The International Journal of Accounting Studies
會計評論，第 51 期，2010 年 7 月
第 1 – 26 頁

證券分析師是否忽略復甦企業股票？以行為觀點探究

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摘要

心理學文獻指出投資人處理資訊效能受認知限制所影響。本研究探討分析師是否亦受認知失調影響，以及有限的認知處理能力如何影響分析師形成投資推薦。認知失調是一種防禦機制，其避免證據與個人信念不一致時所產生的心理不適。此種認知限制可能導致分析師傾向不注意某類型證券或資訊。本研究使用負面推薦作為分析師對公司負面觀感之替代變數，發現分析師對此類公司股票之正向消息有延遲發佈的現象。本研究對分析師行為相關文獻之貢獻，在於提供分析師對過去存在負面觀感的公司股票，平均而言會有對好消息反應不足的實證證據。本研究中復甦型公司股票顯著較長的推薦保留期間與投資管理逆勢操作策略有效性結論一致。

關鍵詞：分析師推薦、認知失調、有限注意力、反應不足

收稿日：2009 年 5 月
接受日：2010 年 1 月
二審後接受

Do Analysts Neglect the Recovering Stocks? From a Behavioral Perspective

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Abstract

Motivated by psychological evidence that cognitive constraints affect investors in processing information, this study investigates whether analysts are subject to cognitive dissonance and how limited cognitive processing power influences analysts' issuance of investment recommendation. Cognitive dissonance is a defense mechanism to avoid psychological discomfort when the evidence is inconsistent with one's prior perception. Such cognitive constraints may limit analysts' attention to certain stocks or information. We use preceding unfavorable recommendations to proxy analysts' negative perceptions and find that analysts delay their incorporating positive signals into the recommendations. This paper contributes to the analyst behavior literature by providing empirical evidence that analysts' underreaction to new information for unfavorable category stocks is partly attributable to the cognitive dissonance. The documented significantly longer duration for the recovering stocks is consistent with the effectiveness of contrarian investment strategies.

Keywords: *Analyst recommendation, Cognitive dissonance, Limited attention, Underreaction.*

∗ The authors gratefully acknowledge the financial support of National Science Council, National Taiwan University and Yuan Ze University. We are grateful to First Call for the use of recommendation data. We have benefited from the helpful comments and suggestions made by two anonymous referees, Guangdi Chang, Yuanchen Chang, Kevin Chen, Chen Lung Chin (editor), Robin Chou, Michael Eames, Tung-Hau Lee, Yi-Hsun Lai, Mei-Feng Lin, Chiuling Lu, Vivian Tai, and seminar participants at National Chi Nan University, National Taiwan University, Yuan-Ze University, 2005 Financial Management Association annual meeting, and 2009 conference of the Chinese Institute of Decision Science. All remaining errors are our own.
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Submitted May 2009
Accepted January 2010
After 2 rounds of review

1. INTRODUCTION

In this paper, we study the effects of analysts' cognitive constraint on investment recommendations. Information is not reflected by stock prices until the information captures investors' attention (Huberman 2001; Huberman and Regev 2001; Barber and Odean 2007). Attention is a scarce cognitive resource (Kahneman 1973) and is crucial to investment decisions. Attention to one assignment necessarily requires a substitution of cognitive resources from other assignments. Thus, investors may be subject to such cognitive constraint and behavioral biases in processing information. To mitigate these restrictions, security analysts function as an intermediary between investors and firms assisting in colleting and interpreting massive investment information. Notwithstanding analysts referred to as sophisticated investors play a role in the capital market, prior studies provide a vast amount of evidence regarding analysts' over- and under-reaction phenomena in their earnings forecasts. For example, DeBondt and Thaler (1990) find that changes in earnings forecasts are too extreme, consistent with overreaction. In contrast, prior studies with evidence for underreaction include Lys and Sohn (1990), Abarbanell (1991), Abarbanell and Bernard (1992), Ali, Klein and Rosenfeld (1992), and Elliot, Philbrick and Wiedman (1995).

Recent studies start to investigate formally and analytically investors' limited attention and cognition processing power. Hong and Stein (1999) and Hirshleifer and Teoh (2004) analyze models in which a few valuable public information is either ignored or merely gradually recognized by investors. Hirshleifer, Hou, Teoh and Zhang (2004) and Hirshleifer and Teoh (2005) suggest that investors ignore useful information in financial statements. Della Vigna and Pollett (2003) show that stock prices do not fully incorporate available demographic information. Corwin and Coughenour (2005) find that the limited attention of NYSE specialists affects securities' execution quality. Hou and Moskowitz (2005) and Hong, Torous and Valkanov (2007) find delayed responses in stock prices to information contained in prices of other securities. Moreover, Peng and Xiong (2006) model investors' attention allocation in learning and study the learning effects on asset-price dynamics. Despite the growing studies in limited attention and cognitive constraints, few, if any, such empirical analysis aims at analysts.

As investors allocate more attention to certain investment aspects, they process more information. After gathering the signals, investors then incorporate them into their beliefs through Bayesian updating. When it comes to analysts' investment recommendations, given the enormous amount of available information and the inevitability of limited attention, analysts have to be selective in information processing. Festinger (1957) proposes a typical cognitive constraint in information processing, cognitive dissonance, which induces individuals to ignore certain new signals. Cognitive dissonance is a type of psychological tension resulting from perceived inconsistencies in cognitions and is defined as "a motivational state that impels the individual to attempt to reduce and eliminate it. . . . As the person attempts to reduce his dissonance, he may manage to change the dissonant information from being salient to being forgotten (Wicklund and Brehm 1976)." In other words, as individuals form opinions and develop behavioral commitment, they may resist cognitive changes. The psychological discomfort occurs when they are confronted with the dissonant information or the consequences of their discrepant acts. To avoid the psychological pain, people tend to reject information that conflicts with prior beliefs.

This study investigates how analysts' negative perceptions influence the timing of their updating the recommendation. In particular, we examine the timeliness of analyst updates when unfavorable recommendations are followed by improved performance. Our findings are consistent with the results of contemporary contrarian studies. For instance, La Porta (1996) finds that analysts tend to extrapolate past performance to the future and Chan, Jegadeesh and Lakonishok (1996) conclude that investors underreact to news and slowly incorporate information into price. However, in contrast to previous research, by focusing on firms with unfavorable prior recommendations (hold, sell, and strong sell) and analysts' timeliness in updating their recommendations to these firms, we investigate a cognitive constraint explanation to analyst underreaction. We posit that in generating recommendations, cognitive bias causes analyst deviation from rational Bayesian updating.

