Independence in Appearance and in Fact: An Experimental Investigation

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Abstract

In this study, we use experimental markets to assess the effect of the SEC's new Independence Rule on investors' perceptions of independence, market prices, and investors' payoff distributions. The new rule requires client firms to disclose in their annual proxy statements the amount of non-audit fees paid to their auditors. The new disclosure is intended to inform investors of auditors' incentives to compromise their independence. Our experimental design is a 2x3 between-subject design, where we control the presence (unbiased reports) or absence of auditor independence in fact (biased reports). While independence in fact was not immediately observable to investors, we controlled for independence in appearance by varying the public disclosure of the extent of non-audit services provided by the auditor to the client. In one market setting, investors were not given any information about whether the auditor provided such non-audit services; in a second setting, investors were explicitly informed that the auditor did not provide any non-audit services, and in a third setting, investors were told that the auditor provided non-audit services that could be perceived to have an adverse effect on independence in fact.

We found that disclosures of non-audit services reduced the accuracy of investors' beliefs of auditors' independence in fact when independence in appearance was inconsistent with independence in fact. This then caused prices of assets to deviate more from their economic predictions (lower market efficiency) in the inconsistent settings relative to the no-disclosure and consistent settings. Thus, disclosures of fees for non-audit services could reduce the efficiency of capital markets if such disclosures result in investors forming inaccurate beliefs of auditor independence in fact – that is, auditors appear independent but they are not independent in fact, or vice versa. The latter is the maintained position of the AICPA, which argued against the new rule. Further research is needed to assess the degree of correspondence between independence in fact and independence in appearance.

Keywords: Auditor independence in appearance; Auditor independence in fact; Experimental economics

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Abstract

The Securities and Exchange Commission (SEC) modified its auditor independence rule on November 15, 2000, after a protracted and heated debate. The new rule requires audit clients to disclose in their annual proxy statements certain information about non-audit services provided by auditors. The disclosure requirements are controversial, and reflect a compromise between the SEC's proposal of a broad-based ban on certain non-audit services to audit clients, and the audit profession's desire not to have any proxy disclosures (SEC 2000).

There is widespread agreement by regulators, accounting practitioners, and auditing academics that auditor independence enhances auditor credibility. However, there is little consensus among these parties regarding how to define and operationalize auditor independence (see e.g. Antle 1984, Allen 1997, Elliott and Jacobson 1992, Pitt and Birenbaum 1997, SEC 2000). Historically, the SEC, the Independence Standards Board (ISB), and the American Institute of Certified Public Accountants (AICPA), have partitioned independence into two dimensions: independence in fact, and independence in appearance. Independence in fact relates to the notion that the auditor possesses an independent mindset when planning and executing an audit, and that the resulting audit report is unbiased. Independence in appearance relates to whether the auditor *appears* to be independent.

Although independence in fact (hereafter, IIF) is at the core of the independence requirement, it is not observable in a timely manner, making it difficult to regulate (Schuetze 1994). This explains in part the SEC's reliance on the appearance dimension in defining auditor independence. Specifically, the SEC's position is that "an auditor's independence is impaired *either* when the accountant is not independent in fact, *or* when in light of all relevant facts and circumstances, a *reasonable investor* would conclude that the auditor would not be capable of acting without bias" (SEC 2000). According to this definition, a violation of independence in appearance (hereafter, IIA) is prima facie evidence of impaired independence, even if the auditor is IIF. As the former chief accountant of the SEC explained: "auditor independence is really

about only one thing– investors confidence in the numbers" (Turner 2000).

From a regulatory point of view, one violation of IIA occurs when auditors provide material amounts of certain kinds of non-audit services to audit clients (Pitt and Birenbaum 1997). Hence, a public disclosure of fees that a client pays to an auditor for non-audit services may provide an observable proxy for IIF. This proxy can be useful when IIA is consistent with IIF. However, such fee disclosures may be misleading if auditors maintain their (unobservable) independence in fact, while appearing to lack independence because they provide non-audit services. Indeed, Dopuch, King, and Schwartz (2002) have shown that violations of IIA do not imply violations of IIF, and IIA need not imply IIF. Since IIA and IIF may or may not be consistent, a fundamental question is how (reasonable) investors will react to situations wherein the disclosures are inconsistent with the underlying facts.

