Stock Recommendations as a Source of Bias in Earnings Forecasts

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ABSTRACT: Recent scandals and controversies have focused substantial attention on the behavior of financial analysts. Responses such as the Sarbanes-Oxley Act, new regulations at securities exchanges, and massive legal settlements are consistent with the perception that analysts' research and stock recommendations exhibit significant self-serving bias. While anecdotal and legal evidence support the allegations that some analysts have intentionally mislead the investing public, recent archival research suggests *unintentional* cognitive processes also contribute to systematic bias in analysts' forecasts (Eames et al. 2002). However, studies based on stock-market data cannot distinguish between unintentional cognitive processes and intentional bias stemming from economic incentives (e.g., trade boosting). In a laboratory experiment we eliminate economic incentives and find that cognitive processes *unintentionally* lead to earnings forecast bias. Our results suggest that recent regulations and policy changes by Congress, the Securities and Exchange Commission, exchange markets, and brokerage firms will not totally eliminate bias in analysts' earnings forecasts.

Keywords: analyst earnings forecast; framing; motivated reasoning; forecast bias.

Data Availability: Contact the authors.

INTRODUCTION

S candal and controversy have surrounded Wall Street financial analysts in recent years. Even before the financial crises of Enron, WorldCom, and HealthSouth, Arthur Levitt, Chairman of the U.S. Securities and Exchange Commission (SEC), described the financial reporting and analysis marketplace as a "game of nods and winks" (Levitt 1998). Recent passage of the Sarbanes-Oxley Act, new regulations at securities exchanges like the New York Stock Exchange, and massive brokerage firm legal settlements are responses, in part, to reduce the optimistic bias in analysts' published research and recommendations. Much of the (perceived) bias has been ascribed to conflicts of interest that arise when securities firms provide a mix of investment banking, brokerage, and investment advisory

services. Financial analysts have faced conflicts in supporting these disparate functions. Analysts have allegedly issued overly optimistic earnings forecasts and inflated stock recommendations in order to support investment-banking deals, curry favor with management, and stimulate trading fees. Incentives relating to the brokerage function encourage optimistic earnings forecasts and "buy" over "sell" recommendations (to stimulate trading), while the investment advisory service is predicated on the assumption of unbiased analyses, earnings forecasts, and recommendations. A substantial body of archival research confirms that analysts' earnings forecasts generally exceed actual earnings, i.e., forecasts exhibit optimism (e.g., O'Brien 1988; Lys and Sohn 1990; Francis and Philbrick 1993; Eames et al. 2002).

The SEC, securities exchange markets, and brokerage firms have designed reforms to reduce conflicts of interest and reduce incentives for optimistically biased recommendations and earnings forecasts.[1] Substantial anecdotal and legal evidence indicate that some analysts have intentionally misled the investing public. However, archival research suggests that at least some of the observed systematic bias may be due to *unintentional* cognitive processes (Eames et al. 2002). In other words, despite the efforts by Congress, the Securities and Exchange Commission, exchange markets, and brokerage firms, there may still be factors within the analysts' decision-making environment that lead to systematically, perhaps unintentionally, biased earnings forecasts. Thus, the recent regulations and procedures designed to alter the incentives faced by analysts may not be entirely effective at eliminating biased earnings forecasts.

Relying on the theory of motivated reasoning, Eames et al. (2002) (hereafter EGK) present evidence that optimistic forecast errors are associated with outstanding "buy" recommendations and pessimistic forecast errors are associated with outstanding "sell" recommendations.[2] EGK conclude that their findings are consistent with an unconscious tendency among analysts to process information in a manner that supports the outstanding stock recommendations. An important strength of the EGK archival study is its external validity—it explains an observed systematic bias in analysts' earnings forecasts. However, the EGK study suffers from internal validity limitations (discussed in more detail later). Most important of these, EGK concede that they cannot rule out trade boosting, the deliberate biasing of earnings forecasts to stimulate trading, which would provide a similar pattern of results to that predicted by their theory of a motivated reasoning bias (i.e., the unconscious tendency to be influenced by previous stock recommendations).

We examine, in a controlled laboratory environment, whether processing information in the context of a previously issued stock recommendation results in unintentional bias in earnings forecasts. The laboratory experiment allows us to overcome the internal validity limitations faced by EGK by eliminating the incentive to boost trading as well as the impact of earnings shocks and earnings management on forecast errors. We control for the timing

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[1] For example, in response to Section 501 of the Sarbanes-Oxley Act, on April 14, 2003 the SEC issued the final rule, *Regulation Analyst Certification* [RIN 3235-AI60], which requires that brokers and dealers include in research reports certifications by the financial analyst that the views expressed in the report accurately reflect the analysts' personal views, and disclose whether the analyst received compensation or other payment in connection with the specific recommendations or views. Regulation Analyst Certification is intended to promote the integrity of research reports and investor confidence in the reports. Also, in May 2002, the SEC approved rule changes filed by the New York Stock Exchange (NYSE) and the National Association of Securities Dealers (NASD) to strengthen the rulings governing analyst conflicts of interest (see Securities Exchange Act Release No. 45908, May 16, 2002).