In the early 1990s, cognitive dissonance was addressed in financial research without mentioning the term. Bernstein (1993) proposes the earnings expectations life cycle, illustrated in Figure 1, which depicts the changes in investor expectations and stock prices that are consistent with these two phenomena. During Stage I, stocks with continuously increasing estimates and reported earnings are most likely to receive favorable recommendations. As strong earnings momentum persists, these stocks are identified as growth stocks. When earnings disappointment occurs, these stocks enter Stage II, during which period earnings expectations and stock prices begin to decline. In response to the earnings disappointment, some analysts tend to lag their updates and provide pessimistic earnings estimates.[1] During Stage III, after posting disappointing returns for an extended time, the stocks may be

[1] Bernstein (1993, 91) suggests that certain analysts tend to lag because "they do not believe the earnings shortfall is a sign of a fundamental problem with the company."

treated as “dogs” and neglected by investors with limited attention and cognitive processing power. Thus, these stocks may be undervalued and may become the targets of contrarian strategies. Stage IV is the recovery stage during which good news regarding these “dogs” emerges. The investors, nevertheless, may be resistant to changing cognition even if more optimistic information is disseminated. Thus, cognitive constraints and behavioral biases may lead to analysts giving inadequate attention to this new information. Therefore, analysts may be hesitant in updating their recommendations, which, in turn, results in abnormal returns associated with the contrarian stocks.

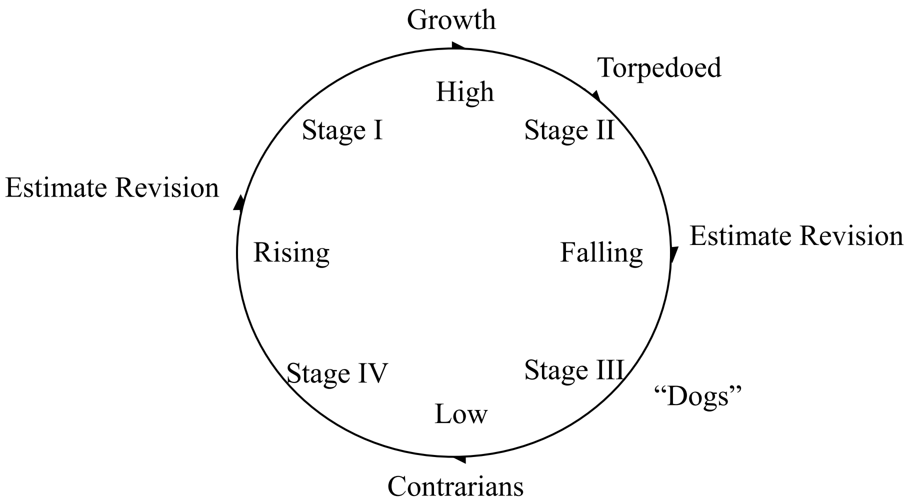

Figure 1 The earnings expectations life cycle

Companies in Stage I are likely to receive favorable recommendations and become growth stocks as the market attends to the earnings momentum. Stage II includes “Negative Surprise Models” that regard stocks with negative earnings surprises as potential *sell* candidates. In response to the earnings disappointment, analysts revise their earnings estimates downwards. Some analysts may even lag. Stage III includes “Dogs” and “Neglect” phases; during the former phase, stocks with declining market prices are identified as “dogs” and shunned by investors. During the latter phase, the stocks may uninterested by the security analysts. Quite often some of these stocks are undervalued and are known as contrarian stocks. Stage IV includes “Positive Surprise” and “Positive Surprise Model” phases. During the former phase, the stocks start to disseminate optimistic information and attract brokerage firms’ attention. The latter is the best phase for stock-picking models, which identify the stocks with higher-than-expected earnings (Bernstein 1993, 91).

Bauman and Miller (1997) report the contrarian investors perceive security analysts to be biased and inaccurate because the analysts overemphasize past performance. Lee (2004, 104) articulates similar concerns and asserts that analysts’ heavy reliance on historical records may lead to upside-down performance reports of beaten-down stocks during a recovery:

> It seems like the perfect solution for investors fed up with conflict-ridden Wall Street stock-pickers: Things are even more topsy-turvy at venerable Value Line, another company that uses a computer model to pick stocks. Last year, its top-rated

> stocks rose 40%, but its bottom-rated ones jumped 90%. . . . Raters that use human stock-pickers aren't doing any better. At Standard & Poor's . . . the one-star stocks climbed 57% for the year ending Jan. 31, while the five-star stocks mustered only 43%. . . . Merrill Lynch & Co.'s sells jumped 46% last year, but its buys rose only 30%.

A contrarian strategy may be successful if security analysts delay in upgrading their recommendations. According to the efficient market hypothesis, the time interval between sequential recommendations should be independent of the previous recommendations. In contrast, we show that after issuing an unfavorable recommendation, analysts are prone to take longer to convey good news, particularly for the firms with superior subsequent performance. Such bias may be due to cognitive dissonance.

Our finding regarding the firms with the most recent preceding unfavorable analyst recommendations but positive current stage price performance is consistent with Barberis, Shleifer and Vishny (1998), who study analyst behavior on overall firms and model how analysts overemphasize prior information and underemphasize new information when valuing firms. We conjecture that analysts' unawareness of unfavorable stocks during the recovery stage (i.e., Stage IV in Figure 1) may contribute to the value stock abnormal returns. Specifically, when stocks for which analysts first suggest hold, sell or strong sell start to release favorable signals, analysts may initially be reluctant to revise their recommendations due to cognitive bias. It may be long after the stock prices are driven up by more positive surprises that analysts begin to redevelop positive perceptions and identify these firms as outperformers and issue favorable recommendations. This bias may be reflected by less timely updates of their recommendations. Accordingly, we examine the difference in duration between two portfolios: One portfolio consists of stocks with recommendation upgrades from an unfavorable category to a favorable category, and the other is associated with reiterated unfavorable recommendations. The finding is consistent with cognitive dissonance that a shorter duration for analysts to reiterate unfavorable recommendations than to issue favorable recommendations. Our finding echoes the effectiveness of a contrarian investment strategy.

This study accounts for two competing explanations for analysts' underreaction: (a) a slow price recovery of unfavorably rated stocks, and (b) analysts' preference of coverage. We adopt performance variables, cumulative abnormal returns, and cumulative raw returns to form the subgroup in the unfavorable category to discriminate against the notions of slow price recovery and sluggish stock market.

Furthermore, we control for analyst inclination to follow a stock to rule out the explanation of selection bias.

This paper contributes to the analyst literature by providing empirical evidence that analysts' underreaction to new information for recovering stocks is partly attributable to the limited attention accompanying cognitive dissonance. Second, our results shed light on how analysts upgrade the recommendations of the recovering stocks, which are the target of contrarian investment strategy. Our empirical results provide an explanation to the puzzle of the efficacy of contrarian investment strategy. Finally, through the understanding of cognitive constraints on recommendation issuance, this study may add to analysts' developing decision aids and mitigating information processing biases.

The remainder of this paper is organized as follows. Section 2 develops the hypotheses. Section 3 describes the research design and data selection. Section 4 provides the empirical results and robustness tests. Section 5 concludes the study.

2. HYPOTHESES

This study investigates whether—and if so, how—psychological phenomenon, cognitive dissonance, influences analysts' timeliness in updating their recommendations. The first hypothesis is based on cognitive dissonance, which is a defense mechanism to avoid psychological discomfort when the realized result is not consistent with one's prior expectation. If the actual future performance contradicts the analysts' outstanding recommendations, they may be subject to mental defenses that try to reduce it by suppressing dissonant information. We use analyst recommendations to proxy analyst opinions. If subsequent performance is not consistent with the analysts' current recommendations, analysts' cognitive dissonance may delay the issuance of an updated recommendation. Next, we provide an example to explain this concept concretely.