The extent to which auditors are IIF but not IIA is at the heart of the debate over whether to require disclosures of non-audit fees. It is widely accepted that the amount of non-audit services provided by audit firms to their clients has increased dramatically in the past decade. This reduces IIA. However, it is not clear whether IIF has been negatively impacted by this increase in non-audit services. Whether or not IIF and IIA are negatively correlated, the publicity surrounding the recent debates by the SEC can create such an association in the minds of investors. For example, during 2000 and 2001, there were over 1100 articles in the popular press that dealt with auditor independence and many did present the SEC's position that IIA and IIF are associated. Thus, it is conceivable that in the minds of readers of these articles, the association is real. That perception has no doubt become even stronger with the recent collapse of Enron and the accusations that its audit firm, Arthur Andersen, compromised its independence in order to continue to receive high audit and non-audit fees. However, whether the Andersen auditors were independent in fact could not be directly observable by outsiders at the time Enron's audit reports were issued. Rather the general inference that they lacked independence was triggered by the fact that Enron had to file for bankruptcy after receiving unqualified audit reports.

Unfortunately, there is a general lack of empirical evidence on the link between nonaudit fees and auditors' lack of independence. In a forthcoming paper, Frankel, Johnson and Nelson (2002) argue that there is positive correlation between auditors' fees for non-audit services and earnings management. Other

non-published papers claim otherwise (e.g., Ashbaugh, LaFond and Mayhew, 202). Note that lack of independence in fact is assumed to be reflected in the level of estimated levels of earnings management.

The purpose of this study is to present direct evidence on how infestors might react to disclosures of non-audit fees in assessing whether the auditors were or were not IIF, using controlled experimental asset markets. In our experiment, we control for auditor's independence in fact by generating computerized reports that are imperfect but *unbiased* (IIF-Yes) in half of our markets, and reports that are imperfect and *biased* (IIF-No) in the other half. We vary the appearance of independence by providing three different disclosure settings. In the first setting, no information is provided regarding the provision of non-audit services (NoNews). In the second setting, investors are informed that the auditor provides non-audit services, and that such an auditor is commonly perceived to have a high likelihood of issuing biased reports (IIA-No). In the third disclosure setting, investors are informed that the auditor does not provide non-audit services, and that such an auditor is commonly perceived to have a high likelihood of issuing unbiased reports (IIA-Yes).

We recognize that our disclosures are not equivalent to providing dollar amounts of audit and non-audit fees provided by the auditors as required in the SEC Rule. However, the only basis we had for determining the dollar amounts of non-audit services fees that subjects would view as material were the SEC's vaguely prescribed dollar amounts of non-audit services which would threaten auditor independence. Note that our disclosures imply that in one case the auditors have a likelihood of being IIF, because they do not provide material amounts of non-audit services. In another case, our disclosure implies that the amounts of non-audit services are material enough to raise doubts about the auditors' IIF. We believe these disclosures capture the essential point of the SEC's view that the provision of material amounts of non-audit services raises doubts in the minds of investors about the auditor's ability to "act without bias."

The combination of the two IIF treatments and the three disclosure treatments generates six experimental settings. The NoNews settings (NoNews/IIF-Yes and NoNews/IIF-No) simulate the reporting regime prior to the new Rule, and provide baseline results to evaluate the impact of the new disclosure. In two of the other four settings the disclosure is consistent with the underlying fact (IIA-Yes/IIF-Yes and IIA-No/IIF-No); in the other two settings, the disclosure is inconsistent with the underlying fact (IIA-

Yes/IIF-No and IIA-No/IIF-Yes). In all cases, investors received feedback from audit reports and asset values that allowed them to infer whether the auditor is IIF-Yes or IIF-No (by the third day in the IIF-YES settings sand the fourth day in the IIF-No setting).

We employ a full factorial, two-by-three, between-subjects design, and report the results of 12 laboratory market sessions (two per setting), each with six investors interacting over 15 experimental market days. We use both economic-based and psychology-based theories to develop three sets of hypotheses. The first set of hypotheses addresses investors' beliefs and accuracy of forecasts (i.e., the belief issue); the second set provides predictions of market prices for shares of the asset (i.e., the pricing efficiency issue); and the third addresses the distribution of profits within our settings of constant total wealth (the payoff distribution issue).