[2] Consistent with EGK, we define forecast errors as forecasted earnings minus actual earnings. Optimistic forecast errors mean that forecasted earnings exceed actual earnings, while pessimistic forecast errors mean that actual earnings exceed forecasted earnings.

of the stock recommendation and eliminate the need to control for level of earnings as required of EGK in their archival study. Demonstrating that unintentional cognitive factors lead to forecast bias does not rule out the possibility that incentives (e.g., trade boosting) also affect analysts' forecast errors, but it suggests that laws and regulations focused on incentives will not entirely eliminate analyst forecast bias.

While EGK rely on the theory of motivated reasoning, we rely on the broader theory of framing. The "frame" we examine is the outstanding stock recommendation. Analysts publish both stock recommendations (i.e., "buy," "hold," or "sell") and earnings forecasts. Because recommendations are relatively static, most earnings forecasts are generated within the context of an outstanding stock recommendation. EGK conjecture that analysts' earnings forecasts are biased by their motive to support their outstanding stock recommendation. In our study, participants are asked to generate an accurate earnings forecast and one piece of information in the background materials is a stock recommendation previously issued by another analyst. As explained in more detail later, the past recommendation in the absence of price and other key data should be viewed as irrelevant information in forming a short-term earnings forecast. Therefore, normatively the stock recommendation should not affect the earnings forecast. However, we predict that the past stock recommendation creates either a positive (e.g., "buy" recommendation) or a negative (e.g., "sell" recommendation) frame through which information is processed. By using a *framing* context rather than a *motivated reasoning* context, our study provides a stronger test of the unconscious influence of past recommendations on stock prices. If our study's participants were also motivated to support their own outstanding and/or current recommendation as analysts are, then any bias we document in a framing context would only be stronger.

We find that participants forecast higher (lower) earnings when the outstanding stock recommendation is "buy" ("sell"), despite the absence of trade-boosting incentives or earnings management. This result is important to those interested in debiasing analyst's forecasts (e.g., regulators, exchange markets, investors) and to researchers investigating sources of analyst bias (e.g., Abarbanell and Lehavy 2003; Cianci 2000; Sedor 2002) because cognitive sources of bias require different debiasing prescriptions than incentive-based biases (Arkes 1991).[3]

In the following section we briefly review the literature on analyst forecast bias and describe theories to explain earnings forecast bias. In the third and fourth sections we present our methodology and results. A final section presents our conclusions and a summary.

SOURCES OF CONSCIOUS AND UNCONSCIOUS FORECAST BIAS

Normatively, decision makers should consider all relevant information in an unbiased manner and make judgments uninfluenced by motives to reach a particular conclusion. In reality, it is difficult to set aside economic incentives or directional frames of reference when processing information. Biased judgments often result.

Archival research finds that analysts' annual earnings forecasts are on average optimistically biased (e.g., EGK; and reviews in Brown 1993; Schipper 1991). A review of the literature leads us to several non-mutually exclusive explanations for biased analyst forecasts. Bias may be due to economic incentives and/or cognitive processing. Biases due to economic incentives are more likely to be a conscious response, while biases due to cognitive processing are less conscious or completely unconscious, i.e., the decision maker is

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[3] The prescription for incentive-based biases is to change the incentives. Cognitive biases are typically insensitive to effort and incentives, and may require mechanisms that change mental associations.

unaware that he or she is processing information in a biased manner. This paper's primary focus is on the cognitive theories; however, we also briefly discuss the economic incentives and then control for their effects in our laboratory study.

Economic Incentive Theories

A number of economic incentive-based explanations have been proposed for earnings forecast optimism including:

* *Management Relations* (Francis and Philbrick 1993)—predicts that analysts intentionally issue optimistically biased earnings forecasts to curry favor with management. The forecaster is willing to trade-off a loss in forecast accuracy with a gain in accuracy resulting from better access to management's information.[4]
* *Trade Boosting* (Kim and Lustgarten 1998)—predicts that analysts intentionally bias earnings forecasts to motivate investors to trade, which boosts commissions earned on trades.
* *Investment Banking Relations* (Lin and McNichols 1998)—predicts that analysts intentionally bias earnings forecasts to increase the likelihood their firm will be awarded lucrative investment banking business.
* *Earnings Management* (Abarbanell and Lehavy 2003)—predicts that managers bias reported earnings to meet or beat analysts' forecasts (or if they cannot meet or beat forecasts, managers may manage reported earnings to take a large loss or "big bath" in one year in order to increase the likelihood of reporting higher earnings in future years).
* *Truncated Distribution* (McNichols and O'Brien 1997)—predicts that optimism results from analysts dropping coverage of poorly performing firms.

