70***	0.02	−0.36
Upgrade	Overlap	1,890	1.62***	1.05***	0.53***	1890	1.35***	1.32***	0.55***
	Non-overlap	1059	2.801	0.14	-0.10	1059	2.701	0.14	−0.15

The sample is described in Table 2. Reported in each panel are mean returns over the two trading days before and after the revision announcement, *R*(pre) and *R*(post), respectively, net of the one- or two-hour announcement returns, *R*(1 hour) and *R*(2 hour), respectively, centered on the revision announcement. In Panel A, returns are reported for revisions that have an earnings guidance event on the same day. In the overlap samples, the guidance event occurs within the revision announcement window, and in the non-overlap sample the guidance event occurs before the revision announcement window. In Panel B, returns are reported for four major events: earnings, earnings guidance, earnings joint with earnings guidance, and transactions (mergers and new issues). In this panel the overlap sample includes revision announcements on days when events are announced and revision announcements in the first hour of trading on days after an event is announced, and the non-overlap sample is all other revisions announced the day after the event day. Downgrades (upgrades) are lowered (raised) recommendations. *** (**, *) indicates statistically significant at the 1% (5%, 10%) level for two-sided Student *t*-statistic.

to clients and then, once the information is incorporated into stock price, announce information-free revisions. Here we report results from four tests of the anticipation story.

5.2.1. The contrarians

If analysts base their revisions on new information that is typically anticipated immediately before the revisions are announced, then the direction of the revisions and the sign of their mean pre-returns should agree. While this agreement is apparent in the full sample, on average, for the contrarian revisions, which are 38% of all revisions, mean pre-returns and revisions are in opposition, as downgrade pre-returns are +2.96% (median 1.83%) and upgrade pre-returns are −3.63% (median −2.02%) (Table 3). One would expect analysts, having provided good (bad) information about the company, to follow with an upgrade (downgrade). The contrarian revisions provide compelling evidence against anticipation.

5.2.2. The selective disclosure hypothesis

If investors often learn analysts' information through private communication just before the revision is announced, the predominance of corporate events just before revisions implies much of that information is probably about one of those events. This pattern points at firm management as a primary reliable source for analysts' information. Yet, we are unaware of published evidence showing that analysts have routine access to inside information on a scale large enough to explain the great value of information revealed in pre-returns for so many followed firms and over such an extended period. Irvine et al. (2007) report no direct evidence of widespread leaking. Nevertheless, if such broad access to inside news were to exist, it would likely be greater before Reg FD, when management could more freely disclose information to selected analysts, than after Reg FD, when selective disclosures are legally prohibited. The selective disclosure hypothesis predicts a high frequency of corporate events before revisions prior to Reg FD and a lower frequency after. The annual fractions of revisions associated with major corporate events (earnings reports, earnings guidance, and transactions) before 2000 is 43.3%, and rises by 4.3–47.6% for 3 years after 2000 (up 3.2% for downgrades and up 5.2% for upgrades). This contradicts the selective disclosure anticipation story.

5.2.3. Small pre-return hypothesis

A second test examines the investor anticipation story in which investors either fully anticipate the revision, or they are largely surprised by information at the revision. In this case the pre-return incorporates virtually all the information or virtually no information. If the analysts provide the new information for the first time through a revision, we should see small absolute pre-returns followed by large absolute returns reflecting the surprise. The indicator variable that equals one when pre-returns are below 1% in absolute value, $|R(-1, 0^{-})| < 1\%$, has no significant impact on the announcement return (Column 1, Table 5). These results reject the anticipation hypothesis. Inferences are unchanged using return cutoffs of 0.5%, 1.5%, and 2.0% and are thus not reported.

Table 5
Revision announcement return reaction tests.

