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Value line quarterly EPS forecast error: Analyst credibility or management appeasement?

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Abstract

A study of Value Line quarterly earnings forecast errors from 1999 through Q3 2016 shows that the direction of forecast bias and forecast efficiency with respect to earnings news depend on investment rating. Patterns of bias and inefficiency indicate that Value Line analysts are primarily motivated to maintain credibility with investors than to appease company managers. For Buy-rated stocks, forecast bias is pessimistic, and forecasts are inefficient with respect to good earnings news. When news is bad for Buy-rated stocks, forecasts are unbiased and efficient. For Sell-rated stocks, forecast bias is optimistic, and forecasts are inefficient with respect to bad earnings news. When news is good for Sell-rated stocks, forecasts are unbiased and efficient.

Jel classification: G11; G14

Keywords: Value Line; Earnings forecasts; Earnings management; Earnings forecast bias; Earnings forecast inefficiency

1. Introduction

With roots dating to 1931, Value Line, Inc. (symbol: VALU) provides independent investment research that for many years has had substantial influence with individual investors. Value Line's core business is producing investment periodicals and underlying research, and its target audiences are individual investors, colleges, libraries, and investment

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management professionals. In its annual report for 2016, Value Line, Inc. reported total revenue from investment periodicals and related publications of $34.5 million. Its flagship publication, the *Investment Survey*, has been published weekly since 1965. It has been recognized by Hulbert Financial Digest in its Newsletter Honor Roll, most recently in 2016. The *Investment Survey* delivers the research and ratings of Value Line's analyst team for 1,700 public companies, which comprise roughly 90% of the market capitalization of U.S. common stocks. Investment ratings are conveyed by Value Line's Timeliness Rating System, which ranks stocks for relative 6-to-12-month-ahead stock price performance. The performance of Value Line's Timeliness ratings has been referred to in prior research as the "Value Line enigma." In addition, the *Investment Survey* delivers both short- and long-term forecasts of 23 financial variables for the companies in its coverage universe. Although investors spend tens of millions of dollars annually subscribing to Value Line publications, relatively little has been reported about the quality of the financial forecasts produced by the company's analysts. The aim of this article is to help close this gap in the literature by reporting an analysis of the bias and inefficiency in Value Line's quarterly earnings per share forecasts.

There is a large literature on analysts' earnings forecasts generally. Perhaps the salient findings are that they are biased and inefficient—short-range forecasts are characterized by pessimism, long-range forecasts by optimism, and forecasts generally do not fully reflect available information. Observed distributions of EPS forecast error typically display a preponderance of large negative forecast errors vis-à-vis large positive errors (a "tail asymmetry") and a preponderance of small positive forecast errors vis-à-vis small negative errors (a "middle asymmetry"). These asymmetries reflect that companies more often than not report earnings that meet or beat analysts' forecasts and that when they miss they tend to miss by wide margins. They have been attributed to (a) incentives for reporting firms to take 'earnings baths' (i.e., large losses) when they cannot meet current earnings benchmarks, (b) incentives for reporting firms to meet or beat earnings forecasts by managing reported earnings and/or by guiding analysts to beatable forecasts, and (c) incentives for analysts to play along with the firms they cover in the earnings guidance game. Among analysts employed by sell-side firms, incentives to produce optimistic forecasts arise from pressures to generate investment banking and trading revenue. Among analysts generally, the pressure for optimistic forecasts also has been attributed to analysts' need to appease the firms they cover for fear of losing access to management as the result of too-critical coverage. Tempering these incentives to optimism are management guidance to analysts to issue beatable forecasts and analysts' desire to maintain credibility with investor clients. In sum, the observed distribution of earnings forecast error is the outcome of a complex interplay of incentives faced by managers of public companies and the analysts who cover them.

Value Line earnings forecasts are uniquely useful for unraveling, at least in part, this confounded knot of incentives. Because Value Line is an independent research firm, its analysts do not support either investment banking or brokerage operations. Hence, only two of the theories of analyst motivation cited in the literature can potentially explain the bias and inefficiency in Value Line forecasts, namely, management appeasement and analyst credibility. In addition, unlike most analysts who produce simultaneously both investment ratings

and earnings forecasts, Value Line analysts produce forecasts only, and they do so with prior knowledge of stocks' investment ratings. In this setting, patterns of forecast bias and inefficiency arguably differ between management appeasement and analyst credibility incentives. The literature indicates that one reason analysts issue biased forecasts is to appease or flatter management to obtain underwriting business and for fear of losing access to management information. If managers prefer that analysts issue beatable earnings forecasts, then analysts will generally oblige them by issuing forecasts that most firms will meet or beat. Moreover, when revising their forecasts, analysts will generally respond more fully to bad earnings news than to good news. Further, if beatable forecasts serve to counteract ill will stemming from undesirable investment ratings, analysts will respond more fully to bad news for low-rated stocks than they will for high-rated stocks, and when news is good they will respond more fully for high-rated stocks than for low-rated stocks. Conversely, if, instead of appeasing company management, analysts seek to maintain or build credibility with investor clients, they will issue forecasts that favorably rated companies will most often meet or exceed, and they will issue forecasts that unfavorably rated companies will most often fail to meet. Hence, forecast pessimism will increase with investment rating. Additionally, analysts will respond more fully to bad news than to good news for favorably rated stocks, and they will respond more fully to good news than to bad news for unfavorably rated stocks. Empirical results reported herein shed new light directly on the motivations of Value Line analysts in particular and indirectly on the motivations of analysts generally.