Assume an analyst supposes the true value of Firm A is \$80, and the current stock price of the firm is \$100. The analyst will issue an unfavorable recommendation. Over a span of months, if the stock price of Firm A increases to \$110, the inconsistence of the prior unfavorable recommendation and the subsequent performance may induce the analyst's cognitive dissonance. If the analyst is reluctant to adjust this prior belief, he will not release—or will delay the release of—updated opinions. Otherwise, the analyst may perceive the misvaluation for Firm A and upgrade the firm. However, if the stock price decreases to \$70, which is lower than the analyst's expected true value, the analyst will issue a favorable recommendation. Thus, we expect a longer time period before upgrading

Firm A in the first case due to the mental process of dealing with conflict information.

Following O'Brien, McNichols, and Lin (2005), we adopt duration analyses to examine the timeliness of analysts' response to new information. To mitigate the noise of analysts' optimistic bias in recommendations (e.g., Francis and Philbrick 1993; Kim and Lustgarten 1998; Irvine 2004), we focus on observations for which the analyst's immediately previous recommendation is unfavorable. We discuss this consideration in detail in Section 3.1. We conjecture that, in generating current opinions, analysts avoid stocks for which their prior recommendation and subsequent performance are not consistent. Cognitive dissonance induces analysts to delay the release of positive recommendations for previously unfavorably rated stocks. Thus, our first hypothesis is as follows:

H1: Analysts withhold favorable recommendations longer relative to unfavorable recommendations in the unfavorable category.

A competing explanation for this hypothesis is that analysts' slowness to upgrade unfavorable stocks may be caused by a firm's slow price recovery or a sluggish stock market. To account for these possible alternative explanations, we extend the examination of the experimental group in the first hypothesis (i.e., the portfolio that includes the observations with previously unfavorable but currently favorable recommendations). For these observations, we examine the difference in duration between the consecutive recommendations for outperformers versus underperformers in the stock market. If analysts take more time to upgrade the unfavorable stocks with worse subsequent performance, we suggest that the longer duration between previous unfavorable and current favorable recommendations in the first hypothesis is due to firm' slow price recovery rather than analysts' cognitive dissonance. We hypothesize that analysts delay conveying favorable information for outperformers over underperformers among recovering unfavorably rated stocks.

H2: Analysts withhold favorable recommendations longer for winners relative to losers among recovering stocks in the unfavorable category.

3. RESEARCH DESIGN AND DATA SELECTION

3.1 COGNITIVE DISSONANCE MEASURE

Cognitive dissonance may emerge with exposure to discrepant information. If an analyst has already formed a negative prospect toward a company, he may resist changing his cognition of this company after receiving information that contradicts his prior belief. The more firmly the analyst believes, the more difficult he changes his cognition. To detect such phenomenon, we adopt recommendations to proxy analyst cognition toward firms and use stock returns to proxy the major information with which analysts are saturated. We focus on unfavorably rated stocks rather than on favorably rated stocks or rather than on both for the following reasons. Prior research suggests that analyst recommendations are optimistic and analysts are reluctant to downgrade favorably rated stocks. If we use a portfolio with prior BUY and current SELL recommendations to proxy the portfolio with cognitive dissonance, the optimistic bias may produce significant noise. Unfavorably rated stocks are formed as a SELL portfolio, which consists of the stocks with current *hold*, *sell*, or *strong sell* recommendations (hereafter referred to as SELL recommendation); a BUY portfolio includes *buy* or *strong buy* recommendations (hereafter referred to as BUY recommendation).

In contrast to prior studies that use *sell* and *strong sell* recommendations to form SELL portfolio, we add *hold* recommendations to our SELL portfolio for two main concerns: (a) a *hold* recommendation is basically a euphemism for *sell* (e.g., Francis and Soffer 1997; Lin and McNichols 1998), and (b) the spirit of cognitive dissonance lies in the underreaction driven by the psychological discomfort that results when subsequent evidence contradicts prior opinion. Our hypotheses capture the effect of the conflict between the prior belief and successive performance to test whether analysts are subject to cognitive dissonance. Compared with *strong buy* or *buy* recommendations, *hold* connotes a slightly negative opinion. In addition, we note that if analysts are subject to cognitive dissonance, even a coarse partitioning scheme is likely to capture such a psychological discomfort effect. Moreover, even if a *hold* recommendation is a cue to actually hold shares rather than sell them, use of coarsely partitioned portfolios implies reduced power to detect cognitive dissonance but does not bias the results in favor of our hypotheses.[2]

[2] We also conduct tests with the SELL portfolio consisting of only *sell* and *strong sell* recommendations. The robustness test results do not qualitatively change the conclusion of our paper. All untabulated results are available on request.

We use a suffix to denote the sequence of issued recommendations, REC_{-t} as the prior t^{th} recommendation and REC_0 as the current recommendation. We form a portfolio, SB, of stocks with the last SELL recommendations and current BUY recommendations. Specifically, SB portfolio stocks have REC_{-1} = SELL recommendation and REC_0 = BUY recommendation. Similarly, the SS portfolio consists of stocks with REC_{-1} = SELL recommendation and REC_0 = SELL recommendations. To test our hypothesis, we examine whether the analysts' speed in upgrading an unfavorable recommendation differs from the speed of their reiteration of an unfavorable recommendation.

We use duration analyses to test the timeliness of analysts' responses to new information (O'Brien et al. 2005). We measure duration as the number of days from the last recommendation to the current recommendation. Specifically, $DURATION_{[-t, -t+1]}$ is the average calendar day between the prior t^{th} recommendation and the prior $(t + 1)^{th}$ recommendation, REC_{-t} and REC_{-t+1}, issued by the same analyst. For example, $DURATION_{[-1, 0]}$ in the BUY portfolio is the mean calendar days between the immediately previous recommendation and current BUY recommendation (i.e., the average calendar day between REC_{-1} = arbitrary recommendations, and REC_0 = *strong buy* or *buy*). We exclude observations with $DURATION_{[-1, 0]}$ greater than 18 months in both SB and SS portfolios to reduce the influence of drop coverage.[3]

Our data sample for duration analyses is with right censored observations and cannot be analyzed by ignoring the censored observations because the longer-lived prior opinions are generally more likely to be censored. Another characteristic of our sample is that the response cannot be negative. This suggests that a transformation of the duration of two successive recommendations such as a log transformation may be necessary or that specialized methods may be more appropriate than those that assume a normal distribution for the error term.