Consistent with an incentive-based explanation for optimism, Cianci (2000) finds in a laboratory experiment that sell-side analysts make more optimistic forecasts than buy-side analysts.

Cognitive Theories

Research indicates there are cognitive processing explanations (unrelated to incentives) for bias in analysts' forecasts. For example, Affleck-Graves et al. (1990) compare forecast bias between analysts and students. Although they find more bias among analysts than among students in the laboratory, students are still biased even though they have no obvious incentives to produce biased forecasts.

EGK hypothesize that a systematic pattern in earnings forecast errors results from the fact that the vast majority of analysts' earnings forecasts are made in the context of an outstanding past recommendation and are released without a concurrent or updated stock recommendation.[5] EGK find that optimistic forecasts are associated with buy recommendations while pessimistic forecasts are associated with sell recommendations.[6] No forecast bias is found for hold recommendations. EGK conclude that their results are consistent

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[4] Recent research has demonstrated that issuing an intentionally optimistic earnings forecast is not an effective way to curry favor with management because optimistic earnings forecasts result in negative earnings surprises, and related negative market reactions, while accurate and pessimistic forecasts have been linked with positive market responses (e.g., Bartov et al. 2002; Kinney et al. 2002; Kasznik and McNichols 2002).

[5] EGK find that 85 percent of the earnings forecasts in their study were issued in the context of a previously issued and outstanding stock recommendation by the brokerage firm.

[6] The overall forecast optimism observed in archival studies reflects the fact that the majority of outstanding recommendations are "buy" recommendations. In EGK, 53.3 percent of the recommendations in their study are "buy" recommendations, 39.2 percent are "hold," and only 7.5 percent are "sell."

with a phenomenon labeled "motivated reasoning" (Kunda 1990), where motivation for a particular conclusion (i.e., directional motivation) biases the judgment process.

Research on motivated reasoning suggests that individuals want to construct rational justifications for desired conclusions. Therefore, they search for relevant information and construct beliefs that logically support these conclusions (Kunda 1990; Boiney et al. 1997). When individuals find supporting information, they draw the desired conclusion while maintaining an illusion of objectivity. The objectivity of this process is considered illusory because individuals do not realize that the process is biased by their desired conclusions. Decision makers do not realize they are accessing only a subset of their relevant knowledge and that they would probably access different beliefs and rules in the presence of different directional goals. They are unaware that they constructed their decision process to make the desired conclusion more likely.

Although EGK interpret their archival results in terms of motivated reasoning, their archival study suffers from a number of internal validity concerns. First, the authors concede that they cannot rule out trade boosting, the deliberate biasing of earnings forecasts to stimulate trading, which would provide a similar pattern of results. They conduct limited tests to distinguish between these competing hypotheses and provide only weak evidence supporting motivated reasoning over trade boosting. Second, EGK only find their results when they impose significant limitations and control variables in their model (e.g., truncating the tails of forecast error distributions representing nearly half their data or including earnings level as a control variable in their regression analysis). Third, 15 percent of the earnings forecasts in their sample data were issued with a contemporaneous stock recommendation. Thus, it is not entirely clear to what extent the influence of earnings forecasts on contemporaneous recommendations impacted their results.

Our experimental setting overcomes these limitations of the EGK study and investigates whether earnings forecasts are unintentionally biased by an outstanding stock recommendation when there is no motivation for such bias. While we believe motivated reasoning can contribute to the observed bias in analysts' earnings forecasts, we examine the simpler and broader theory of framing. That is, an inherited past recommendation provides a "frame" for the analyst that could bias earnings forecasts even when the analyst is not particularly motivated to support the recommendation. Analysts who develop both the recommendation and forecast would be subject to motivated reasoning that would only exacerbate the framing effect.

Russo and Schoemaker (2002, 25) divide the decision-making process into four stages. The first stage, *framing*, "determines the viewpoint from which decision-makers look at the issue and sets parameters for which aspects of the situation they consider important and which they do not." Frames are heuristics adopted to simplify complex decision processes by allowing the decision maker to focus attention on some things while ignoring others. Thus, frames induce the decision maker to view the world from a particular limited perspective. Russo and Schoemaker (2002) use the analogy of a window frame to illustrate the effects of decision frames. In buildings with multiple windows, no single window can reveal the entire panorama. When one chooses between windows, certain aspects of reality or important events will be missed because they are outside the limits of the chosen window frame. Russo and Schoemaker (2002) illustrate the concepts by considering two frames within the context of buying a car: an *economic transaction* frame and a *relational* frame. When the event is thought of in terms of relationship concepts like trust, honesty, communication, rapport, alliances, and cooperation, creating a win-win situation comes to mind. On the other hand, when the economic transaction frame is adopted, most people focus on price, value, credit rating, negotiating the best deal, warranties, and so on. Decision frames