The distribution of Value Line quarterly EPS forecast error from 1999 through the third quarter of 2016 is consistent with prior studies of analysts' earnings forecast error. The overall mean (median) forecast error is −1.4 (0.0) cents per share, and the frequency of positive errors exceeds that of negative errors by 49 to 43%. These results and others reported herein indicate the presence of both middle and tail asymmetries in the forecast error distribution, similar to that documented in prior research. What has not been reported previously, however, is that, although these asymmetries appear in the entire sample, segmenting by investment rating shows that the middle asymmetry is confined primarily to stocks rated Buy and the tail asymmetry is confined to stocks rated Sell. As well, Value Line earnings forecast bias and inefficiency display distinctly different patterns across Buy, Hold, and Sell rating categories. Forecast pessimism is increasing in investment rating; the mean (median) forecast errors for stocks rated Buy, Hold and Sell are 2.3 (2.0), −1.0 (0.0), and −6.5 (−2.0) cents per share, respectively. Moreover, among stocks rated Buy, Value Line forecasts are unbiased and efficient with respect to prior bad news, while at the same time they are biased and inefficient with respect to prior good news. The opposite pattern emerges among stocks rated Sell, for which forecasts are unbiased and efficient with respect to prior good news and biased and inefficient with respect to prior bad news. These patterns of bias and inefficiency point to analysts' desire to maintain credibility with investor clients, as opposed to appeasing company management, as the dominant force motivating analyst behavior. Additionally, the time pattern of forecast error over the one-year forecast horizon before quarter end is better understood in terms of analyst credibility than in terms of management appeasement.

2. Prior research

2.1. Earnings forecast bias

The body of published research on analysts' earnings forecasts is extensive. A dominant theme emerging from this literature is that because reported earnings, on average, fail to meet analysts' forecasts, researchers typically conclude that analysts issue optimistic earnings forecasts (e.g., Abarbanell & Lehavy, 2003b; Agrawal & Chen, 2006; Bradshaw et al., 2006; Brous, 1992; Brous & Kini, 1993; Butler & Lange, 1991; Dreman & Berry, 1995a; Easterwood & Nutt, 1999; Francis & Philbrick, 1993; Fried & Givoly, 1982; Kang et al., 1994; and O'Brien, 1988). This conclusion, however, is confounded by the fact that the frequency with which reported earnings meet or beat forecasts typically exceeds the frequency with which they fail to meet forecasts. Analysts' incentives to issue optimistic forecasts have been attributed to their employers' investment banking and brokerage operations and to their fear of losing access to management as the result of negative research (e.g., Cowen et al., 2006; Dugar & Nathan, 1995; Francis & Philbrick, 1993; Ljungqvist et al., 2007; Michaely & Womack, 1999; Richardson et al., 2004). Mitigating these incentives for optimism are analysts' desire to establish and maintain credibility with investor clients (Cowen et al., 2006; Lin & McNichols, 1998; Raedy et al., 2006) and management guidance to lower forecasts as quarter end approaches (Richardson et al., 2004). Richardson et al. (2004) report that in the late 1990s institutional and regulatory changes increased managers' incentives to guide analysts to beatable forecasts, so that optimism at longer forecast horizon becomes pessimism as quarter end approaches. Managers' incentives to meet or beat analysts' forecasts derive from the differential stock price impact of a quarterly earnings miss versus that of a meet or beat (Skinner & Sloan, 2002) and from valuation premia for firms that consistently meet or beat estimates (Bartov, Givoly, & Hayn, 2002; Kasznick & McNichols, 2002). Firms seek to meet or beat forecasts by managing reported earnings (Abarbanell & Lehavy, 2003a, 2003b; Bartov et al., 2002; Burgstahler & Dichev, 1997; Degeorge et al., 1999; Matsumoto, 2002) and by guiding analysts to beatable forecasts (Cotter et al., 2006; Matsumoto, 2002; Richardson et al., 2004). Analysts' incentives to participate in the earnings guidance game stem from their dependence on management for future information and from their employers' underwriting activities (Cotter et al., 2006; Dugar & Nathan, 1995; Lin & McNichols, 1998; Michaely & Womack, 1999; Richardson et al., 2004).

Some research shows that earnings forecast bias depends on investment rating. Francis and Philbrick (1993) test whether analysts' earnings forecasts are more optimistic for stocks rated Sell than for those rated Hold and similarly for those rated Hold versus Buy. They assume that Sell ratings undermine relations with management and that analysts issue relatively optimistic earnings forecasts to compensate. If, however, managers prefer that analysts issue beatable forecasts, it seems likely the impact of rating on forecast bias would run in the direction opposite to that hypothesized by Francis and Philbrick (1993). That is, earnings forecast optimism (pessimism) would be lower (higher) for Sells than for Holds and similarly for Holds versus Buys, because analysts would issue earnings forecasts that lower-rated stocks are more likely to meet or beat. Francis and Philbrick (1993) find that

mean unscaled forecast error for Buys is not significantly different from zero and that mean forecast errors for Holds and Sells are not significantly different from Buys or from each other.[1] Additional evidence that investment rating influences earnings forecast error is provided by Abarbanell and Lehavy (2003a) who argue that stock rating affects firms' incentive to manage reported earnings. Their results, along with Abarbanell and Lehavy (2003b) and Cohen and Lys (2003), can explain the preponderance of small positive versus small negative forecast errors (the "middle" asymmetry) and the preponderance of large negative versus large positive forecast errors (the "tail" asymmetry) that are typically observed in earnings forecast error distributions.[2] Abarbanell and Lehavy (2003a) find that firms rated Buy (Sell) are more (less) likely to meet or beat analysts' forecasts. They explain this in terms of firms' incentives to manage reported earnings, but they do not consider that this pattern of forecast error across Buy/Hold/Sell ratings might be attributable to analyst forecast bias.