Independent variable	(1)		(2)		(3)	
	× DOWN	× UP	× DOWN	× UP	× DOWN	× UP
Panel A: regression estimates						
Intercept	−0.01***	0.01*	−0.02***	0.02***	−0.02*	0.01
Topbroker	−0.01***	0.02**	−0.01***	0.02**	−0.05***	0.02*
$\|R(-1, 0^-)\| < 1\%$	−0.02	0.01				
Nokeyevents			0.00	−0.03*		
$R(0^+, +1)$ quartile					−0.01	0.02
Year-end dummies	Yes		Yes		Yes	
N	31,965		31,965		31,965	
Adjusted R^2	0.03		0.03		0.03	
Panel B: means of selected monthly regression estimates						
	$\|R(-1, 0^-)\| < 1\%$		Nokeyevents		$R(0^+, +1)$ quartile	
	× DOWN	× UP	× DOWN	× UP	× DOWN	× UP
Mean estimate	−0.03	−0.01	−0.00	−0.03	−0.01	0.02
N	84		84		84	

The sample is described in Table 2. Reported are linear regressions of the revision announcement return, measured over the 40-min window around the announcement. Independent variables include four zero-one dummy variables: Topbroker is one for top brokerages (those with more than a thousand revisions); $|R(-1, 0^-)| < 1\%$ is one when the absolute value of $R(-1, 0^-)$ is below 1%, where $R(-1, 0^-)$ is the return over the day before and through 20 min before the revision day announcement; Nokeyevents is one for firms with no major event announcement; and $R(0^+, +1)$Quartile is one when the post-return is in the top quartile for upgrades and bottom quartile for downgrades. In the estimations, each independent variable is multiplied by either DOWN, which is one when the revision is a downgrade, or UP, which is one when the revision is an upgrade. Panel A reports estimates from fitting all observations. Panel B reports the means of the indicated parameters from estimations of the model in every month of the sample period. The regressions include unreported year-end dummy variables. *** (**, *) indicates statistically significant at the 1% (5%, 10%) level for two-sided Student *t*-statistic.

5.2.4. *Reactions in the absence of a major event*

The third test assumes informed revisions tend to be allied with a major event. For example, revisions could be more likely right after firms announce earnings or guidance. In this case the partially anticipated event announcements signal sooner than expected arrivals of revision that are likely to have more information than previously expected, and could also intensify investor efforts to learn of analysts' information. Being more fully anticipated, the announcement of such event-linked revisions would then be less informative, ceteris paribus. To test this, we include an indicator variable, Nokeyevents, which equals one if there is no major prior event, and zero otherwise. Findings indicate that the announcement return is not significantly different from zero when there is no major prior event, rejecting this major event hypothesis (Column 2, Panel A, Table 5). Alternative variations of this hypothesis feature other definitions of major events (e.g., only an earnings event). Results from these tests are qualitatively similar and are thus not reported.

Panel B of Table 5 reports the mean monthly regression estimates for each hypothesis tested in Panel A, where only the respective test hypothesis coefficients are reported to save space. These estimates address the concern that findings in the full-sample estimation are blurred by extreme values or unusual subperiods. They reinforce the conclusions reached from Panel A and reject the anticipation story.

A concern is that *First Call* systematically reports delayed or inaccurate revision time stamps causing revisions to appear to be information-free while injecting the pre-return with the information. However, Table 4 evidence shows the central findings are invariant to widening the announcement return window to two hours, contrary to the stamp concern. In untabulated results, we also test time stamp accuracy using revisions announced the day after a major event or a media event, which are less likely to suffer from obvious event bias. Returns are examined around the time stamp for intervals of 1.5 and 3.5 hours, from 10:30 to 16:00, respectively, one and three hours before the announcement and ending 0.5 hour after (trimming the post-return exposure). The results show the 30 minutes opening returns contain reaction to overnight news and events, and the later returns that include revision announcements do not display any significant returns. Also note the anticipation tests throw additional light on whether the time stamps are late. Delay predicts revision anticipation. Thus, findings that reject anticipation indicate time stamp inaccuracy is a secondary concern.[9]

[9] Womack (1996) and Juergens (1999) report analyst research could enter *First Call's* system up to 90 min after clients receive it. As Green (2006) points out, their samples are before 1997, and since then analyst research is given to *First Call* with little delay and before it is given to brokerage sales. In agreement, in communications *First Call* notes they directly transmit their research to all institutional clients, and investors learn of the reports promptly. Footnote 3 of Brav and Lehavy (2003) detail *First Call* coding of analyst reports in "real-time".