guide thinking by filtering the information attended to by decision makers. Research suggests that decision makers: (1) think through one frame at a time without even realizing they are thinking through a frame at all, (2) have difficulty seeing other perspectives or frames, (3) are locked into a frame and have difficulty switching frames, and (4) process information in a way that is consistent with their simple frame (Russo and Schoemaker 2002). Sedor (2002) hypothesizes that optimistic forecast bias could stem from the tone and form (i.e., positive frame) management uses to convey their future plans to analysts. Her results are consistent with analysts being biased by management's scenario frame in the case of loss firms. Although management may intend this result, presumably analysts do not. Mulligan and Hastie (2005) find that presenting company news to investors in a coherent story format rather than scrambled facts substantially impacted investors' price forecasts even though the information content conveyed was the same in both conditions. They conclude that the coherence of the narrative representation (i.e., a coherent story frame) focuses the decision-maker's attention on the story's conclusion, which is relevant to the predictive task.

Although stock recommendations are typically outstanding when analysts issue short-term forecasts of year-end earnings (i.e., six to 12 months out), in the absence of price information, the outstanding recommendations should not influence the short-term earnings forecasts. An outstanding recommendation is considered an irrelevant *frame* when forecasting current earnings because the past recommendation provides no useful information in forecasting future earnings.[7]

A security analyst should compare the intrinsic value (i.e., the discounted stream of future earnings) to the current stock price to decide whether the stock is over- or underpriced. If underpriced, then a "buy" recommendation is appropriate (i.e., prices should be higher in the future), and if overpriced, then a "sell" recommendation is appropriate. In this analysis, the analyst takes into account the firm's long-term prospects. For example, many startup or high-tech companies receive favorable stock recommendation even though they have never reported a profit, and do not expect to report one in the foreseeable future, which is a salient example of the lack of correspondence between short-term earnings and stock recommendations.[8] Recommendations reflect expectations of future relative returns via a comparison of market price at the time of the recommendation and firm intrinsic value. As such, previously issued recommendations are interpretable *only* if current and recommendation-date market prices are known. Since *no price information* was provided to our participants, outstanding recommendations provide no meaningful evidence regarding short-term earnings or future market returns.

While a past recommendation should not normatively affect a short-term earnings forecast, it is possible that the outstanding recommendation serves to *frame* the way analysts process and weigh information when forming earnings forecasts. We use a framing context in this study rather than motivated reasoning in order to provide a more robust test of *unintended* bias resulting from "framed" information processing and to overcome one of the potential weaknesses of the EGK study (that earnings forecasts impact contemporaneously issued recommendations). In our study, forecasters are not asked to formulate a

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[7] Prior research has found that short-term earnings forecasts play little to no role as *input* to analysts' recommendation decisions (Balog 1991; Biggs 1984), suggesting little relation between recommendation and short-term earnings forecasts.

[8] The favorable recommendations associated with dot-coms in the late 1990s are examples. Recommendations and stock valuations were clearly not driven by short-term earnings forecasts because these firms were losing money at unprecedented rates. Rather than focus on short-term losses, analysts focused on long-term potential market share and website-related factors such as "stickiness" and total "eyeballs."

recommendation; rather they are asked to develop an accurate earnings forecast and we manipulate past recommendations issued by others. Therefore, rather than processing company qualitative and quantitative information with an underlying motive to achieve a desired conclusion (e.g., a current buy recommendation) or justify a previous recommendation, our participants are motivated to form an accurate earnings forecast in the context of an existing yet irrelevant stock recommendation.

We expect the positive or negative frame suggested by an outstanding buy or sell recommendation to influence participants' forecasts. We predict that, in generating earnings forecasts, analysts tend to process information in a manner that biases forecasts in the direction consistent with the recommendation frame (i.e., the outstanding stock recommendation, which can be self-generated or inherited from another). Consider analysts whose brokerage firm has recommended buying a stock in the past. Overweighting (underweighting) positive (negative) diagnostic information and attributing positive evidential value to nondiagnostic information would lead to higher earnings forecasts, consistent with a buy frame. In other words, when exposed to a buy (positive) frame, analysts may unconsciously select and process information that is more consistent with high future earnings expectations, e.g., growth opportunities and expansions of product lines, while ignoring or discounting information that is more consistent with low future earnings expectations. As a result, their earnings forecasts will be unconsciously biased upward, and higher earnings forecasts are more likely to be optimistic (i.e., greater than actual earnings). Similarly, analysts whose brokerage firm has recommended selling are more likely to unconsciously attend to negative information about the firm's earnings prospects, and are thereby more likely to generate a pessimistic earnings forecast. Therefore, we predict that analyst earnings forecasts will be relatively optimistic for outstanding buy recommendations and relatively pessimistic for outstanding sell recommendations.[9] Our hypothesis, stated in alternative form, is:

H1: Earnings forecasts are higher when forecasters inherit a positive frame (i.e., favorable outstanding stock recommendation) than when they inherit a negative frame.