The efficient market hypothesis suggests that the behavior of market prices should not differ between settings with consistent information and settings with inconsistent information. The assumption is that investors will learn to ignore misleading information and focus on the correspondence between audit reports and actual asset values, which provides credible feedback about the auditor's underlying IIF. However, research in psychology has shown that when multiple people display similar biases (Plous 1993), market outcomes may reflect these so-called systematic biases (Camerer, Loewenstein, and Weber 1989; Ganguly, Kagel, and Moser 1994).

A particular bias that is germane to our research is "belief persistence," where people retain erroneous beliefs even after they observe discrediting evidence (Koonce 1992; Lord, Ross, and Lepper 1979). This bias applies to our setting in the following manner. Investors in our markets receive two types of information: information related to IIA that is received at the beginning of the sessions, and market information that provides feedback related to IIF that is received later in the session. Investors who receive inconsistent information (i.e., IIA-No/IIF-Yes and IIA-Yes/IIF-No settings), and are subject to the belief persistence bias, will form incorrect beliefs about the auditor's IIF, and will maintain these erroneous beliefs while ignoring accurate market feedback information. Meanwhile, investors who receive the same inconsistent information but are not subject to the "belief persistence" bias will update their beliefs based

on market feedback, converging to the correct belief of the underlying IIF. These latter investors can arbitrate the price disparities, thereby moving the price to reflect the correct IIF and economic value

Even if the markets are efficient, the SEC has stated that it is also concerned about the payoff distributions across investors. We address the payoff distribution issue by comparing the wealth distribution among investors across our six settings. Since all investors receive identical endowments, and all are symmetrically informed in each setting, we surmise that the resulting trading profits should not reflect a systematic bias.

Briefly, we find that investors' beliefs were significantly less accurate in the inconsistent settings than in the NoNews and consistent settings, whereas there was no significant difference in belief accuracy between the NoNews and the consistent settings. Thus, in our markets, disclosures did not significantly improve the accuracy of investors' belief in the consistent settings over the no disclosure settings, and led to inferior investors' beliefs in the inconsistent settings. We also find that prices were closer to the economic predictions in the consistent and NoNews settings than in the inconsistent settings, with no significant difference between the consistent and NoNews settings. Finally, wealth was not distributed uniformly across traders in the settings in which auditors were not IIA.

These results do not support the SEC's assumption that disclosures of audit fees provide a useful proxy for assessing auditor IIF, relative to a setting of no disclosure. At the same time, the results do support the SEC's belief that disclosures of material amounts of non-audit fees will affect investors' inferences about auditors' independence in fact, even if the inferences might be incorrect. Of course, our findings are based on experimental market settings where asset prices are not affected by other informative disclosures, as we would encounter in naturally occurring settings.

The paper proceeds as follows. The experimental methods and design are discussed in the next section, followed by the development of hypotheses in section 3. The results are presented in section 4. A summary and discussion of limitations and possible future research extensions appear in section 5.

1. Introduction

The Securities and Exchange Commission (SEC) modified its auditor independence rule on November 15, 2000, after a protracted and heated debate.[1] The new rule requires audit clients to disclose in their annual proxy statements certain information about non-audit services provided by auditors.[2] The disclosure requirements are controversial, and reflect a compromise between the SEC's proposal of a broad-based ban on certain non-audit services to audit clients, and the audit profession's desire not to have any proxy disclosures (SEC 2000).

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The paper proceeds as follows. The experimental methods and design are discussed in the next section, followed by the development of hypotheses in section 3. The results are presented in section 4. A summary and discussion of limitations and possible future research extensions appear in section 5.

2. Experimental Methods and Design

We begin by providing a brief overview of the experimental setting, followed by more details on the methods and experimental design. Our setting has three types of players: a computerized venture capitalist (VC), a computerized auditor, and a set of investors.[8] The VC's role is to manage a project that has a known distribution of payoff values (but the actual value is unknown to the players). An auditor produces a report of the project's value that is to be provided to the investors. Investors do not know the

auditor's quality (i.e., accuracy of the mapping from the true value to the report), but they do know the distribution of auditor qualities. In addition, investors receive information related to the level of independence in appearance treatments (discussed below). After receiving the report, investors provide information about their prediction of the auditor type, their confidence in their predictions, and a forecast of the true value of the VC's project. Investors then participate in a computerized market to trade the shares of an asset among themselves. At the end of the trading day, the project's value (denoted as true value) is reported and all shares are redeemed at the true value.