6. The post-returns

Mean short-run returns drift in the direction of the revision (Panel B, Table 3). That drift could be registering information released by analysts with delay. Alternatively, both the revisions and the drift could be reflecting future return indicators made apparent in the pre-event announcements and news, or overhanging from possible pre-existing momentum. In this case revisions are information-free but could appear to agree with post-returns due to piggybacking on predictors of those returns. Here, we report results from testing these two explanations for the post-return behavior.

6.1. Is there underreaction to revisions that have greater short-term drift?

If the short-term drift after revisions is correcting underreaction to the revisions then there should be in the first instance a similarly signed reaction to the revision announcement (see, e.g., Fama, 1998). However, we find no reaction to the revision announcements, on average.

Underreaction also predicts announcement returns should be smaller when short-run drift is larger (in absolute value). To test this prediction, the announcement return regression is expanded with two variables. First is the product of an indicator variable that equals one for stocks with post-returns in the sample bottom quartile, and the downgrade dummy variable, $R(0^{+}, +1)$ Quartile $\times$ DOWN. These downgraded stocks have more downward short-run drift and thus should have announcement underreaction below the other downgrades, ceteris paribus. Second is a corresponding variable for upgrades: $R(0^{+}, +1)$ Quartile $\times$ UP. The estimated coefficients for these variables are not different from zero (Column 3, Panel A, Table 5). The results are corroborated in the mean of monthly regression estimates (Column 3, Panel B). They reject short-run drift as early correction of underreaction to analyst revisions. The results are qualitatively similar when the post-return is measured over five trading days (not reported).

6.2. The predictability of revisions and post-returns

The second explanation, that analysts piggyback revisions on technical predictors of post-returns, implies that predictors of future returns, both long-term and short-term, are significant determinants of the revision choice and the short-term drift after the revisions. We test these predictions in two steps.

Step one assesses if revision decisions agree with factors found in the literature that predict long-term momentum in future returns. A central predictor is the prior return. Upward (downward) momentum is reported in strategies that buy "winners" (sell "losers"); firms in the top (bottom) prior return fractiles (Jegadeesh and Titman, 1993, 2001). PEAD is directly related to earnings announcement returns (Brandt et al., 2008). The prior return is also a central short-term predictor in contrarian strategies (shorting past winners and buying past losers). Reversals have been shown to follow extreme prior return news shocks (Atkins and Dyl, 1990; Bremer and Sweeny, 1991). For the predicting prior return we use the pre-return, $R(-1, 0^{-})^{\pm}$, measured over day -1 and through 20 minutes before the revision announcement, where positive/negative pre-return is indicated by the $\pm$ superscript.

We consider a number of predictors of momentum, PEAD, and return reversals. Small firm size (Foster et al., 1984; Bernard and Thomas, 1989, 1990); firm risk (Bernard and Thomas, 1989); and trading volume (Garfinkel and Sokobin, 2006), are associated with larger momentum. Studies of contrarian strategies report short-run return reversals are more likely for small firms (Lo and MacKinlay, 1990; Lehmann, 1990; Bhushan, 1994; Conrad et al., 1994), higher volume stocks (Conrad et al., 1994), more illiquid stocks (Bremer and Sweeny, 1991; Cox and Peterson, 1994), and when autocovariance is negative (Lo and MacKinlay, 1990; Lehmann, 1990; Conrad et al., 1991). The studies also show stronger short-run trending when autocovariance is positive and volume is low.