METHOD
Experimental Task and Procedures

Participants in the primary experiment were 180 M.B.A. students completing their financial accounting core course at two business schools. We believe M.B.A. students are an appropriate participant group because they do not bring to the laboratory incentives that exist in the *natural environment* and can influence the judgments of professional analysts (such as trade boosting or interest in managing relations with the companies they are researching). Additionally, they have an active interest in business, are knowledgeable about

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[9] The source of the recommendation (i.e., inherited from another or self-generated) would have no effect on the *direction* of the expected bias, but it may influence the *magnitude* of the bias. As noted above, we use an inherited-from-another framing context in this study rather than motivated reasoning in order to provide a more robust test of *unintended* bias resulting from "framed" information processing and to overcome one of the potential weaknesses of the EGK study (that earnings forecasts impact contemporaneously issued recommendations). We believe that recommendations inherited from others create a general frame, whereas previous self-generated recommendations create a frame as well as conditions for motivated reasoning as discussed in EGK (i.e., the fact that analysts' often self-generate prior expectations would be expected to strengthen the potential biasing effect of recommendations noted in this study).

financial analysis, and most (92 percent) plan to invest in stock in the near future (Hodge 2001).[10]

Participants completed the experiment with one of the authors present and were debriefed on the purpose and results of the study subsequently. Participants were asked to assume the role of a financial research analyst at a Wall Street firm. They were informed they had been assigned to the team of one of the firm's lead analysts specializing in the electronics industry, and that the analyst was preparing to issue a formal report on a company that manufactured high-tech communication devices (the company was fictional, although based on a composite of actual high-tech companies). The participant was then asked by the lead analyst to develop an annual earnings forecast for the year ended December 31, 2002. For participants in the recommendation conditions, the materials included the past outstanding stock recommendation.

Participants were given background information about the business, its competitive conditions, and selected financial data, which included quarterly earnings for the past ten quarters, as well as annual earnings, financial ratios, and cash flow data for the past five years. Also included was the past years' recommendation and excerpts from the past year's management's discussion and analysis (MD&A). Participants reviewed the information provided and then recorded their annual earnings forecast and their annual EPS forecast.

The experiment is a 1×3 between-subjects design. The prior stock recommendation was manipulated at three levels: strong buy, sell, and no recommendation.[11] Past earnings and other information in the financial statements and in the MD&A did not differ between experimental conditions and was not entirely consistent with either of the recommendation categories. Participants in the strong buy (sell) conditions were informed that, in the last two reports (issued six months and a year prior to the current forecast date), the brokerage firm had issued a recommendation of strong buy (sell). Participants in the no recommendation condition received information identical to that received in the other two conditions except there was no mention of a past recommendation. In all conditions participants were informed, "the brokerage firm takes pride in the accuracy of its earnings forecast." The objective of this statement was to emphasize that accuracy was the goal (and implicitly that trade boosting was not). Furthermore, there was no mention of any incentives to boost trade. See the Appendix for an example of the experimental materials for the strong buy condition. The dependent variable is forecasted annual net earnings (in total and per share) for the year 2002.

RESULTS

Our results are based on observations from 155 participants because nine participants failed a post-experimental manipulation check and 16 participants either failed to complete the materials, forecasted revenue rather than earnings, or forecasted third quarter earnings rather than annual earnings. Because the experiment was run at two different schools, we include location as a factor in our analyses. No main effect due to location or interaction with location approached significance. Therefore we pooled the data for the two locations.

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[10] Frederickson and Miller (2004) suggest students are less knowledgeable and may rely more on simplistic valuation models than practicing analysts, which could reduce the potential external validity of this study. However, EGK provide empirical archival evidence that is consistent with practicing analysts' having the stock recommendation bias examined in this study. Thus, we determined that the increase in internal validity we gained by using M.B.A. students was a more important consideration in this study.

[11] We did not use a "strong sell" because this recommendation is rarely found in practice (less than 2 percent of all analysts' recommendations according to First Call [Vickers and France 2002]).

At one school there was an opportunity to ask participants how extensive they would rate their training in finance and accounting, and their work experience in finance and accounting. Their responses to these questions were included as covariates in our model and we found no significant effects on their earnings forecasts ($p > .70$).