Prior research indicates forecast bias depends on the analyst's employer type. Cowen et al. (2006) find that analysts employed by firms with significant underwriting and trading operations make less optimistic forecasts than those at brokerage firms that do no underwriting and that forecast optimism is especially low among bulge underwriter firm analysts. Their results imply that the importance of analyst (firm) reputation reduces forecast optimism. Ljunqvist et al. (2007) find that the presence of institutional investors in stocks is associated with more accurate earnings forecasts. Lin and McNichols (1998) find that earnings forecasts issued by affiliated analysts are generally not more optimistic around seasoned equity offerings than those issued by unaffiliated analysts.[3] These results suggest that analysts' desire to establish and maintain credibility among investor clients can impact their forecasts. As explained below, the present research tests the hypothesis that analysts' desire to maintain credibility with investors leads them to issue forecasts that firms rated Buy will generally meet or beat and that firms rated Sell will generally miss.

2.2. Earnings forecast efficiency

If analysts' forecasts efficiently incorporate relevant information about future earnings, then their forecast errors are uncorrelated with available information. Forecast errors have been found to be correlated with past stock returns, past earnings changes, and prior forecast errors (Ali et al., 1992; Abarbanell & Bernard, 1992; Shane & Brous, 2001). Cohen and Lys (2003) state "analysts underreact to both prior good news and prior bad news and are, thus, inefficient" (p.155). Raedy et al. (2006) provide a rational economic explanation for analyst underreaction to forecast error; namely, for an error of given magnitude, analyst credibility is damaged when later information causes a forecast revision of the opposite sign than the analyst's prior revision. Hence, analysts' loss functions are asymmetric with respect to the sign of earnings forecast error. Extending this thought, it seems reasonable that analyst credibility is weakened when stocks on their Buy lists fail to meet earnings forecasts and, conversely, when stocks on Sell lists meet or exceed forecasts. This suggests a tendency to maintain forecasts that Buy-rated firms are likely to meet or beat and that Sell-rated firms are not likely to meet. As a result, analysts will efficiently incorporate bad earnings news into their forecasts for stocks on their Buy lists, and they will respond more slowly to good news.

For Sell-rated stocks, analysts will efficiently incorporate good news into their forecasts and respond more slowly to bad news. The present research explores the possibility that the nature of the asymmetry in analysts' loss function, and hence of the inefficiency in their forecasts, depends on investment rating.

Basu and Markov (2004) show that if analysts' loss function is linear, as opposed to quadratic, then ordinary least squares (OLS) regression tests of rationality are misspecified. If analysts seek to minimize absolute forecast error, then regression tests of rationality should be estimated by the method of least absolute deviation (LAD). OLS and LAD estimators are analogues of the sample mean and median, and in regression they are consistent and asymptotically Normal estimators of the population mean and median of the dependent variable conditional on the explanatory variables. However, because the sample median is relatively insensitive to extreme observations, the LAD estimator is a robust estimator for skewed, fat-tailed distributions. In the present research, the unbiasedness and efficiency of analysts' forecasts are examined in LAD regression framework in which model parameters are allowed to vary by investment rating. This econometric setting enables tests of competing theories of analyst behavior, management appeasement and analyst credibility, which possess clearly distinguishable implications for forecast bias and inefficiency.

2.3. Value line earnings forecasts

Published research on Value Line's quarterly EPS forecasts is scant. Philbrick and Ricks (1991) find that from 1984 to 1986 mean and median quarterly earnings forecast errors are a statistically significant −0.37% and −0.04% of stock price, respectively. Francis and Philbrick (1993) find that from 1987 to 1989 mean unscaled quarterly EPS forecast errors for stocks rated Buy, Hold and Sell are not significantly different from zero.[4] Ramnath et al. (2005) find that from 1993 to 1997 mean and median quarterly earnings forecast errors are a statistically significant −0.054% and 0.011% of stock price, respectively. Das et al. (1998) investigate Value Line's *annual* earnings forecasts from 1989 to 1993 and report that the mean forecast error is a statistically significant −1.5% of stock price. Szakmary et al. (2008) find that *3–5 year ahead* earnings forecasts display large optimistic bias.

3. Methodology and data

3.1. Quarterly EPS forecast error and investment rating

Value Line analysts produce multiple forecasts for a given quarter with initial forecasts typically issued more than a year before quarter end. Quarterly EPS Forecast Error is calculated as Actual EPS minus the EPS forecast issued at horizon *h* before quarter end:

$$FE_{it}^{h} = E_{it} - F_{it}^{h} \tag{1}$$

E_{it} denotes actual EPS for company *i* in quarter *t*. F_{it}^{h} denotes the Value Line forecast issued at horizon *h*. FE_{it}^{-1} denotes the error of the forecast issued approximately one year before

Table 1

Timeliness rank	Number of stocks	Predicted 6–12 month stock performance	Firm-quarter observations
1	100	Highest	3,843
2	300	Above average	11,105
3	~900	Average	27,923
4	300	Below average	9,969
5	100	Lowest	3,487
	~1,700		56,327

quarter end. FE_{it}^{0} denotes the error of the latest forecast before quarter end. The mean (median) number of days from the date of the latest forecast to quarter end is 16 (17). The horizon profile of forecast error is characterized below in Section 4 in intervals from $h = -1$ to 0.

Forecast errors are often scaled (i.e., deflated, normalized, divided) by stock price even though the practice can confound interpretation. For example, in Abarbanell and Lehavy (2003a) the apparent relation between unexpected accruals and earnings forecast error could be an artifact of scaling by stock price.[5] The distribution of the P/E ratio reflects investor expectations for future performance. Consequently, earnings forecast error of a given dollar amount likely has a larger impact on the price of a high-P/E stock than of a low-P/E stock. Yet, scaling the error by stock price reverses its measured impact. Scaling by stock price also can introduce time dependence in measured forecast error to the extent that common stock earnings multiples vary over the sample period. Cohen and Lys (2003) show that scaling by stock price magnifies the left tail of the distribution of earnings forecast error. Results reported below in Section 4 show the same effect of price scaling, which also has the effect of increasing the clustering of observations near the mean of the scaled forecast error distribution.