If analysts make revision decisions that are based on prior returns and future return predictors then revisions should trend with the pre-returns, and can be contrary when the predictors point to reversal. To examine the decision, we use a logistical regression equation in which the dependent variable is one for upgrades, and several independent variables: Standard deviation, the difference between the daily return standard deviation over days -120 to -6 and +6 to +120 (revisions are announced on day 0); Abnormalvolume, trading volume over days -5 to -1, adjusted by mean volume over days -120 to -6 and +6 to +120; Autocovariance, stock return autocovariance over days -240 to -5; and Illiquidity, measured following Amihud (2002). We also include five indicator variables; Small firm, one for firms with market value of equity, measured using CRSP prices and shares, in the sample bottom quartile; two momentum predictors, announcements of earnings and guidance (Patell, 1976; Penman, 1980; Ball and Brown, 1968; Bernard and Thomas, 1989); one for merger or financing events, and one denoting top brokerage analysts.

Upgrades are more common after rising pre-returns (Column 1, Table 6). This shows revisions piggyback on pre-returns. Each future return predictor strengthens this relationship. The likelihood of an upgrade after positive pre-returns is greater for firms that announce earnings or guidance and, correspondingly greater for a downgrade. Contrarian upgrades (downgrades) when pre-returns fall (rise) are more likely after a transaction event. A number of the return reversal indicators reduce the likelihood of a trending revision (small firm, low autocovariance, heavy trading, low risk, and

Table 6
Return predictor impact on revision choice, post-returns.

Independent variable	Upgrade versus downgrade (1)		Post-announcement return (2)	
Panel A: revision logit and post-return ordinary least squares estimates				
Intercept	−0.08***		−0.07	
$R(-1, 0^-)$	13.77***		0.42*	
$R(-1, 0^-) \times$ small firm	−4.17***		−2.52**	
$R(-1, 0^-) \times$ autocovariance	12.43***		5.55***	
$R(-1, 0^-) \times$ earnings	4.48***		1.50***	
$R(-1, 0^-) \times$ guidance	4.68***		1.92***	
$R(-1, 0^-) \times$ transactions	−6.17***		−0.14	
$R(-1, 0^-) \times$ topbroker	−0.39***		−1.51***	
	$\times R(-1, 0^-)^-$	$\times R(^-1, 0^-)^+$	$\times R(0^+, +1)^-$	$\times R(0^+, +1)^+$
Standard deviation	3.06***	15.11***	−17.89***	14.29***
Abnormal volume	−4.09***	−4.11***	−1.02***	1.03***
Illiquid	−5.36***	5.29***	0.15***	15.23***
Year-end dummies	Yes		Yes	
	31,966		31,966	
	$\chi^2 = 1483$ ($p = 0.01$)		$R^2 = 0.72$	
	Raw estimates		Revised estimates	
	Downgrade	Upgrade	Downgrade	Upgrade
Panel B: abnormal post-announcement returns				
Mean	−0.67***	0.50***	−0.19***	0.20***
Median	−0.49***	0.24***	−0.10**	−0.16***

The sample is described in Table 2. The independent variables are small firm, dummy variable is one if firm market value of equity, measured with CRSP prices and shares outstanding, is in the sample bottom quartile; autocovariance, the daily stock return autocovariance over 240 days before day −5. Four zero-one dummy variables: Earnings is one for earnings and joint earnings and guidance announcements; Guidance is one for guidance announcements; Transactions is one for merger-related or equity financing-related events; and topbroker is one for top brokerages (those with over a thousand revisions). Standard deviation is the difference between 120-day daily return standard deviations over days −120 to −6 and +6 to +120. Abnormal volume is trading volume over days −5 to 0, adjusted by mean volume over days −120 to −6 and +6 to +120. Illiquid is stock illiquidity measured following Amihud (2002). The last three independent variables enter the estimations after being multiplied by the pre-return when it is negative and when it is positive, or by the post-return in the post-announcement and announcement return regressions, as noted by the intra-column headings. $R(-1, 0^-)^{\pm}$ is the return over day −1 through 20 min before the revision announcement, which at times could positive or negative, as indicated by the superscript is +(−). The case is similar for $R(0^+, +1)^{\pm}$. Panel A, column 1 shows revision logistic estimates, upgrades are one and downgrades are zero, where downgrades (upgrades) are lowered (raised) recommendations. Column 2 reports least squares estimates for the post-announcement return. Panel B reports means and medians for the abnormal post-return and its residual, from the regressions in Panel A. The regressions include unreported year-end dummy variables. *** (**, *) indicates statistically significant at the 1% (5%, 10%) level for two-sided Student *t*-statistic.

liquidity). The impacts of the interaction variables on the revision choice are essentially symmetric for risk, volume, and illiquidity, consistent with earlier findings, for both positive and negative pre-returns. The results show agreement between analyst revision decisions and well-known technical predictors of future returns. They agree with analysts giving weight to long-term momentum and short-run reversal predictors when making their revision decisions, in the shadow of career concerns.