To determine if participants had attended to the recommendation provided, we asked in a post-experimental questionnaire what the outstanding recommendation had been. As noted above, all subjects who failed to recall the correct recommendation (nine subjects) were excluded from our analyses. When asked what was important to the participant in making an earnings forecast, the most common response was "prior earnings." Not one participant mentioned the outstanding recommendation, indicating that participants did not perceive the past stock recommendation as an important input into their forecast.[12] The fact that participants did not mention the outstanding recommendation supports the notion that the framing bias, if it exists, is unconscious (at least in this setting where other incentives for intentional bias are not present).

Panel A of Table 1 provides the means and standard deviations of the earnings and earnings per share (EPS) forecasts for the three recommendation conditions. Consistent with the hypothesized framing effect, both earnings and EPS forecasts are higher when the

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TABLE 1
Mean (Standard Deviation) of EPS Forecasts by Recommendation and Tests for Differences in Means by Recommendation

Panel A: Mean and Standard Deviation of Earnings Forecast by Recommendation

		Recommendation[a]		
		Strong Buy	**None[b]**	**Sell**
Earnings Forecast[c]	Mean	$10,969	$10,240	$10,082
	Standard Deviation	($5,368)	($3,192)	($3,396)
EPS Forecast	Mean	$1.02	$.98	$.93
	Standard Deviation	($.48)	($.29)	($.26)
n		64	37	54

Panel B: Statistical Tests of H1—Comparisons of Recommendations

	Comparisons to Strong Buy	
Earnings: t-statistic	1.75	1.74
p-value, one tailed	.04	.04
EPS: t-statistic	1.47	2.15
p-value, one-tailed	.071	.02

[a] Recommendation is the manipulated between-subjects (independent) variable. Participants were informed that the prior recommendation by the brokerage firm was either a strong buy, or sell. In the "None" condition there was no mention of an outstanding recommendation.
[b] Subjects in this condition received no past recommendation. Experimental materials were distributed randomly. We made fewer copies of the "None" condition because we were interested in the "framing" effects of outstanding recommendation and no recommendation was provided in the "None" condition.
[c] The earnings forecast measure is illustrated in the Appendix.

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[12] We report additional direct measures of the perceived relevance of past stock recommendations later in the paper.

outstanding recommendation is a buy and lower when the outstanding recommendation is a sell, despite participants having the identical underlying financial information. The percentage increase in earnings (EPS) for buy recommendations over sell recommendations is 9 percent (10 percent).

Panel B of Table 1 presents statistical tests of our hypothesis. A comparison of the means reveals the differences in earnings and EPS forecasts between the buy and sell recommendation conditions are significant and in the expected direction ($p < .05$). Thus, H1 is supported. The no recommendation estimates of earnings and EPS are significantly different from the buy recommendation ($p \leq .07$), but not from the sell recommendations ($p < .54$).

To provide additional evidence that participants considered the outstanding recommendation as irrelevant information, we conducted two supplemental experiments. First, to "peer into the minds" of decision makers, we had two M.B.A. students complete the experimental task while thinking aloud (i.e., protocol analysis). We analyzed the audio tapes and transcripts and while it was clear the participants read and attended to the outstanding recommendation, it was also clear that the recommendation was not consciously used in the earnings forecast process—that is, they considered the information irrelevant for the task. In subsequent interviews with the protocol participants, they confirmed that they did not consider the information relevant for the prescribed task.

The second supplemental experiment was identical to the main experiment except that participants were either in the strong buy or sell conditions and they responded to the following debrief question:

> Please list the items of information you found relevant in developing your earnings forecast and allocate points totaling 100, with the most important item receiving the most points. For example, if you found three items of information relevant in developing your earnings forecast with one being more important than the others, your list might look like this (with the description of the informational item):

<div align="center">

Item 1:   70 points
Item 2:   15 points
Item 3:   15 points
Total 100 points

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Twenty-four M.B.A. students participated in the second supplemental experiment.[13] In response to the debriefing question above, 23 did not list recommendation as relevant and one participant listed it as a minor item (10 points).[14] These two supplemental experiments, combined with the fact that none of the participants in the main experiment mentioned recommendation in the debriefing questionnaire confirm that participants considered the outstanding stock recommendation irrelevant to the short-term earnings forecasting task.

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[13] These students did not participate in the primary experiment.

[14] We are grateful to the editor and the anonymous reviewers for suggesting supplemental experimentation. The pattern of forecasts was consistent with that reported in Table 1 both with and without the 24th subject who listed recommendation (i.e., subjects in the buy condition generated higher forecasts than did subjects in the sell condition).