For the first two hypotheses, we examine analyst recommendations in an 18-month window following the unfavorable recommendation using the Cox proportional hazard model. To implement the model, we define the duration of interest as the period of two successive recommendations starting with the unfavorable recommendation and ending with the earlier of a favorably upgrade by the analyst or the end of the window. The general form of the Cox proportional standard continuous-time hazard model is:

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[3] The untabulated results are robust to the inclusion of observations with $DURATION_{[-1, 0]}$ less than one year. We repeat the analysis but exclude observations with $DURATION_{[-1, 0]}$ exceeding two years, yielding a similar result. We treat durations of two successive recommendations greater than two years as presumed drop coverage because although observations with more than two-year durations increases the sample size by less than 7%, the duration volatility increases more than 60%.

$$h_i(t) = \lambda_0(t)\exp(Z_i^{'}\beta)\,, \tag{1}$$

where $\lambda_0(t)$ is an unspecified baseline hazard function, Z_i is the vector of explanatory variables for the ith observation, and β is the vector of coefficients. Cox (1972, 1975) introduce the partial likelihood function to estimate the vector of unknown regression parameters associated with the explanatory variables. In terms of our first hypothesis, we use SS portfolio as baseline to detect the whether analysts upgrade unfavorably rated stocks more slowly than downgrade unfavorable rated stocks. If this is the case, then we would expect a negative coefficient estimate in the hazard model to express upgrades from unfavorable category to be slower than downgrades from unfavorable category.

3.2 PERFORMANCE MEASURE

One potential explanation for analysts' delayed upgrades for SELL firms is slow price recovery[4] or a sluggish stock market. To test whether the longer duration in the SB portfolio is driven by a slow price recovery, a sluggish stock market, or underreaction to new information that conflicts with analysts' prior beliefs, we further examine the duration of the SB portfolio's subgroups partitioned by company performance. We adopt cumulative raw returns to measure company performance and employ a market model[5] to adjust stock performance to discriminate the sluggish stock market explanation. We only tabulate the results for cumulative abnormal returns. RET_0 and $ABRET_0$ are raw and abnormal returns, respectively, on the current recommendation announcement date.

We define winners as the stocks within the 70th percentile of cumulative returns between the current and the immediately prior recommendations, REC_0 and REC_{-1}. Losers are defined as stocks within the corresponding 30th percentile.[6] We further subdivide the SB portfolio into a winner subportfolio, SWB, and loser subportfolio, SLB (see Figure 2). In terms of the second hypothesis, we examine the duration for both the SWB portfolio (hereafter disappointing winners) and SLB portfolio (hereafter disappointing losers) to investigate whether the prolonged response in upgrading SELL stocks is induced by a company's slow price recovery. Moreover, we use disappointing loser portfolio as baseline in the hazard model to detect the speed of upgrading unfavorably rated winners and the speed of upgrading

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[4] On the other hand, if the market underreacts to analysts' prior unfavorable recommendations, the duration between the recommendations for the SS companies may be shorter. Our untabulated test results, nevertheless, show that market underreaction does not appear to result in shorter duration for the SS firms.

[5] We use S&P 500 returns as a benchmark and estimate the slope coefficients for the market model via (–120, –10) and (10, 120) windows to calculate abnormal returns.

[6] Our results are robust to the untabulated tests with recalculation for winners and losers by using 75th and 25th percentiles, respectively.

unfavorably rated losers. If slow price recovery drive analyst's prolonged response in upgrade unfavorably rated stocks, then we would expect a positive estimated coefficient in the hazard model, vise versa.

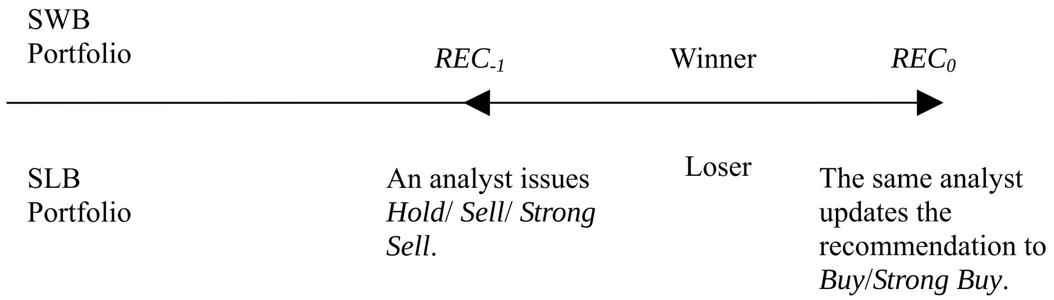

Figure 2 Disappointing winners (SWB) and disappointing losers (SLB)

We define winners as the stocks within the 70th percentile of cumulative returns between the current and the immediately prior recommendations, REC_0 and REC_{-1}. Losers are defined as stocks within the corresponding 30th percentile. We further subdivide the SB portfolio into a winner subportfolio, SWB, and loser subportfolio, SLB. Then we examine the duration for both the SWB portfolio (hereafter, disappointing winners) and SLB portfolio (hereafter, disappointing losers) to investigate whether the prolonged response in upgrading SELL stocks is induced by a company's slow price recovery.

Prior research has shown that analyst recommendations embody valuable information. After analysts issue unfavorable recommendations, stock prices decline. Therefore, the SELL portfolio may take longer to reach higher cumulative abnormal returns than to reach lower cumulative abnormal returns before being upgraded to the BUY portfolio. That is, the duration for the disappointing winners is inherently longer than the duration for the disappointing losers. To determine whether the delayed response to the disappointing losers stems from cognitive dissonance, we lessen the effect of capital market reaction to the unfavorable recommendations. According to Womack (1996), because the three-trading-day cumulative abnormal return around recommendation announcement date significantly declines for added-to-sell recommendation changes, we exclude three-trading-day abnormal returns after SELL recommendations and recalculate the 70th and the 30th percentiles for the winners and losers.[7] The untabulated results yield similar conclusions. We also compare the duration performance and successive performance of current recommendations for the disappointing winners and disappointing losers to investigate whether analysts respond proactively or reactively to the stock market. We define $CR_{[-t, -t+1]}$ and $CAR_{[-t, -t+1]}$ as cumulative raw and cumulative abnormal returns, respectively, during the period between REC_{-t+1} and REC_{-t} to measure the duration stock performance.

7 We also exclude five-trading-day cumulative return and seven-trading-day cumulative return after unfavorable recommendations. The tenor of the results is unchanged.

We adopt an alternative test of returns to examine whether analysts take more time to respond to new, favorable information than the stock market. We divide the disappointing winners' withholding period between REC_{-1} and REC_0 into five subperiods and examine whether analysts issue upgrades to the unfavorable category as stock prices surge. $CAR^i_{[-1, 0]}$ is the mean value of cumulative abnormal return in the i^{th} subperiod between REC_0 and REC_{-1}. Specifically, $CAR^1_{[-1, 0]}$ is the average cumulative abnormal return in the first subperiod after the prior recommendation, REC_{-1}, and $CAR^5_{[-1, 0]}$ is the average cumulative abnormal return in the last subperiod after the prior recommendation. If the stock performance is greater in the last two subperiods rather than first two subperiods, we suggest that analysts upgrade SELL recommended stocks after stock prices go up. In other words, analysts are reactive to the stock market for the disappointing winners.[8] All portfolio and variable definitions are summarized in the Appendix.

3.3 DATA DESCRIPTION AND CHARACTERISTICS

Our sample consists of S&P500 companies in both the CRSP and First Call databases from January 1995 to May 2002. We obtain analyst recommendations from First Call and earnings data and the Standard Industry Classification Code data from COMPUSTAT. We use S&P500 companies to form our portfolios because prior analyst research suggests that analysts concentrate on large companies. We focus on unfavorably rated stocks with subsequent good performance to capture the contradiction between the prior belief and the subsequent evidence. After obtaining new information, analysts may realize the recovery of previously unfavorably rated stocks and then either update their opinions or drop those stocks. When a small company performs poorly, it is often dropped by analysts rather than issued an unfavorable recommendation. Because First Call does not present data regarding dropped coverage, if we include many small companies, the duration variable, which we adopt to measure the delay response to information, induces too much noise.