Value Line's Timeliness Rank conveys the predicted relative 6-to-12-month price performance of the approximately 1,700 stocks in its coverage universe. Each stock is ranked from 1 (highest) to 5 (lowest) by a quantitative model of ex post earnings and stock price performance. As such, the Timeliness rank is independent of Value Line analysts' input. Because Timeliness is a relative rank, the number of stocks in each rank at each point in time remains constant as shown in Table 1. The total number of sample firm-quarter observations in each rank is shown in the rightmost column. In the present study, it is assumed that rank 1 and 2 stocks are recommended Buys, rank 3 stocks are Holds, and rank 4 and 5 stocks are Sells.

3.2. Rationality of analysts' forecasts

Bias and inefficiency in analysts' forecasts are investigated in the regression framework proposed by Basu and Markov (2004):

$$E_t = \alpha_0 + \alpha_1 F_t^0 + \alpha_2 FE_{t-1}^0 + \varepsilon_t \quad (2)$$

If analysts' forecasts are unbiased, then $\alpha_0 = 0$ and $\alpha_1 = 1$. $\alpha_0 \neq 0$ captures forecast bias that is uncorrelated with the forecast, and $\alpha_1 \neq 1$ captures forecast bias that is correlated with the forecast. If forecasts are efficient with respect to prior earnings news then $\alpha_2 = 0$. Prior

Table 2

Management Appeasement Hypothesis (MAH) Implications for forecast efficiency					
Prior bad news ($FE^0_{t-1} < 0$)			Prior good news ($FE^0_{t-1} > 0$)		
$\alpha_2^{Sell} <$	$\alpha_2^{Hold} <$	$\alpha_2^{Buy} <$	$\alpha_2^{Buy} <$	$\alpha_2^{Hold} <$	α_2^{Sell}

earnings news is assumed to be captured by prior-quarter earnings forecast error such that $FE^0_{t-1} > 0$ ($FE^0_{t-1} < 0$) indicates good (bad) news. The possibility exists that forecasts are unbiased ($\alpha_0 = 0$; $\alpha_1 = 1$) yet inefficient ($\alpha_2 \neq 0$).

Subtracting the latest current-quarter forecast from both sides of (2) results in:

$$FE^0_t = E_t - F^0_t = \alpha_0 + \alpha_1' F^0_t + \alpha_2 FE^0_{t-1} + \varepsilon_t \quad (3)$$

where $\alpha_1' = \alpha_1 - 1$. For $\alpha_1' > 0$, forecast optimism (pessimism) is decreasing (increasing) in the forecast; that is, the signed forecast error is increasing in the forecast. For $\alpha_1' < 0$, forecast optimism (pessimism) is increasing (decreasing) in the forecast. For $\alpha_2 > 0$ ($\alpha_2 < 0$), analysts underreact (overreact) to prior earnings news. Coefficients in Eq. (3) are estimated in LAD regression with dummy variables to capture quarterly calendar effects.[6] For a discussion of LAD estimation, see Portnoy and Koenker (1997). Hypothesis tests on LAD-estimated coefficients are conducted based on the resampling method described in Chen et al. (2008).[7]

In interpreting regression results, it is assumed that managers prefer that analysts issue beatable forecasts (Richardson et al., 2004). If analysts seek to appease managers, they will bias their forecasts so as to mitigate ill will created by unfavorable investment ratings. Analysts' forecasts will display a pessimistic bias for lower-rated stocks such that stocks rated Sell will more often meet or beat forecasts than will stocks rated Hold and similarly for stocks rated Hold versus those rated Buy. Hence, by the Management Appeasement Hypothesis (MAH) it will be the case that in Eq. (3) $\alpha_0^{Sell} > \alpha_0^{Hold} > \alpha_0^{Buy} \geq 0$. That is, the estimated constant term for Sells will exceed its value for Holds, which will exceed its value for Buys, which will be non-negative if managers prefer that analysts issue beatable forecasts and analysts seek to appease managers. Moreover, if analysts generally strive to maintain beatable forecasts, they will respond more efficiently to bad news than to good news, and if they are more strongly incented to maintain beatable forecasts for Sells than for Buys, they will respond more efficiently to bad news for Sells than to bad news for Buys and more efficiently to good news for Buys than to good news for Sells. If the MAH describes analyst behavior, then the pattern of inefficiency in analysts' forecasts will be reflected in the coefficient relations shown in Table 2.

If, instead of seeking to appease managers, analysts seek to maintain credibility among investors, they will bias earnings forecasts such that firms rated Buy will more often meet or beat forecasts than will firms rated Hold, and those rated Hold will more frequently meet or beat forecasts than will those rated Sell. That is, by the Analyst Credibility Hypothesis (ACH) an overall optimistic (pessimistic) bias will be decreasing (increasing) in invest-

Table 3

Analyst Credibility Hypothesis (ACH) Implications for forecast efficiency	
Prior good news ($FE^0_{t-1} > 0$)	$\alpha_2^{Sell} < \alpha_2^{Hold} < \alpha_2^{Buy}$
Prior bad news ($FE^0_{t-1} < 0$)	$\alpha_2^{Sell} > \alpha_2^{Hold} > \alpha_2^{Buy}$

ment rating, and the constant term in Eq. (3) will be such that $\alpha_0^{Sell} < 0 < \alpha_0^{Buy}$ and $\alpha_0^{Sell} < \alpha_0^{Hold} < \alpha_0^{Buy}$. Further, if analysts seek to maintain forecasts that firms rated Buy are likely to meet or beat, they will respond more efficiently to bad news than to good news for Buys, and if they seek to maintain forecasts that firms rated Sell are likely to miss, they will respond more efficiently to good news than to bad for Sells. Hence, for stocks rated Buy (Sell), analysts' forecasts will be relatively inefficient with respect to good (bad) prior earnings news. If the ACH describes analyst behavior, then the patterns of inefficiency in their forecasts will be reflected in the coefficient relations shown in Table 3.