We report the results of 12 market sessions – two sessions under each of six settings (discussed below) – with each session having six investors. Thus, our results are generated by a total of 72 different subjects, who volunteered to participate in the experiment. The subjects are business school students, and were paid for their participation based on their choices. Each experimental session is conducted on networked PCs, with privacy maintained for subjects. In each session, the administrator provides the subjects with a copy of the instructions about the software for trading and subjects then practice using the software to become proficient at using the trading mechanism. The subjects then receive instructions about the experiment[9] and complete a quiz to assess their understanding of the experiment (earning cash based on the number of correct questions). Finally, subjects review the quiz and participate in the actual experiment.

Table 1 summarizes the experimental parameters and methods. Each session is comprised of 15 'trading days,' with each day lasting two minutes.[10] At the beginning of each day, all investors are endowed with eight shares and ¥2,000 (the yen is used as the experimental currency with an *ex ante* transformation function of yen to dollars to achieve an expected payoff of $15 per hour).

{Insert Table 1 about here}

Investors are first presented with a computer screen that elicits their beliefs of the auditor's type (whether IIF or not), the degree of confidence in the beliefs about the auditor's type, and their estimates of the share values. The screen also contains information about the services provided by the auditor and the deviations of actual values from the auditor's report in prior days. A replica of the screen appears in Figure 1.

{Insert Figure 1 about here}

The left half of the screen first shows the auditor's report for the current day, in this case 183 for Day 4. A set of questions are presented to which subjects provide answers along with a reminder that the investors will be rewarded for the accuracy of their answers.[11] The first question requested the investor's opinion about the type of error in the auditor's report. In this case, the investor selects "error with bias." The next question asks for the degree of confidence in the answer provided for the first question. The investor responds by selecting "very confident." Finally, the investor provides an estimate of the share value, which in this case is 173. The right half of the screen indicates that this auditor provides non-audit services. The auditor's report is shown again, (183), followed by the actual share values and auditor's reports for the previous days. Note that in this illustration the auditor's report exceeded the actual values by 10 for days 1 and 2. However, on day 3, the auditor's report exceeded the actual value by 20, which is clear evidence that the (computerized) auditor is biased (the setting is IIF-NO). For the IIF-Yes setting, investors would view a case where the auditor's report was 10 less than the true value (on day 4), which would provide clear evidence that the auditor was unbiased.

The trading mechanism is a computerized continuous double auction, a market mechanism that allows all investors to buy and/or sell shares of the asset by submitting bids to buy; offers to sell; or by accepting other traders' bids or offers using networked computers. Figure 2 displays the computer screen used by investors. The screen has seven windows including (1) the 'trading' window (upper left-hand side), (2) the 'open order' window (upper center), (3) the 'your transactions (last 10)' window (top right-hand side), (4) the 'account' window (center left-hand side), (5) the 'time' window (center of the screen), (6) the 'news' window (bottom right-hand side), and (7) the 'quotes' window (bottom left-hand side). These are described in the order listed.

{Insert Figure 2 about here}

The 'trading' window' is used by investors to select the buy or sell option, the quantity of shares to buy or sell, and the price for each share. Investors can type in the quantity and price or use the sliding bars to enter their choices. After entering their trade order they are required to 'confirm' the order before it is submitted to the market. In Figure 2, the investor indicates a desire to buy four shares at a price of 170. In

order to submit this order to the market, the investor would click on the confirm button shown in the 'trading' window.

The 'open order' window presents the outstanding orders the investor has in the market. Investors can use this window to cancel an order by simply double clicking on the order. In this case, the investor has one open sell order (four shares at 180). The 'your transactions' window shows the last 10 transactions for the current day. In this case the investor has made one sale this day (six at 174, for day 4, and at time 0:57). The 'account' window shows the investor's current share and cash balances for the current day, the gain from the previous day, and the 'bank' which is the running total of yen earned up to the last day. The investor has two shares, and ¥3,044 in cash, had a gain in the previous day of 848, and has a total accumulation of ¥2,992. The 'time' window shows the day (day 4) and the time remaining for the day (36 seconds). The 'news' window shows three items; the 'news' box; the 'today's auditor's report' box; and the 'past reports and share values' box. The news box contains information related to the independence in appearance treatment (discussed in more detail below). The 'today's auditor's report' shows the auditor's report (in this case 183). The 'past reports and share values' box shows a history of past days (for example in day 3, the report was 126 and the true value was 106). The 'quotes' window shows the market information. This includes the quantities and prices of transactions for the current day and the bid and ask amounts and quantities. Shown are two bids of two shares at 150, and three shares at 155, and one offer of four shares at 180. At any time during the trading day, investors can execute a transaction by simply clicking on the 'sell' or 'buy' box and then confirming the transaction (the confirm box is not shown, but pops up when an investor clicks on either of the two boxes).