Step two assesses whether the future return predictors also predict the short-run drift after revisions using a cross-section regression (Column 2, Table 6). That drift is moderated for both small and low autocovariance firms, and amplified for those with earnings and guidance events and top broker revisions. Three predictor effects depend on the sign of the post-return and are interacted with the positive/negative $(\pm)\ R(\ 0^+, +1)^{\pm}$. The pre-return is positively correlated with the post-return, as expected under piggybacking. The post-return is amplified by more risk, more pre-volume, and more illiquidity. These results show that return predictors documented in the literature, are significant determinants of short-run returns after revisions, in agreement with their effects documented in studies of price–momentum, PEAD, and future return reversals.

Residuals from the fitted post-return estimations show the predictors account for 50–60% of the short-run drift after revisions. Mean residuals are −0.19% for downgrades and 0.20% for upgrades (Panel B, Table 6), and medians are small and economically insignificant. Because they are small, the residuals are unlikely to represent economic profits once round-trip transaction costs are taken into account.

Because the post-return behavior agrees with many of the predictors, that return is likely to overstate the appearance of new information. The piggybacking of revisions on predictors falsely amplifies the appearance of agreement between the revision choice and the short-run post-returns. Although the post-return residual could contain a measure of new information passed from analysts to investors through revisions, it still also may overstate information flow because of other omitted predictors not examined here, and because there may be omitted changes in expected returns traceable to

changes in firm operations signaled by corporate announcements ahead of the revisions.[10] However, our purpose is not to account fully for the cross-section variation in the short-run post-return, and is instead to assess whether analyst revision choice is based on factors that are known to predict future returns.

6.3. A comparison of affirmation and revision post-returns

Perspective on piggybacking can be broadened by a comparison of stock returns after revisions with stock returns after affirmations, which are new recommendations that reiterate rather than revise an earlier recommendation. While we generally ignore affirmations because they are not obvious signals of changes in analyst opinions, we expect that when the analyst issues an affirmation after a news event, the post-return is likely to change less in absolute value, since in the information role the price-to-value ratio may not have changed suitably, and under piggybacking the expected post-return change was not large enough.[11] To test this prediction we compare returns after revisions with returns after *explicit* affirmations (i.e., affirmations that have the necessary *First Call* time stamp), that are first matched to have pre-returns similar to the pre-returns in the revision downgrade and upgrade samples. From *First Call*, 2027 affirmations meet the requirements of the revision sample, and we identify a similar sized sample of representative revisions by drawing every 17th revision from the revisions sample ($2105 = 35{,}803/17$), after being sorted by pre-return for downgrades then upgrades. For each of these revisions the pre-return is matched with the affirmation having the closest pre-return, so the affirmation sample pre-returns and the matched downgrade and upgrade revision sample pre-returns are virtually identically distributed. For example, the mean pre-return is −3.8% for the downgrade matched affirmations and +1.6% for the upgrade matched affirmations and the matched revision.

While the signs of the corresponding affirmation mean post-returns, −0.09% (p-value $= -0.40$) and 0.14% (p-value $=$ 0.37), agree with the signs in the matched revision downgrade and upgrade samples, neither of the affirmation post-return means is significantly different from zero, and both are economically small. This shows analysts are more inclined to revise than to affirm their recommendations when post-returns are predictably larger in absolute value, another sign of revision bunching. Further evidence of this bunching tendency is that the revision pre-return distribution is populated with more extreme pre-returns and is thus more fat-tailed. For example, the frequency of pre-returns below −10% is twice as high for revisions than for affirmations (over 11% versus under 5% for the affirmations), and the frequency above +10% is almost twice as high for the revisions (over 9% versus 5%, respectively).