Table 1 provides descriptive statistics on recommendations, portfolio returns, cumulative returns, and durations. Panel A reports the distribution of portfolios formed by analysts' recommendations. The BB portfolio (i.e., $REC_{-1} = REC_0 =$ BUY recommendation) is the largest group, and SS is the smallest one. The percentages of all observations in the BUY portfolios formed by current and prior favorable recommendations are 65.75% and 68.80%, respectively. These findings show analysts are prone to be optimistic when valuing firms. Our first test focuses on the

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[8] We use cumulative raw return to measure stock performance, and the result is robust.

SB and SS portfolios to investigate how analysts respond to new information after issuing unfavorable opinions.

Panel B of Table 1 presents recommendation announcement date returns, the cumulative raw return, and the cumulative abnormal return for all observations for the BUY and SELL portfolios. The mean return on the recommendation announcement date is positive in the BUY portfolio and negative in the SELL portfolio. The averages of cumulative raw return and cumulative abnormal return are greater in the BUY portfolio than those in the SELL portfolio. This finding suggests that the stocks with BUY recommendations outperform the SELL category securities. Panel C reports the duration between REC_{-1} and REC_0. The differences in duration among the three portfolios are insignificant. The calendar days are almost the same between REC_{-1}＝arbitrary recommendations with REC_0 = *strong buy* or *buy* and REC_{-1}＝arbitrary recommendations with REC_0＝*hold*, *sell*, or *strong sell*.

4. EMPIRICAL RESULTS

4.1 TEST OF ANALYSYS' COGNITIVE DISSONANCE

We first use univariate test to preliminarily observe the pattern of analyst's upgrading and downgrading in unfavorably rated stocks. According to the efficient market hypothesis, if analysts' recommendations are rational, the duration between sequential recommendations should be independent of the previous recommendations. That is, the duration should be insignificantly different between the SB and SS portfolios. However, as the results in Panel A of Table 2 show, analysts take 171 (137) days to convey positive (negative) information through upgrading (negatively reiterating) the stocks in the unfavorable category. This result supports the inference that analysts are subject to cognitive dissonance when they receive good news on stocks with previously unfavorable recommendations.

Panel B of Table 2 presents 1,713 observations in the disappointing winners, SWB portfolio, and disappointing losers, SLB portfolio, formed by cumulative abnormal returns.

Table 1 Descriptive statistics for analyst recommendations, 1995-2002, with the length of time between two consecutive recommendations within 18 months

Panel A: Distribution of portfolios formed by analysts' recommendation recommendations

	All observations		Current Recommendation			
			BUY portfolio		SELL portfolio	
Prior recommendation	N	%	N	%	N	%
BUY	14,810	68.80	8,306	38.58	6,504	30.21
SELL	6,717	31.20	5,848	27.17	869	4.04
Total	21,527	100.00	14,154	65.75	7,373	34.25

Panel B: Return of recommendation day, cumulative raw return and cumulative abnormal return

	All observations			BUY portfolio			SELL portfolio		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
RET_0	21,527	–0.0057	0.0709	14,154	0.0078	0.0613	7,373	–0.0317	0.0801
$CR_{[-1, 0]}$	21,527	0.0965	0.3719	14,154	0.1174	0.4079	7,373	0.0564	0.3702
$CAR_{[-1, 0]}$	21,527	0.0334	0.5270	14,154	0.0479	0.5273	7,373	0.0060	0.5254

Panel C: Duration between recommendations

	All observations			BUY portfolio			SELL portfolio		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.
$DURATION_{[-1, 0]}$	21,527	170	139	14,154	170	140	7,373	171	137

The BUY portfolio consists of stocks for which analysts issue *buy* or *strong buy*, and the SELL portfolio consists of stocks for which analysts issue *hold*, *sell*, or *strong sell* recommendations. We denote the current recommendation as REC_0. REC_{-1} is defined as the immediately prior recommendation. $DURATION_{[-t, -t+1]}$ is defined as the number of days between REC_{-t+1} and REC_{-t}. For instance, $DURATION_{[-1, 0]}$ in BUY portfolio is the number of calendar day(s) between current favorable recommendation and the immediately previous favorable or unfavorable recommendation, that is, the number of calendar day(s) between REC_0 = *Strong Buy* or *Buy*, and REC_{-1} = arbitrary recommendations. RET_0 and $ABRET_0$ are raw and abnormal returns on REC_0 date, respectively, and $CR_{[-t, -t+1]}$ and $CAR_{[-t, -t+1]}$ are cumulative raw and cumulative abnormal returns between REC_{-t} and REC_{-t+1}, respectively. Panel A reports portfolios formed by analyst recommendation recommendations, with number and percent of all observations. Panel B presents returns on the recommendation date, cumulative raw returns, and cumulative abnormal returns. Panel C presents the distribution of the duration between recommendations.

Table 2 Comparison test for SS versus SB and SWB versus SLB portfolios with duration within 18 months

Panel A: Duration between most recent and current recommendations for SS and SB portfolios

	SS	SB	*t* statistic
N	869	5,848	
$DURATION_{[-1, 0]}$	137	171	7.45 ***

Panel B: Difference in Duration between REC_0 and REC_{-1} for SWB and SLB portfolios

	SWB[a]	SLB[b]	*t* statistic
N	1,713	1,713	
$DURATION_{[-1, 0]}$	211	191	4.17 ***

Panel C: Abnormal returns on REC_0 date for SWB and SLB portfolios

RET_0	0.0210	0.0257	–2.47 **
$ABRET_0$	0.0244	0.0208	1.86 *

Panel D: Cumulative abnormal returns between REC_0 and REC_{-1} for SWB and SLB portfolios

$CR_{[-1, 0]}$	0.4481	–0.2295	38.51 ***
$CAR_{[-1, 0]}$	0.4869	–0.3799	56.93 ***

$DURATION_{[-1, 0]}$ is defined as the number of calendar day(s) between the immediately previous and the current recommendations, REC_{-1} and REC_0. The SS portfolio includes the stocks with reiterated sell recommendations, and the SB portfolio consists of the stocks with unfavorable immediately previous recommendations but favorable current recommendations. The SWB portfolio consists of winner stocks with a negative prior recommendations (REC_{-1} = SELL recommendation) but a positive current recommendation (REC_0 = BUY recommendation). The winner stocks are the securities within the 70th percentile of cumulative abnormal returns between the two recommendations, REC_{-1} and REC_0. The SLB portfolio consists of loser stocks in the SB portfolio. The loser stocks are defined as the securities within the 30th percentile of cumulative abnormal returns between REC_{-1} and REC_0.

Panels A and B report the number of days between REC_0 and REC_{-1} for the SS and SB portfolios and for the SWB and SLB portfolios, respectively. Panel C reports abnormal daily returns on REC_0 date for the SWB and SLB portfolios. Panel D presents cumulative abnormal returns between REC_0 and REC_{-1}. ***, **, and * denote significance based on a *t*-test at the 1%, 5%, and 10% level, respectively.