3.3. Data and sample

Each weekly issue of the *Investment Survey* contains reports on a set of companies organized by industry so that updated reports are published quarterly for all companies in Value Line's universe. Each company report contains historical financial data, target stock price, and forecasts of quarterly and annual earnings, sales, cash flow, dividends, and more. These data are obtained from Value Line's *Earnings and Projections* file beginning 1988 through the third quarter of 2016. The sample excludes firms with non-December fiscal years and firms in agriculture, financial services, fishing, forestry, and public administration industries. From 1988 through 1998 Value Line forecasts display significant optimistic bias that largely disappears beginning in 1999 and thereafter. Value Line, Inc. annual reports from 1999 and 2000 mention technological initiatives underway at the time to upgrade information systems and revisions to the salary structure in the firm's Research Department. Because these initiatives and revisions presumably led to substantial reduction in optimistic forecast bias beginning in 1999, the sample period of analysis begins with that year.

4. Results and discussion

4.1. The forecast error distribution

Restricting the sample to short-horizon ($h = 0$) forecasts, there are 56,898 firm-quarter observations for 2,170 unique firms. Panel A of Table 4 reports selected percentiles of the distribution of unscaled forecast error both with (Row 1) and without (Row 2) extreme 0.5% tails. It is not possible to know if extreme observations in the untrimmed data (Row 1), particularly those in the left tail, are the result of data errors, so ensuing analyses utilize trimmed data. However, it should be noted that LAD regression results reported below hold

Table 4 The distribution of value line quarterly EPS forecast error and components

		Percentiles									
	N	Min	0.5	5	25	50	75	95	99.5	Max	Skew
A: Forecast error ($)											
1-untrimmed	56,898	−231.0	−1.64	−0.33	−0.05	0.00	0.05	0.24	0.87	9.38	−156.1
2-trimmed	56,327	−1.6	−1.03	−0.31	−0.05	0.00	0.05	0.22	0.63	0.87	−2.0
B: Forecast error, standardized											
Unscaled		−8.4	−5.3	−1.5	−0.8	0.1	0.8	1.2	3.3	4.6	−2.0
Scaled		−47.5	−4.6	−0.7	−0.3	0.1	0.3	0.5	1.8	20.2	−15.4
C: Earnings, standardized											
Unscaled		−13.5	−2.4	−1.0	−0.7	−0.2	0.9	1.5	4.3	33.3	5.1
Scaled		−90.5	−4.5	−0.7	−0.3	0.1	0.4	0.6	1.4	9.2	−25.9
D: Forecasts, standardized											
Unscaled		−15.2	−2.0	−0.9	−0.7	−0.2	0.9	1.4	4.4	34.4	5.9
Scaled		−95.7	−4.2	−0.8	−0.4	0.1	0.5	0.7	1.8	15.2	−25.4
E: Normal (0,1)			−2.6	−1.6	−1.3	0.0	1.3	1.6	2.6		0

Panel A shows percentiles of the distribution of unscaled quarterly earnings forecast error from 1999 to 2016 Q3 for the entire sample (Row 1) and after trimming extreme 0.5% tails (Row 2). Panels B, C, and D report percentiles of standardized distributions of trimmed forecast error and its components, earnings and forecasts, both unscaled and scaled by stock price and multiplied by 100. Table entries for Panels B–D show percentiles of each standardized distribution in terms of units of standard deviation from the mean. Comparable statistics are shown for the Standard Normal distribution in Panel E.

up in the untrimmed sample. Row 2 shows that negative skewness remaining in the trimmed sample is greatly reduced vis-à-vis the untrimmed sample. The median forecast error is $0.00, and 50% of sample errors are of magnitude less than or equal to 5 cents per share.

Panels B–D of Table 4 report percentiles of standardized distributions of trimmed forecast error and its components, earnings and forecasts, both unscaled and scaled by stock price. Each distribution is standardized by subtracting its mean and dividing by its standard deviation so that table entries show percentiles in terms of units of standard deviation from the mean. Comparable statistics are shown for the Standard Normal distribution in Panel E. Panel B shows that scaling forecast error by stock price drastically increases negative skewness and the length of both tails while simultaneously exacerbating the central clustering of observations. The minimum unscaled error lies 8.4 standard deviations below its mean, whereas the minimum scaled error lies more than 47 standard deviations below its mean. Scaling has a similar effect for the components of forecast error, except that in the case of earnings and forecasts scaling by stock price changes skewness from positive to negative. Comparison with the Standard Normal distribution shows that scaling by price also increases clustering of observations near the mean. For example, Panel B shows that 50% of unscaled errors lie within +/−0.8 standard deviations of the mean, while 50% of scaled errors are within +/−0.3 standard deviations of its mean. Similarly, inspection of panels C and D indicates that scaling by stock price increases the central clustering of the distributions of both actual earnings and forecasts. The minimum stock price in the sample is $1.60; hence, these effects of scaling cannot be attributed to very low stock prices. Remaining analyses focus on trimmed, unscaled forecast errors.