7. Conclusion

Our findings show the revision of analyst recommendations to buy and sell stocks is typically information-free. They often quickly follow large stock prices reactions to corporate events and news, downgrades after negative news and upgrades after positive news, on average. Their announcement returns are small and their short-term post-returns drift mildly with the revisions. We examine if the pre-returns could reflect information implied by the revisions, perhaps because of measurement problems or systematic anticipation. But the evidence contradicts these explanations. In an obvious instance, over a third of the revisions are contrary to their large pre-returns. We examine the modest short-term returns, which might be registering analyst information with some delay. However, those post-returns tend to reflect common predictors of future returns, such as price–momentum indicators, PEAD predictors, and return reversal predictors, leaving less than 20 basis points of post-return unexplained, which is below round-trip transaction costs. While the post-return residuals could reflect investor reaction to analyst information, they could also reflect changes in expected future returns indicated by news of corporate earnings and investment opportunities and other long-term drift factors. The results show that analyst revisions piggyback on recent news and events, trending with short- and long-term momentum factors and contrarian with return reversal predictors, and their revisions are information-free. Revisions could be motivated by strategic career concerns, as better ranking of stock picking performance seems to both credit analyst with return performance and boost their pay and employment opportunities.

Our findings differ markedly from prior studies which report significant and large return reactions to revisions. We suggest the difference arises because analysts revise recommendations quickly after corporate news. This piggybacking blurs daily and overnight return measures for analyst information with reaction to the news, and prior studies have not effectively separated the revision-specific returns from that news. Using intraday data to measure the stock returns around recommendation revisions allows separating the revision period return from the pre-revision period return, as well as from post-announcement momentum and return reversals. We note other concerns with the information view. The notion that analysts simultaneously transmit valuable information to several savvy investors with new recommendations appears to be an inefficient way for brokerages to profit from expensive information discovery. Brokerages have a variety of ways to profit from their valuable investment information. We note peculiarities with past measures of revision information value.

[10] For example, authors note trading characteristics that often are unobservable for researchers could be useful in technical analysis, including past earnings behavior (Ball and Brown, 1968; Watts, 1978; Foster et al., 1984; Rendelman et al., 1987; Bernard and Thomas, 1989), the proportions of small and large trades (Bernard and Thomas, 1990; Battalio and Mendenhall, 2005), the proportion of informed trades (Easley et al., 2002; Sadka, 2006), and macroeconomic effects (Chordia and Shivakumar, 2006; Anilowski et al., 2007).

[11] We thank an anonymous referee for suggesting this affirmations test.

For example, when annually aggregated per broker, the implied value appears to be unusually large, exceeding brokerage market value of equity. Moreover, past measures appear to be wrong for the large fraction of contrarian revisions.

The new findings expand knowledge of analyst recommendation behavior and suggest the marketing role for revisions could be more important in future research. Among the implications that can be drawn from our results, we note first that they indicate the securities markets are informationally more efficient than previously believed. The findings are also of policy interest, as policymakers have relied on the view that analyst stock picking materially impacts stock prices. Another implication is that a need exists for a more comprehensive understanding of analysts' economic role and behavior, both theoretically and empirically. The findings call for more evidence about the information role, the marketing role and the analyst revision decision process. More empirical evidence is needed concerning measures of analyst information based on long-term returns following revisions. Our findings suggest an identification problem could be present in those measures, due to confounding events and news.

Appendix A

Panel A of Table A1 reports three day-centered abnormal returns after sorting on return breaks with absolute values under and above $|\pm\alpha\%|$. They show that high return revisions are more common than low return revisions. For example, at the $|\pm\alpha\%| = 3\%$ break, 61.5% of the revisions are high value. Using, instead, five day abnormal return to measure values, the frequencies of high-value revisions rise, respectively, to 79.2%, 68.6%, and 57.9% (not reported).