SUMMARY AND CONCLUSIONS

This paper uses a laboratory experiment to investigate whether analysts' earnings forecasts are influenced by outstanding stock recommendations. We predict analysts' earnings forecasts are higher when they have a positive *frame* (i.e., a past stock recommendation of buy) and lower when they have a negative frame (i.e., a past stock recommendation of sell). Frames (Russo and Schoemaker 2002) determine the viewpoint from which the decision maker processes and filters information. While frames serve a useful purpose to simplify decision making by allowing the decision maker to focus on information they consider important, the heuristic can result in unintentional and predictable biases.

Past recommendations in the absence of pricing information should have no role in the forecasting of short-term earnings, therefore differences in earnings forecasts due to different past recommendations in our experiment reflect cognitive bias in forecasting earnings.

We find that earnings forecasts are significantly higher when buy recommendations are outstanding than when sell recommendations are outstanding, consistent with a framing bias. The bias appears to be primarily in the buy condition however as earnings forecasts were no different in the sell and the no recommendation conditions. This result may be due to the fact that we used a technology stock at a time when technology stocks had been hit hard in the market and represented an unfavorable sector. Therefore, in the absence of a recommendation, participants may have been negatively predisposed.

A laboratory experiment is ideal for testing our theory because it abstracts from confounding incentives in the analysts' environment that contribute to biased forecasts, e.g., trade-boosting incentives, that cannot be disentangled from bias caused by framing or motivated reasoning.

Because the effects of motivated reasoning (where the analyst is responsible for both the stock recommendation and an earnings forecast) are likely to strengthen the framing effects explored in this study, these findings support the contention in Eames et al. (2002) that motivated reasoning contributes to the bias found in analysts' forecasts. Due to the archival nature of their data, Eames et al. (2002) were unable to determine whether trade boosting, motivated reasoning, or both were explanations for the bias found in analysts' forecasts. This paper provides evidence that cognitive biases contribute to the systematic bias found in analysts' forecasts for our participants exhibited bias while faced with no direct economic incentives. Unintentional forecast bias is important because biased earnings forecasts can lead to biased estimates of firm value, and suboptimal investment and capital allocation decisions. Our results suggest that recent regulations and policy changes by Congress, the Securities and Exchange Commission, exchange markets, and brokerage firms will not fully eliminate biased earnings forecasts because at least some bias stems from an unconscious cognitive behavior.

A potential limitation of our study is that we rely on M.B.A. students as surrogates for analysts. We contend that M.B.A. students are reasonable surrogates for analysts in this simple setting because they have an active interest in business, investing, and financial analysis, and they possess the intellect appropriate to the task. More importantly, M.B.A. students allow us to test for unintentional cognitive biases without the institutional incentives that analysts implicitly bring to the task.

Another potential limitation of this study is that our experimental instrument limits or excludes information typically available to earnings forecasters (e.g., price information) in order to better measure the effects of stock recommendations on earnings forecasts. We believe that the general phenomenon demonstrated in this study is generalizable to more complex environments and this belief appears to be supported by the archival empirical results reported in Eames et al. (2002).

APPENDIX
Experimental Materials for the Buy Recommendation Condition
Instructions

With your newly granted M.B.A. degree you decide to take a position as a financial analyst at the Wall Street brokerage firm First Delta Securities (please play along for the purposes of this exercise). You are very fortunate to be assigned to the team of one of the firm's lead analysts, specializing in the electronics industry. The broker is preparing to issue another formal report on Techno Inc., a manufacturer of high-tech communications devices. The broker has been following Techno Inc. for over 5 years. In the last two reports (issued January and July of 2002) the broker has issued a recommendation of "Strong Buy." In addition to the recommendation and a discussion, the formal report will include an earnings forecast for the year ending December 31, 2002.

Your brokerage firm takes great pride in the accuracy of its earnings forecasts. In a signal of confidence in your abilities, the broker has asked you to develop an annual earnings forecast for Techno Inc. In the pages that follow you will find background information and selected financial data that will be useful in developing your earnings forecast.

Please record your earnings forecast here:

Techno Inc. 2002 Annual Net Income Forecast (in thousands): _____

Techno Inc. 2002 Annual Earnings Per Share Forecast: _____

TECHNO INC.
BACKGROUND INFORMATION
Business

The Company's principal products are Semiconductor Devices and Components, Ceramic Devices and Components, and wireless communication devices.

The principal customers for these products are equipment manufacturers for commercial and defense microwave systems such as cellular telephones, commercial telecommunications, direct broadcast satellites, automotive collision avoidance applications, and military radar, missile, and electronic warfare. The Company primarily targets the high-volume wireless markets, TV distribution, and telecommunications markets. The Company's operations are within a single segment of the electronics industry: the development, production and sale of microwave materials, devices, and components.

Competitive Conditions

All of the Company's products are subject to substantial competition. The principal competitive factors affecting the Company's business are product performance, price, applications support, and adherence to delivery schedules. The Company faces competition from divisions of larger, more diversified organizations in the electronics industry with substantially greater assets and access to larger financial resources, as well as from many smaller specialized companies. Some of Techno's customers could elect to develop and manufacture internally the products they purchase from Techno.