[a] *Hold* / *Sell* / *Strong Sell* → Winner → *Buy* / *Strong Buy*.

[b] *Hold* / *Sell* / *Strong Sell* → Loser → *Buy* / *Strong Buy*.

The duration in the disappointing winners is 211 calendar days, which is approximately 10% greater than the duration in the disappointing losers. In untabulated results, the duration of a portfolio sorted by cumulative raw returns for the disappointing winners is 246 days, which is approximately 38% longer than the duration for the disappointing losers. We also exclude three-trading-day abnormal returns after SELL recommendations and recalculate the 30th and the 70th percentiles for losers and winners to lessen the negative effect of capital market reaction after unfavorable recommendations. The untabulated results provide a similar conclusion. Thus, the results suggest that analysts take longer to upgrade negatively rated stocks with better subsequent performance but, in contrast, are faster in upgrading those with inferior performance. Accordingly, a slow price recovery of the previously unfavorably rated stocks or a sluggish stock market is not an explanation for the slower pace at which analysts upgrade stocks in the reduced category. We also inspect the stock market reaction to the unfavorable category stocks. We measure cumulative abnormal returns and cumulative raw returns for the disappointing winners (SWB portfolios) and the disappointing losers (SLB portfolios). Panel C of Table 2 shows that the abnormal return on recommendation day for the disappointing winners is significantly greater than that for the disappointing losers. Panel D reports the cumulative returns between REC_{-1} and REC_0. The cumulative abnormal duration return is 48.69% for the disappointing winners and –37.99% for the disappointing losers.

We further use hazard model to test the difference between times to upgrade and to downgrade the unfavorable category. Table 3 reports the results of Cox regressions for our hypotheses. Panel A demonstrates the results of Likelihood Ratio, Score and Wald tests to show the suitability of the upgrade/downgrade indicator as explanatory variable. The negative coefficient in H_1 in the first column in Panel B shows that analysts need more time to upgrade unfavorable rated stocks than to downgrade unfavorable rated stocks. The hazard ratio of 0.7860 for SB means that, conditional on having arrived at time t without an update, analysts are 78.60% likely to upgrade than to downgrade SELL portfolio.

Table 3 Hazard model test for SS versus SB and SWB versus SLB portfolios with duration within 18 months

Panel A: Likelihood Ratio, Score and Wald tests Test for cognitive hypotheses (H_1 and H_2)

	LR Chi-square	Score Chi-square	Wald Chi-square
H_1: SB	40.9701***	43.6635***	43.5347***
H_2: SWB	14.5747***	14.6039***	14.6603***

Panel B: Cox regressions of the duration of two successive recommendations within a 18-month window for cognitive hypotheses (H_1 and H_2)

	Coefficient Estimate	Chi-square	Hazard Ratio
H_1: SB	–0.2405	43.5347***	0.7860
H_2: SWB	–0.1307	14.6603***	0.8780

The SS portfolio includes the stocks with reiterated sell recommendations, and the SB portfolio consists of the stocks with unfavorable immediately previous recommendations but favorable current recommendations. The SWB portfolio consists of winner stocks with a negative prior recommendations (REC_{-1} = SELL recommendation) but a positive current recommendation (REC_0 = BUY recommendation). The winner stocks are the securities within the 70^{th} of cumulative abnormal returns between the two recommendations, REC_{-1} and REC_0. The SLB portfolio consists of loser stocks in the SB portfolio. The loser stocks are defined as the securities within the 30^{th} of cumulative abnormal returns between REC_{-1} and REC_0.

Panel A demonstrates the statistics of Likelihood Ratio, Score and Wald tests for cognitive hypotheses (H_1 and H_2). Panel B presents the results of Cox regressions for cognitive hypotheses (H_1 and H_2). The baselines for hypothesis one to three are SS, and SLB, respectively. We use partial likelihood method to estimate coefficients. ***, **, and * denote significant at the 1%, 5%, and 10% level, respectively.

To discover the longer time for analysts to upgrade than downgrade unfavorable category is driven by the psychological reason or market's slow price recovery, we next examine analyst's upgrade behavior for different post-recommendation performance of unfavorable category. If this were the case that slow price recovery drive analyst's prolonged response in upgrade unfavorably rated stocks, then we would expect a positive estimated coefficient in the hazard model. The negative coefficient in H_2 provides the evidence that analysts upgrade disappointing winners less timely than disappointing losers. That is, analysts are more reluctant to upgrade winners than to upgrade losers. The hazard ratio of 0.8780 for disappointing winners means that, conditional on having arrived at time t without an upgrade, analysts are 87.80% likely to upgrade winners in SB portfolio than to upgrade losers in SB portfolio. This ancillary result confirms our univariate test result of the first hypothesis and refutes the alternative view of that the prolonged response results from the capital market influence.

4.2 PROACTIVE OR REACTIVE TO THE STOCK MARKET?

In this section we partition the cumulative returns between prior and current recommendations into five subperiods to further investigate whether analysts proact or react to the stock market. If analysts are reactive to the stock market, we expect to observe analysts' upward revisions right after the stock market's rebound. Otherwise, there should be no significant increase in stock prices sooner than analysts' positive updates.

Table 4 reports the cumulative abnormal returns between REC_{-1} and REC_0 for the five subperiods. In the first row, the difference in cumulative abnormal returns between the first and the second subperiods is 0.61, which is statistically insignificant. The insignificant difference in cumulative abnormal returns between the first and the third subperiods is 0.18. In the second row, the negative difference between the second and the third subperiods indicates that the cumulative abnormal return decrease in the third subperiod relative to the second subperiod. The differences among first four subperiods are not significant. However, the differences between the fifth subperiod and the rest periods are positively significant. The findings of pairwise tests for the fifth subperiod are consistent with the argument that upgrades occur after price rebounds. Specifically, there are significantly greater returns prior to analysts' issuing favorable recommendations. This result is consistent with our conjecture that analysts are being reactive rather than proactive when they upgrade stocks in the unfavorable category. We suggest that analysts underreact to new, favorable information that conflicts with their prior perception.

Thus, these findings support our first two hypotheses that analysts' cognitive dissonance leads to their delayed upgrades for previous unfavorably rated stocks.

Table 4 Tests for the cumulative returns in five subperiods between REC_0 and REC_{-1}

	$CAR^1_{[-1, 0]}$	$CAR^2_{[-1, 0]}$	$CAR^3_{[-1, 0]}$	$CAR^4_{[-1, 0]}$	$CAR^5_{[-1, 0]}$
$CAR^1_{[-1, 0]}$		0.61	0.18	0.85	3.23***
		(0.5444)	(0.8534)	(0.3981)	(0.0013)
$CAR^2_{[-1, 0]}$			–0.49	0.07	2.77***
			(0.6237)	(0.9404)	(0.0057)
$CAR^3_{[-1, 0]}$				0.49	3.24***
				(0.6240)	(0.0013)
$CAR^4_{[-1, 0]}$					2.41**
					(0.0160)

$CAR^i_{[-1, 0]}$ is the cumulative abnormal return in the i^{th} subperiod between REC_0 and REC_{-1}. Table 4 shows the pairwise tests for cumulative abnormal returns among five subperiods returns between REC_0 and REC_{-1}. *P* values are in parentheses. ***, **, and * denote significance based on a *t*-test at the 1%, 5%, and 10% level, respectively.