Panel B reports evidence showing that the value of the abnormal returns is too big to be attributed to analyst information. It reports dollar values and multiples for 11 prominent brokerages. Annual revision value for a brokerage is computed each year as

$$E = \Sigma R_i(3) \times p_i(\text{pre}) \times n_i(\text{pre}), \tag{4}$$

where for followed firm i, $R_i(3)$ is the three day revision announcement abnormal return, p_i(pre) is stock price five days before the announcement, and n_i(pre) is shares outstanding at that time (using CRSP stock price and shares outstanding). The brokerage income multiple is the ratio of the annual revision value to brokerage net income (Compustat item DATA172 or net income from the annual 10-K found on the SEC's Edgar, http://www.sec.gov). In the value multiple, brokerage net income is replaced with brokerage market value of equity (CRSP stock price times shares outstanding). For downgrades the return sign is reversed to record positively the value of the presumed negative information. To avoid double counting the value from multiple revisions for the same firm on the same day, only the first revision is used. Dollars are expressed in millions of December 2007 dollars using the Consumer Price Index.

Table A1
Values and multiples of revision 3-day abnormal announcement returns.

Break point $\pm a\%$	$\lvert\pm a\%\rvert = 2\%$		$\lvert\pm a\%\rvert = 3\%$		$\lvert\pm a\%\rvert = 4\%$	
Abnormal return, π	Number	Percent	Number	Percent	Number	Percent
Panel A: frequency of revisions						
$\pi \leqslant \lvert\pm a\%\rvert$	15,562	27.8	43,334	38.5	53,921	47.9
$\lvert\pm a\%\rvert < \pi$	81,788	72.7	69,141	61.5	58,554	52.1
Brokerage	Annual mean value (millions)		Total value (millions)		Annual mean value/NI	Total value/MVE
Panel B: yearly brokerage dollar value and proportions, of the 3-day abnormal return						
A.G. Edwards Inc.	$47,127		$329,887		165.1	11.9
Bank of America Corporation	156,648		1,096,535		17.0	1.5
Bear, Stearns & Co. Inc.	70,248		491,740		83.6	11.2
Citigroup Global Markets Inc.	240,664		1,684,650		15.6	1.1
Goldman, Sachs & Co.	145,898		1,021,283		45.8	3.4
J.P. Morgan Securities Inc.	106,849		747,946		32.4	2.7
Lehman Brothers Inc.	150,875		1,056,122		106.7	11.6
Morgan Stanley & Co. Inc.	182,958		1,280,710		37.0	2.4
Merrill Lynch	289,386		2,025,703		150.9	6.4
Prudential Inc.	123,567		864,972		118.5	4.7
Raymond James Inc.	136,904		958,329		107.5	6.7
Total	$138,901		$11,557,877		80.0	5.8
All other brokerages	$200,601		$12,838,451		n.a	n.a

The sample is described in Table 2. Panel A reports revision frequency sorted by whether the centered, 3-day cumulative abnormal revision announcement return is below or above the absolute value of return break point a. Panel B reports annual and total values of all revision announcements for the brokerages and two mean ratios. Annual value is the yearly sum of products of firm abnormal return and recent prior market value of equity for all brokerage revisions. Total value is the sum of the annual values over the sample period. The first ratio is the mean of the ratio of the annual value divided by brokerage net income, NI (Compustat item DATA172 and brokerage 10-K reports from SEC's Edgar). The second ratio is the mean of the total value divided by brokerage end-of-year market value of equity, MVE (CRSP year end price multiplied by shares outstanding).