Table 5 Value line quarterly EPS forecast error by magnitude of error

Intervals of absolute forecast error ($) $\lvert FE_t^0 \rvert$									
	0	[0–.01)	[.01–.02)	[.02–.03)	[.03–.04)	[.04–.05)	[.05–.10)	>0.10	Total
A	8	5	14	11	7	7	20	29	100%
B		1.26	1.33	1.54	1.41	1.38	1.23	0.84	1.15

Row A shows the proportional distribution of forecast errors in intervals of absolute forecast error around zero. For example, 8% of forecast errors equal zero, 5% of errors are less than or equal to $0.01 in absolute value, and so forth. Row B shows the ratio of positive to negative forecast errors P/N in each interval of absolute error. For example, among errors larger than $0.10 in magnitude P/N = 0.84, and in the entire sample P/N = 1.15. The sample is trimmed at the extreme 0.5% tails of the error distribution.

Table 5 illustrates the presence of middle and tail asymmetries in the forecast error distribution. Row A shows the proportional distribution of forecast errors in intervals of absolute forecast error centered on zero. For example, 8% of forecast errors equal zero, 5% of errors are less than or equal to 1 cent in absolute value, and so forth, 51% of the sample is comprised of forecast errors of magnitude less than or equal to 5 cents. Row B shows that in the complete sample the ratio of positive errors to negative errors *P/N* equals 1.15 and that only among errors larger than 10 cents magnitude does the number of negative errors exceed the number of positive errors. The relative frequency of small positive errors versus small negative errors evidences the middle asymmetry, and the relative frequency of large negative errors versus large positive errors evidences the tail asymmetry.

4.2. The horizon profile of forecast bias

Richardson et al. (2004) demonstrate that earnings forecast bias switches from optimism to pessimism as the forecast horizon diminishes. This pattern of bias over the forecast horizon is attributed to analysts' desire to support their employers' underwriting and trading operations at longer horizons and to play along with managers in the earnings guidance game in which managers guide analysts to beatable forecasts just before quarter end. In the case of Value Line, which has no underwriting or trading operations, the horizon profile of forecast bias reflects analysts' desire to either appease managers or to maintain credibility with investors. The MAH implies that the horizon profile will resemble that in Richardson et al. (2004), where long-horizon optimism becomes short-horizon pessimism. Moreover, the profile will be more pronounced for Sells than for Buys if analysts bias their earnings forecasts so as to mitigate the ill will that is presumably attributable to poor investment ratings. That is, long-horizon optimism and short-horizon pessimism will both be exaggerated for Sells vis-à-vis Buys. Conversely, the ACH implies that forecast bias will be such that stocks rated Buy will most often meet or beat forecasts and those rated Sell will most often fail to meet forecasts. ACH implications for the shape of the horizon profile are not clear.

Fig. 1 displays the horizon profile of mean forecast error by investment rating from one year prior ($h = -1$) to within 30 days ($h = 0$) of quarter end. Consistent with MAH, mean

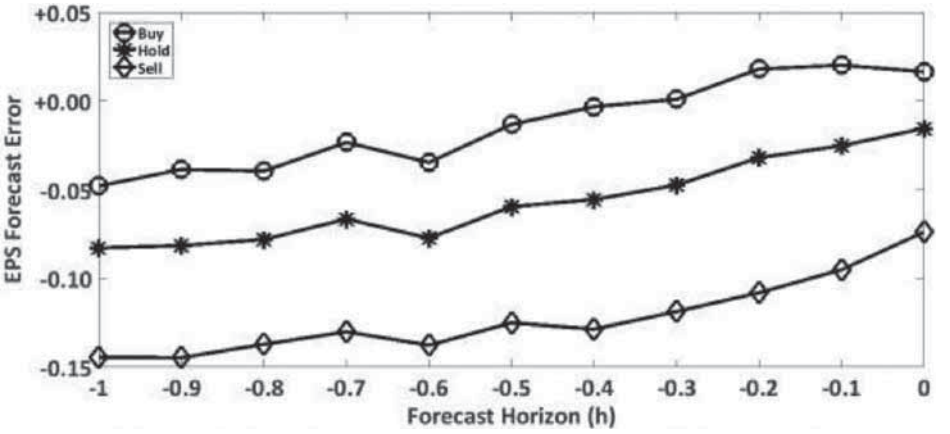

Fig. 1. The horizon profile of mean EPS forecast error by investment rating: 1999–2016 Q3. *Notes:* $h = -1$ denotes 1-year before quarter end; $h = 0$ denotes <30 days before quarter end.

forecast error at long-horizon indicates optimism that is decreasing in investment rating; that is, analysts are optimistic for all stocks, but they are more optimistic for Sells versus Holds and for Holds versus Buys. If, however, analysts seek to appease managers, and if managers prefer that analysts issue beatable forecasts, then forecast optimism will become pessimism before quarter end. Clearly, except for Buys, this does not happen. Hence, it does not appear from the horizon profile of forecast bias that analysts seek to appease managers. Rather, the horizon profile suggests that, consistent with analyst credibility, forecast bias is such that, on average, stocks rated Buy meet or beat forecasts, stocks rated Sell fail to meet, and stocks rated Hold lie between these cases.

4.3. Earnings forecast bias

Table 6 characterizes the forecast error distribution in the complete sample and segmented by investment rating. Panel A shows that in the entire sample the mean (median) forecast error equals −1.4 (0.0) cents, while positive forecast errors exceed negative errors by a ratio

Table 6 Quarterly EPS forecast error distribution in the complete sample and by investment rating

	Forecast error (FE_t^0)		Ratio of positive to negative forecast errors (P/N)							
	Mean	Median	[0–.01)	[.01–.02)	[.02–.03)	[.03–.04)	[.04–.05)	[.05–.10)	>0.10	Total
A: Complete sample	−0.014	0.000	1.26	1.33	1.54	1.41	1.38	1.23	0.84	1.15
B: Investment rating										
Buy	0.023	0.020	1.76	1.72	2.14	2.21	2.13	2.20	1.88	1.98
Hold	−0.010	0.000	1.21	1.29	1.51	1.32	1.37	1.22	0.89	1.16
Sell	−0.065	−0.020	0.84	1.01	1.05	0.95	0.87	0.70	0.39	0.65

Table entries show mean and median quarterly EPS forecast error and ratios of positive to negative forecast error (*P/N*) by magnitude of absolute forecast error. Panel A pertains to the entire sample. Panel B segments results by Investment Rating.