We also depict the subsequent buy-and-hold abnormal returns for SWB and SLB to capture the patterns of post-updating drifts in Figure 3. The buy-and-hold abnormal returns in Panels A and B are portfolios' cumulative raw returns adjusted by the equally- and value-weighted market returns, respectively. Both figures show that post buy-and-hold abnormal returns of SLB portfolios are greater than those of SWB portfolios, supporting the notion that analysts are not proactive to the market for the SWB portfolio relative to the SLB portfolio. We suggest that analysts withhold favorable recommendations for portfolios with cognitive dissonance.

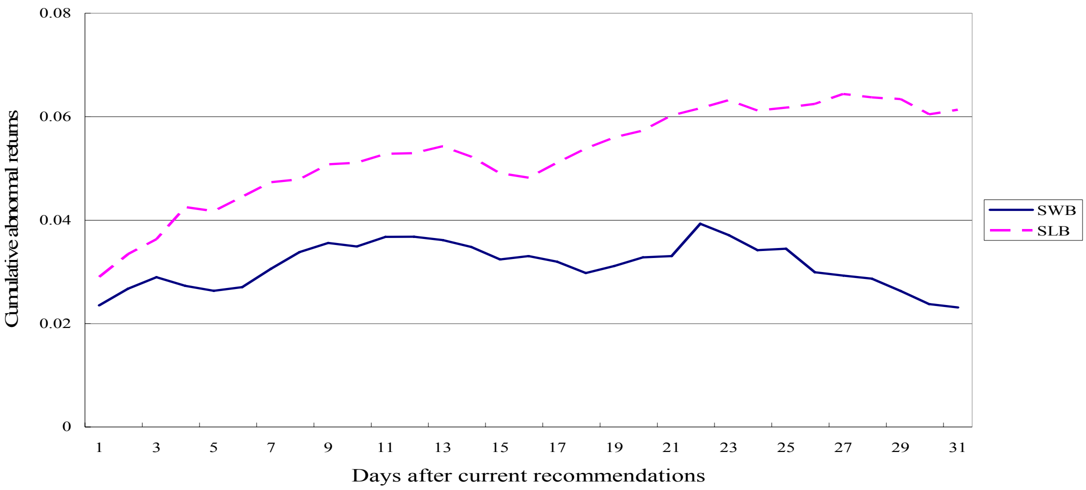

Figure 3 Post-SWB and post-SLB drifts for thirty days

Panel A: Equally-weighted abnormal returns

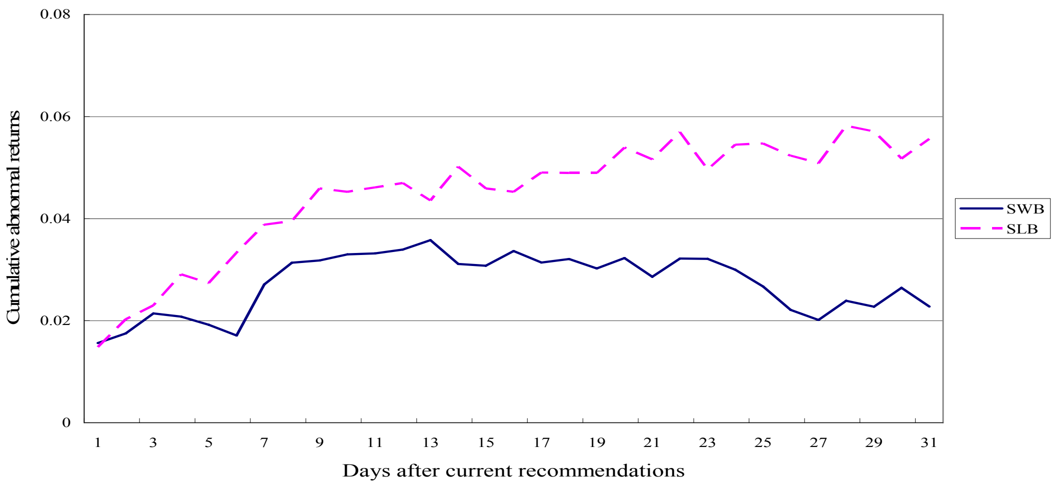

Figure 3 Post-SWB and post-SLB drifts for thirty days
Panel B: Value-weighted abnormal returns

The SWB portfolio consists of winner stocks with a negative prior recommendations (REC_{-1} = SELL recommendation) but a positive current recommendation (REC_0 = BUY recommendation). The winner stocks are the securities with cumulative abnormal returns exceeding the cutoff point of the 70th percentile of cumulative abnormal returns between the two recommendations, REC_{-1} and REC_0. The SLB portfolio consists of loser stocks in the SB portfolio. The loser stocks are defined as the securities within the 30th percentile of cumulative abnormal returns between REC_{-1} and REC_0. Post-SWB and post-SLB drifts are cumulative abnormal returns for one to thirty days subsequent to the current BUY recommendations.

4.3 CONTROLLING THE OTHER VARIABLES AFFECTING ANALYSTS' COVERAGE DECISIONS

Analysts may pay less attention to smaller firms or firms with fewer earnings surprises. If so, the duration between two recommendations may be a function of firm size, market value, and other factors. To test the sensitivity of our results to this concern, we use these variables as proxies to pick firms that are more likely to be consistently followed (Heckman 1979; Rajan and Servaes 1997) and restrict the sample to those firms to mitigate selection bias.

We adopt a logistic model with proxies for analyst inclination to cover a stock. We define a dummy dependent variable, with Y_0 as a representative firm that analysts are unlikely to follow and Y_1 as the opposite. If analysts issue recommendations of the quarterly earnings announcements, then we define the firm as a member of group Y_1. π is the response probability to be modeled. The logistic model is as follows:

$$\pi = \alpha_0 + \alpha_1 \times MV + \alpha_2 \times UE + \sum \beta_i \times DY_i + \sum \gamma_j \times DI_j + \varepsilon \, , \quad (2)$$

$$P(Y_0, Y_1) = [1 + \exp(-\hat{\pi})]^{-1}, \quad (3)$$

where MV is the natural logarithm of the market value, UE is the absolute value of the earnings surprise on the basis of the random walk model, DY_1, is a dummy variable equal to 1 when the earnings announcement is made from 1995 to 1997, and DY_2 is a dummy variable equal to 1 when the announcement date is from 1998 to 1999; dummy variables DI_j, $j = 1,...,8$, represent the j^{th} industry classified by one-digit SIC codes, ε is an error term, and α, β and γ are coefficients for the corresponding variables. $\hat{\pi}$ is the predicted probability of the event that analysts are likely to follow for the given independent variables.