The experimental design is a 2x3 full factorial, between-subject design, as shown in Table 2. The first treatment relates to independence in appearance and has three levels: NoNews, IIA-Yes, and IIA-No (shown in the columns). Under the NoNews settings, investors receive the following information:

> 'No News.'

Under the IIA-Yes settings, investors receive the following information:

> 'The auditor is not providing other services to the venture capitalist. Such an auditor is commonly perceived to have a high likelihood of issuing reports without bias.'

Under the IIA-No settings, investors receive the following information:

> 'The auditor is providing other services to the venture capitalist. Such an auditor is commonly perceived to have a high likelihood of issuing reports with bias.'

{Insert Table 2 about here}

The second treatment varies independence in fact between two levels, including IIF-Yes and IIF-No (shown in the rows). Under IIF-No the auditor's report is imperfect and biased (that is, the error term under this setting is drawn from the set {0, 10, 20}, as shown in Table 1), while under the IIF-Yes, the auditor's report is imperfect, but unbiased (that is, the error term is drawn from the set {-10, 0, 10}). The six settings are denoted as NoNews/IIF-Yes; NoNews/IIF-No; IIA-Yes/IIF-Yes; IIA-Yes/IIF-No; IIA-No/IIF-Yes; and IIA-No/IIF-No.

3. Hypotheses

We develop two sets of hypotheses. The first addresses investors' beliefs about auditor type (i.e., the beliefs issue) and the second deals with market prices for shares of the asset (i.e., the pricing efficiency issue). We also consider the distribution of profits (the payoff distribution issue), but not with a formal hypothesis. We investigate these three issues because investors may have biased beliefs, but biases in individual beliefs may not affect asset prices when those traders who have correct beliefs set prices. We consider the payoff distribution issue because investors that have biases may earn lower profits even though overall biases do not affect asset prices. Thus, such biases may lead to an uneven distribution of profits across investors.

Beliefs and the congruence of IIA with IIF (beliefs issue)

Figure 3 provides a framework to guide our hypotheses. This figure indicates that the evidence used by subjects to form beliefs and to select forecasts is based on two primary sources: the information about IIA (relation A) and the feedback from the market regarding the correspondence between reports and the underlying share values (relation B). The market feedback (relation B) is constant across the six settings.

Specifically, investors have conclusive evidence to determine whether the auditor is IIF or not, either at the end of day 3 or day 4.[12] The issue we wish to investigate is the extent to which beliefs are similar between the consistent settings (IIA-Yes/IIF-Yes and IIA-No/IIF-No), the inconsistent settings (IIA-Yes/IIF-No and IIA-No/IIF-Yes), and the settings with no information about IIA (NoNews/IIF-Yes and NoNews/IIF-No).

The individual rationality hypothesis (hereafter denoted by IRH), suggests beliefs should not differ across our settings because investors discount the irrelevant information about IIA in the inconsistent settings and focus only on the credible feedback generated over time about the auditor's IIF. That is, beliefs will reflect all relevant information (and only relevant information).

Research in psychology has shown that subjects use heuristics when making decisions which may result in systematic biases and errors in judgments and decisions (Kahneman and Tversky 2000). One bias that is relevant to our experiment is "belief persistence" (Lord et al. 1979). Belief persistence results in subjects retaining erroneous beliefs even after they are presented with evidence that demonstrates that their beliefs are erroneous.[13] Lord et al. (1979) is one of the original studies in the area of belief persistence. In this research, two groups of subjects were studied, those favoring capital punishment and those opposed. Subjects who previously indicated that they favored capital punishment where given a report that indicated capital punishment was not an effective deterrent to crime and the group that opposed capital punishment were given a report that indicated that capital punishment was an effective deterrent. The authors found that rather than modify their beliefs, each group became stronger in their position. In auditing research, Koonce (1992) found that once an auditor has developed a written explanation for a cause-effect phenomena, belief in the validity of that relation appears to persevere unless the auditor is explicitly requested to re-explain the phenomena. In financial markets research, Bloomfield, Libby, and Nelson (2001) find that investor over-rely on old elements of the earnings time series.