Table 7 Earnings forecast bias and inefficiency

	N	$\hat{\alpha}_0$	$\hat{\alpha}_1$	$\hat{\alpha}_2$
A: Complete sample	51,956	0.002	0.004[a]	0.233[a]
B: Buys	13,647	0.005[a]	0.011[a]	0.259[a]
C: Holds	25,929	0.003[a]	0.003	0.187[a]
D: Sells	12,380	−0.004[a]	−0.014[a]	0.235[a]
E: Prior bad news ($FE^0_{t-1} < 0$)	22,143	0.002	−0.007[a]	0.205[a]
Buy	3,032	0.002	−0.002	0.056
Hold	10,977	0.002	−0.007	0.154[a]
Sell	8,134	−0.003	−0.021[a]	0.246[a]
F: Prior good news ($FE^0_{t-1} > 0$)	29,813	0.002[a]	0.009[a]	0.231[a]
Buy	10,633	0.004[a]	0.008[a]	0.320[a]
Hold	14,943	0.004[a]	0.007[a]	0.175[a]
Sell	4,237	−0.001	−0.002	0.089

Regression results for Eq. (3): $FE^0_t = \alpha_0 + \alpha_1' F^0_t + \alpha_2 FE^0_{t-1} + \varepsilon_t$. Parameters are estimated by least absolute deviation regression—see Portnoy and Koenker (1997).

[a]Indicates statistical significance at 1% based on the resampling method described in Chen et al. (2008).

of 1.15 to 1 (i.e., by 49 to 43%). As can be seen in ratios of positive-to-negative errors, positive errors are most frequently of small magnitude (<10 cents), and negative errors are most frequently of large magnitude (>10 cents). This is consistent with the presence of both middle and tail asymmetries. Panel B shows that by a ratio of nearly 2-to-1 positive forecast errors for stocks rated Buy exceed negative errors. Among stocks rated Sell, the ratio of positive-to-negative errors equals 0.65, which indicates more than 1.5 negative errors for each positive error. Among stocks rated Buy, the prevalence of positive versus negative errors is apparent across all magnitudes of error, and there is no evidence of a tail asymmetry. Among stocks rated Sell, there is virtually no evidence of a middle asymmetry; only a tail asymmetry is apparent. These results are consistent with the ACH, which implies that analysts bias their forecasts such that Buy-rated stocks will likely meet or beat their forecasts and that Sell-rated stocks will likely miss forecasts.

4.4. Earnings forecast efficiency

The MAH implies that analysts bias their forecasts so that firms generally meet or beat them and that the pessimistic bias is more pronounced among stocks rated Sell than Hold and Buy. Further, the MAH implies that analysts generally respond more efficiently to bad earnings news than to good news. Moreover, when news is bad analysts respond more efficiently for Sells than for Buys and when news is good they respond more efficiently for Buys than Sells. The ACH implies that analysts bias their forecasts so that stocks rated Buy (Sell) most often meet or beat (fail to meet) forecasts. The ACH implies further that when news is bad analysts respond more efficiently for Buys than Sells, and when news is good they respond more efficiently for Sells than Buys. These implications are examined empirically in results for Eq. (3).

Table 7 presents regression results for Eq. (3), for which parameters are estimated by the method of LAD. Hypothesis tests on the estimated coefficients are based on methods

described in Chen et al. (2008). If analysts' forecasts are unbiased and efficient with respect to prior earnings news, then all coefficients in Eq. (3) equal zero. Panel A presents results for the entire sample of trimmed observations.[8] The constant $\hat{\alpha}_0 = .002$ is not significantly different from zero. The forecast coefficient $\hat{\alpha}_1' = .004$ is significantly positive, which indicates the presence of forecast bias that is correlated with the forecast; that is, forecast pessimism (optimism) is increasing (decreasing) with the forecast. The prior news coefficient $\hat{\alpha}_2 = .233$ is significantly positive, which indicates that analysts underreact to (and, hence, their forecasts are inefficient with respect to) prior earnings news. Panels B–D of Table 7 present results for stocks rated Buy, Hold and Sell, respectively, and they indicate the presence of forecast bias and inefficiency in each rating category. The relation among the estimated constant terms is consistent with the ACH: $\hat{\alpha}_0^{\text{Sell}} < 0 < \hat{\alpha}_0^{\text{Buy}}$ and $\hat{\alpha}_0^{\text{Sell}} < \hat{\alpha}_0^{\text{Hold}} < \hat{\alpha}_0^{\text{Buy}}$. Also, the prior news coefficients suggest that forecast inefficiency is more pronounced for stocks rated Buy or Sell than for stocks rated Hold. Hence, investment rating seems to impact the manner in which analysts respond to earnings news.