First Delta Securities Summary Report: TECHNO INC. (TCQ)
July 15, 2002
Recommendation: STRONG BUY

QUARTERLY FINANCIAL DATA
(In thousands except per share data)

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Annual Total
FISCAL 2002					
Sales	$28,893	$29,955			
Gross profit.................	8,005	12,823			
Net income	(991)	2,964			
Earnings per share	(.09)	.28			
FISCAL 2001					
Sales	$26,171	$28,960	$30,433	$31,316	$116,881
Gross profit.................	8,897	10,629	11,823	12,733	44,082
Net income	1,577	2,733	2,838	3,154	10,302
Earnings per share	.15	.26	.27	.30	0.98
FISCAL 2000					
Sales	$20,066	$20,137	$22,287	$22,763	$85,253
Gross profit.................	3,792	2,819	5,241	4,882	16,734
Net income (loss)	(3,424)	(4,728)	(2,075)	(5,345)	(15,572)
Earnings per share	(.35)	(.48)	(.21)	(.54)	(1.58)

SELECTED FINANCIAL DATA

FIVE YEAR FINANCIAL SUMMARY
(In thousands, except per share amounts and financial ratios)

FISCAL YEAR	2001	2000	1999	1998	1997
RESULTS OF OPERATION					
Sales	$116,881	$85,253	$96,894	$78,254	$70,147
Cost of sales	72,799	68,519	65,986	54,376	55,395
Research & development expenses	10,035	9,545	9,148	4,154	3,429
Selling & administrative expenses	22,359	20,441	17,226	15,727	16,281
Net income (loss)	10,302	(15,572)	3,794	2,847	(11,466)
Per share data—Net income (loss) diluted	$0.98	$(1.58)	$0.43	$0.36	$(1.53)
Weighted average common shares..........	10,512	9,848	8,751	7,882	7,502
FINANCIAL RATIOS					
Current Ratio	2.52	2.10	3.35	1.68	1.64
Debt to Equity.............	2.9%	8.3%	4.5%	17.1%	19.9%
INDUSTRY P/E RATIO	12				
FINANCIAL POSITION					
Working Capital	$26,061	$18,409	$32,647	$10,983	$8,981
Total current assets.........	43,173	35,176	46,551	27,184	23,037
Total assets	76,929	65,253	75,423	50,167	44,430
Long-term debt	1,625	3,606	2,565	4,744	4,826
Stockholders' equity........	55,822	43,386	57,533	27,674	24,261
CASH FLOW					
Net cash (used in) provided by operations............	15,748	(5,475)	1,270		
Net cash used in investments..............	(13,205)	(3,835)	(13,619)		
Net cash provided by financing	2,002	3,799	20,165		

OTHER STATISTICS					
New orders (net of cancellations)............	121,100	81,300	103,200	84,900	66,700
Backlog at year end........	$33,800	$32,500	$36,500	$30,200	$23,500

First Delta Securities' Recommendation for Techno Inc.
(from the two most recent reports)

Date: January 29, 2002
Recommendation: STRONG BUY

Date: July 15, 2002
Recommendation: STRONG BUY

Excerpts from Management's 2001 Discussion and Analysis of Financial Condition and Results of Operations

- Significant improvements included achievements in capacity expansion, margin improvements, and new products introductions.
- The increase in sales between 2000 and 2001 was primarily the result of higher sales volumes due to the increased penetration into several handset platforms.
- Deliveries to one major customer were 25% of total sales for fiscal 2001.
- The Company continued to increase its focus on the commercial wireless markets as defense sales declined to 18% of fiscal 2001 sales, compared with 21% in fiscal 2000.
- Fiscal 2000 included approximately $900 thousand associated with severance costs related to various corporate executives and $626 thousand for recruiting and consolidation costs associated with one of its plants.
- Overall, selling and administrative expenses continue to steadily decrease as a percentage of sales, whereas, the actual selling and administrative spending continues to increase. These increases in selling and administrative expenses reflect the increased investments in the sales, marketing and administrative activities namely the addition of dedicated account managers for key wireless OEM manufacturers, improvements to the Company's information systems, training costs and recruiting costs for key positions.
- Other expense and income increased $59 thousand in fiscal 2001 due to losses resulting from the retirement of obsolete equipment.
- The Company continued its investments in capital expenditures particularly for the semiconductor wafer fabrication operation, the semiconductor assembly, and test areas, as well as for improved manufacturing capabilities at the ceramics manufacturing facility.
- The Company remains strongly committed to adding the required capacity needed to service the wireless markets as demand continues to grow.
- The Company believes sales of wireless telephone handsets will continue to grow during fiscal year 2002.

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