Under the conventional view the annual dollar value of revision information released by each of five major investment banks (Bear, Stearns; Goldman, Sachs; Lehman Brothers; Merrill Lynch; and Morgan Stanley) exceeds $168 billion, on average. Collectively, the five investment banks' revisions are worth $839 billion annually. The annual value exceeds 84 times investment bank net income and is more than six times investment bank market value of equity, on average. The seven year sum of revision for the sample is worth $1.2 trillion per bank, or collectively just over $5.9 trillion for all five banks. The multiples are larger for the two smaller investment banks, A.G. Edwards and Raymond James. Similarly striking, yet smaller, multiples are evident for the four leading universal banks (Citigroup Global Markets Inc., J.P. Morgan Securities, Bank of America, and Prudential Financial), reflecting their other large sources of net income and supporting assets (e.g., 56% of Citigroup's 2003, $17,853,000,000 net income is from credit cards, consumer finance, and retail banking, which is not prominent in investment banks. Per bank the revision information is annually worth $157 billion, or collectively $628 billion for the four banks. Over the seven years, each bank releases $1.1 trillion worth of revisions, or $4.4 trillion worth of revisions are released by all four banks.

Panel B reports the revision value for all 11 banks exceeds $11.5 trillion and their multiples are large, on average. The last row reports that summary revision value for the remaining brokerages exceeds $12.8 trillion. Thus, the grand value of the revision abnormal returns is $24.3 trillion for the sample period, which reflects value from rising stock prices and from falling prices and a revision frequency that exceeds 15,000 per year and over 65 per trading day. To put the grand value in perspective, the December 2006 total value of New York Stock Exchange firms listed by CRSP is $15.5 trillion, or just under two-thirds of the grand value of revision returns for the 11 banks.

While the values and multiples are only reasonable lower-bound approximations, a number of caveats suggest they are conservative. Using five day abnormal returns boosts values and multiples by 7–10%. Dropping obvious loss firms pushes value up by 35% (75%) for major (minor) investment banks and 50% for universals, on average (obvious loss firms have absolute abnormal return under 1.5%.). Values climb over 25% if an 8% cost of equity is used to compound annual values into the 2007 value, as might be done in formal net present value or flow to equity valuations. Understatement is also likely as all value measures ignore profit spillover from asset substitutes and complements. For example, a brokerage can profit from information concerning firm A by trading the stock of firm *Z*, which could be larger and have a deeper market, hence profits could exceed 100% of the original information value about A. Restating the measures after taxes does not materially affect the conclusion that the abnormal returns are too big to agree with the information role, even at a rate as high as 35%.

Also note that under piggybacking, the value measures largely reflect new information that was freshly impounded into stock prices so the brokerages have no privileged information or obvious arbitrage opportunities. In this case, revisions release brokerage private information which the brokerage presumably could profit from. However, how well bank investors may capture their private information value has not been widely investigated, perhaps due to data scarcity and difficulties with measuring profit, and only a few studies report impact cost evidence related to the private information case. Lakonishok and Lee (2001) find little cost for insider trading. Obizhaeva (2007) reports impact cost in portfolio transitions which may rely on private information. A theoretical level estimate for private information capture is half the inverse of Kyle's (1985) lambda. There is no reason that fraction cannot exceed 100% before adjusting for trader profit. We thank Tarun Chordia and Pete Kyle for helpful input on this point (Table A1).

Appendix B

The media event sample is every 15th revision from the chronologically ordered Remainder groups in Panel C of Table 3. Reported is the nature of the Factiva.com announcements reported over the day before and the day of but before the revision announcement time, for the sample formed into the four classes reported in Table 3. Revisions are classified on the basis of the first Factiva.com announcement in the event of multiple announcements.

Earnings news: Earnings announcements and sales announcements.

Financing news: Alter borrowing base, boost reserves for liabilities, debt financing-related, debt rating change, dividend change, equity financing-related, filing-related, private placement, selected into stock index, stock rating change, stock repurchase, stock split, and stock swap.

New business: Asset sale, cut workforce, divestiture, Food and Drug Administration-related government approval, merger, new client, new contract, new products, new projects, new strategic plan, outsourcing, product withdrawal or delay, sale of stake in another company, and stakeholder holding change.

Other news: Accounting issue, chief executive officer talk, Chapter 11 discussion, competitor news, foreign stock market-related, gold price rising, governance action, industry wrap-up, insider trading, lawsuit, make donation, and management change, terrorism related, union dealing, win award, and 52 week high and low (Dow Jones).

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