Panels E and F of Table 7 present results for observations segmented by prior earnings news, where non-negative (negative) prior-quarter forecast error is taken to be good (bad) news. Within each prior news subset, observations are further segmented by investment rating. Panel E of Table 7 indicates there are 22,143 observations of prior bad news. For these observations, the estimated constant $\hat{\alpha}_0 = 0.002$ is not significantly different from zero. The slope $\hat{\alpha}_1' = -0.007$ is significantly negative, which indicates forecast optimism (pessimism) that is increasing (decreasing) in the forecast. The slope $\hat{\alpha}_2 = 0.205$ is significantly positive, which indicates that analysts' forecasts are inefficient with respect to prior bad news. Segmenting prior bad news observations by investment rating shows that the bias and inefficiency in analysts' forecasts can be traced primarily to stocks rated Sell. For these stocks, results indicate both bias and inefficiency in analysts' forecasts. For stocks rated Hold, analysts' forecasts appear unbiased ($\hat{\alpha}_1 = \hat{\alpha}_1' = 0$) but inefficient with respect to prior bad news ($\hat{\alpha}_2 > 0$). For stocks rated Buy, none of the coefficients is significantly different from zero, which indicates that for these stocks analysts' forecasts are unbiased and efficient with respect to bad news.

Panel F of Table 7 shows there are 29,813 observations of prior good news. For these observations, the estimated constant $\hat{\alpha}_0 = 0.002$ is significantly positive, which indicates a pessimistic bias that is uncorrelated with the earnings forecast and with prior news. The slope $\hat{\alpha}_1' = 0.009$ is significantly positive, which indicates forecast pessimism (optimism) that is increasing (decreasing) in the forecast. The slope $\hat{\alpha}_2 = 0.231$ is significantly positive, which indicates that analysts' forecasts are inefficient with respect to good news. Segmenting prior good news observations by investment rating shows that the bias and inefficiency can be traced to stocks rated Buy and Hold. For these stocks, all of the estimated coefficients are significantly different from zero. For stocks rated Sell, however, none of the coefficients is significantly different from zero, which indicates that for these stocks analysts' forecasts are unbiased and efficient. The patterns of bias and inefficiency indicated in Table 7 are consistent with analysts seeking to maintain credibility with investors rather than to appease managers of the companies they follow.

5. Summary and conclusion

Equity analysts occupy a precarious position balancing the often conflicting expectations of investor clients and managers of public companies. Investors expect analysts will produce unbiased, objective research on the companies they cover. Doing so, however, puts analysts at risk of losing access to company managers who provide information analysts need in their work but who may be sensitive to critical coverage. Analysts can be further conflicted in striving to support their employers' investment banking and brokerage activities. In the end, their research reports and recommendations embody the subjective tradeoffs they make in balancing these conflicts. Bias and inefficiency in earnings forecasts have been studied extensively by researchers seeking to understand analysts' motives. The present research continues in this vein. Its primary contribution is that it sheds new light on analysts' motives in a setting in which they are free from the pressures of supporting underwriting and trading activities. Because Value Line is not involved in these activities, and because stocks' investment ratings are assigned by Value Line with no analyst input, Value Line earnings forecast errors are particularly useful for assessing analysts' incentives to maintain credibility with investors and to appease company management.

Empirical results reported in the present research support several inferences. First, analysts appear to bias their forecasts primarily to maintain credibility with investors. If it were the case that analysts strive to appease company managers, and assuming that managers prefer that analysts issue beatable forecasts, then most firms will report earnings that meet or beat forecasts. Prior research establishes that this is indeed the case generally, and the present research shows that this finding holds among Value Line earnings forecasts as well. However, the present research also shows that the propensity for reported earnings to meet or beat forecasts is confined primarily to stocks rated Buy. More generally, the direction of earnings forecast bias depends on investment rating. The bias is pessimistic for Buy-rated stocks, which by a ratio of almost 2 to 1 report earnings that meet or beat forecasts. The bias is optimistic for Sell-rated stocks, for which earnings misses prevail by a ratio of more than 1.5 to 1. Hence, it does not appear that Value Line analysts strive to appease the managers of companies to which Sell ratings are attached. Rather, it appears that analysts strive to maintain credibility with investors by issuing earnings forecasts that Buy-rated stocks are likely to meet or beat and that Sell-rated stocks are likely to miss.

The present research documents a pattern of forecast inefficiency with respect to earnings news that further supports the view that analysts strive to maintain credibility. Although prior research establishes that analysts underreact to earnings news, the present research shows that they do so under certain conditions. Value Line analysts underreact to good news for Buy-rated stocks and to bad news for Sell-rated stocks. However, they respond efficiently to bad news for Buy-rated stocks and to good news for Sell-rated stocks. These results are consistent with analysts striving to maintain pessimistic forecasts for Buys and optimistic forecasts for Sells, which again suggests that analysts seek primarily to maintain credibility. This interplay among investment rating and earnings forecast bias and inefficiency illuminate the incentives motivating analysts to an extent not elaborated heretofore.

Notes

1 See their Table 3, Panel B.
2 Evidence of these asymmetries is also apparent in Bartov et. al. (2002), Burgstahler and Dichev (1997), Brown (2001), Cotter, et. al. (2006), Degeorge et. al. (1999), Kasznick and McNichols (2002), and Matsumoto (2002).
3 In a similar vein, Walker and Claasen (2006) find that analyst affiliation has no effect on stock price response to ratings changes.
4 Their investment ratings are derived from Value Line Timeliness ratings: 1, 2 = Buy, 3 = Hold, 4, 5 = Sell. From their Table 3 Panel B, the mean unscaled forecast error for Buys -$0.003 is not significantly different from zero, and the mean unscaled errors for Holds and Sells are not significantly different from Buys or from each other.
5 If stock price and P/E are increasing in investment rating, then results in their Table 4 Panel A can be attributed to a stock price effect, not to earnings management.
6 Eq. (3) is also estimated via quarterly LAD regressions, and the significance of the coefficients is assessed from the time series of the quarterly estimates. Results reported herein are robust to this alternative estimation procedure.
7 See their Eq. (8), p. 111.
8 Results reported in Table 7 are robust to inclusion of extreme observations.

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