Panel A in Table 5 reports the coefficient estimates of the independent variables for analyst coverage in the logistic regression. Panel B reports the robustness test's results for controlling analysts' coverage preference by using logistic model. The results in Panel A indicate that the natural logarithm of the market value, earnings surprise, and most of the independent dummy variables are suitable variables for capturing analysts' coverage preference. When a firm's estimated probability in the logistic model is greater than 0.5, we categorize the firm as part of the group that analysts are more likely to follow. To corroborate the shorter duration of SS and SLB portfolios not driven by analysts' coverage preference, we, hereafter, restrict our new sample with estimated probability greater than 0.5. Namely, we focus on the firms that analysts are more likely to follow. After we control analysts' coverage preference, the new sample size for SB (SS) portfolio decreases from 5,848 (869) to 4,362 (676) and the duration for new sample for SB (SS) portfolio is 171 (134). The difference in duration between SB and SS portfolios increases when we compare to the original sample. The significantly greater duration for SB portfolio relative to SS portfolio provides evidence for the first hypothesis that analysts withhold favorable recommendations longer relative to unfavorable recommendations in the unfavorable category after we take analysts' coverage preference into account.

Further, we reexamine the second hypothesis with the sample selected by this logistic model. Panel B in Table 5 shows that the new sample size for SWB (SLB) portfolio decreases from 1,713 (1,713) to 1,015 (1,081). The difference in duration of 20 days between SWB and SLB portfolios remains significant. Unsurprisingly, the cumulative abnormal return for SWB portfolio is significantly greater than that for SLB, suggesting the stock performance for winners and losers in our research design has distinguishability. Consequentially, the results of controlling analysts' coverage preference supports the inference that analysts are subject to cognitive dissonance when they receive good news on stocks with previously unfavorable recommendations.

Table 5 The difference in duration with the other variables for the frequency of recommendations being controlled

Panel A: Estimated coefficients of proxies for the preference of analyst coverage

Variable	Estimate (Standard Error)	Wald Chi-square
INT	–6.145 (0.4225)	211.52 ***
MV	0.320 (0.0186)	297.21 ***
UE	0.349 (0.0905)	14.82 ***
DY1	–0.088 (0.0539)	2.66
DY2	0.036 (0.0463)	0.60
DI1	2.042 (0.2785)	53.75 ***
DI2	1.198 (0.2592)	21.36 ***
DI3	1.575 (0.2596)	36.83 ***
DI4	1.103 (0.2625)	17.65 ***
DI5	1.484 (0.2631)	31.80 ***
DI6	1.304 (0.2598)	25.18 ***
DI7	1.567 (0.2646)	35.06 ***
DI8	1.495 (0.3029)	24.38 ***

Panel B: Difference in duration and cumulative abnormal return during the period from REC_{-1} to REC_0

	SB	SS	*t* statistic (SB–SS)
N	4,362	676	
$DURATION_{[-1, 0]}$	171	134	7.31***
$CAR_{[-1, 0]}$	0.0290	0.0095	1.06
	SWB	SLB	*t* statistic (SWB–SLB)
N	1,015	1,081	
$DURATION_{[-1, 0]}$	233	213	3.25***
$CAR_{[-1, 0]}$	0.5820	–0.4217	46.59***

The logistic model is as follows:

$$\pi = \alpha_0 + \alpha_1 \times MV + \alpha_2 \times UE + \sum \beta_i \times DY_i + \sum \gamma_j \times DI_j + \varepsilon, \quad i = 1,2, \text{ and } j = 1,\ldots,8,$$

$$P(Y_0, Y_1) = [1 + \exp(-\hat{\pi})]^{-1},$$

where MV is the natural logarithm of the market value; UE is the absolute value of earnings surprise on the basis of the random model; the dummy variable, DY_1, equals 1 when the sample period is from 1995 to 1997; the dummy variable, DY_2, equals 1 when the period is from 1998 to 1999; the dummy variable, DI_j, $j = 1,\ldots,8$, represent the industry classified by one-digit SIC codes; ε is an error term, and α, β, and γ are the coefficients of corresponding variables. π is the probability of the event that analysts are likely to follow. $\hat{\pi}$ is the predicted probability for the given independent variables. *INT* is intercept of the logistic model. If an analyst recommendation emerges within 30 days before or after a quarterly earnings announcement, we define the firm as a member of group Y_1. When the firm's probability in the logistic model is greater than 0.5, we categorize the firm in the group that analysts are more likely to follow. ***, **, and * denote significance based on Chi-square test or *t*-test at the 1%, 5%, and 10% level, respectively.

5. CONCLUSION

Motivated by psychological evidence that cognitive constraints affect investors in processing information, this study, which adopts security analysts' previous recommendations to represent their prior perceptions, posits and reports delayed upgrades for the stocks with unfavorable prior recommendations. Our results suggest that analysts' cognitive dissonance—a defense mechanism equipped to avoid psychological discomfort accompanying evidence that contradicts prior beliefs—contributes to their underreaction to the recovering stocks. Specifically, if a company's successive performance contradicts an analyst's previous recommendation, the analyst may be subject to cognitive dissonance and, thus, prone to underreact to new information. Such underreaction echoes the notion that analysts are subject to limited attention at least when they face evidence that contradicts prior beliefs. Our results are robust when we control for alternative explanations to analyst underreaction, including slow price recover of unfavorably rated stocks and differences in analysts' preference of coverage.

APPENDIX

Panel A: Portfolio Definitions[a]

Portfolio	Definition
BUY	stocks with current *buy* or *strong buy* recommendation
SELL	stocks with current *hold*, *sell*, or *strong sell* recommendation
SB	stocks with last *hold*, *sell*, or *strong sell* recommendation, and current *buy* or *strong buy* recommendation
SS	stocks with last *hold*, *sell*, or *strong sell* recommendation, and reiteration unfavorable recommendation currently
SWB	SB portfolio with winners, which is the 70th percentile sorted by cumulative returns between REC_{-1} and REC_0
SLB	SB portfolio with losers, which is the 30th percentiles sorted by cumulative returns between REC_{-1} and REC_0

Panel B: Variable Definitions[b]

Variable	Definitions
REC_{-t}	prior t^{th} recommendation
REC_0	current recommendation
$DURATION_{[-1, 0]}$	mean calendar days between last and current recommendations
$CR_{[-t, -t+1]}$	cumulative raw return between the prior t^{th} recommendation and prior $(t+1)^{th}$ recommendation
$CAR_{[-t, -t+1]}$	cumulative abnormal return between the prior t^{th} recommendation and prior $(t+1)^{th}$ recommendation
RET_0	raw returns on the REC_0 issuance day
$ABRET_0$	abnormal returns on the REC_0 issuance day
$CAR^i_{[-1, 0]}$	mean cumulative abnormal return in the i^{th} subperiod between REC_0 and REC_1, i=1, …, 5
INT	intercept of the logistic model
MV	natural logarithm of the market value
UE	absolute value of earnings surprise on the basis of the random model
DYi, i=1, 2	dummy variables for periods 1995 to 1997, 1998 to 1999, and 2000 to 2002; for example (*DY1*, *DY2*) = (0, 0) when the observation is during 2000-2002.
DIj	dummy variables for industry classified by one-digit SIC codes, j=1,2, …, 8

a. Stock recommendation and return data are retrieved from First Call and CRSP, respectively.
b. Return data and earnings information are retrieved from CRSP and COMPUSTAT, respectively.

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