In four of our settings, subjects are conditioned with the expectation that IIA is correlated with IIF, which is correct in the consistent settings (IIA-Yes/IIF-Yes, IIA-No/IIF-No), but not in the inconsistent settings (IIA-Yes/IIF-No and IIA-No/IIF-Yes settings). We examine the extent to which subjects unlearn the erroneous correlation in the inconsistent settings. We test this issue by determining whether investors who receive inconsistent information (i.e., IIA-No/IIF-Yes and IIA-No/IIF-Yes settings) form and maintain

different beliefs than investors who receive consistent information (i.e., IIA-Yes/IIF-Yes and IIA-No/IIF-No settings), or investors who do not receive IIA information (NoNews). Our two alternate hypotheses are:

H1 (IRH). *In steady state, investors' beliefs will not differ across settings.*

H1 (BELIEF PERSISTENCE). *In steady state, investors' beliefs will differ between inconsistent settings, NoNews settings, and consistent settings.*

Market prices (efficiency issue)

Our second hypothesis focuses on the pricing of shares of the asset. Again, under the efficient market hypothesis, prices will converge to impound all relevant information (and only relevant information). Thus, the EMH suggests that even though some investors may hold incorrect beliefs, prices will reflect the underlying economics because the investors who have correct beliefs arbitrate the price disparities, moving the price to reflect the correct beliefs. Libby, Bloomfield, and Nelson (2002) review the experimental literature in this area and interpret the literature to indicate that markets are "efficient" in disseminating information in some cases. Bloomfield (2001) creates a framework for evaluating the processes that combine to affect a market's ability to impound publicly-available information. We include elements that should enhance market efficiency (investors have economic incentives to arbitrage price discrepancies, have mechanisms to take advantages of mispricings, and receive feedback about report-value correspondence). Hence, over time prices should impound all *relevant*, and only relevant, information.

However, if biases are systematic and most investors hold incorrect beliefs, prices may reflect these biased beliefs. The literature on the extent to which market prices are unaffected by individuals' biases is mixed (Ganguly et al.1994). Our settings will allow us to investigate whether prices differ between the inconsistent settings and consistent/NoNews settings. If belief persistence is systematic, it can lead to prices in the inconsistent settings that reflect this bias. The two alternate hypotheses are:

H2 (EMH). *In steady state, asset prices will not differ across settings.*

H2 (BELIEF PERSISTENCE). *In steady state, asset prices will differ between inconsistent settings, NoNews settings, and consistent settings.*

Distribution of investors' profits (payoff distribution issue)

The third hypothesis focuses on investors' relative levels of profits across settings. Researchers using experimental markets frequently compare the distribution of payoffs to determine how treatments (such as different pricing mechanisms) affect payoffs, with an eye toward "equity" or uniform payoffs. It is unclear whether uniform distribution of profits is a satisfactory indication of "equity" in markets in which investors can undertake price discovery. These investors will face greater risks, thus justifying higher profits for compensation of higher risks (Friedman and Rust 1993). We do not explore this issue (see Lamoureux and Schnitzlein 1997 for a discussion of price discovery in experimental settings). Rather our goal is to compare payoff distributions across settings to determine if inconsistent settings result in different payoff distributions. In particular, we investigate whether the extent to which the fixed resources are divided among the investors is a function of the accuracy of their beliefs (Camerer et al. 1989). The two alternates are:

H3 (IRH). *In steady state, the distribution of investors' profits will not differ across settings.*

H3 (BELIEF PERSISTENCE). *In steady state, the distribution of profits will be less evenly distributed in inconsistent settings than in the NoNews and consistent settings.*

4. Results

Our analysis focuses on three issues, (1) investors' beliefs of the auditor's IIF; (2) the extent to which prices of assets properly reflect the auditor's true IIF; and (3) distribution of subjects' payoffs. The results are drawn from 12 market sessions, where each session had six investors who interacted for 15 experimental days.

Accuracy of Perceptions (belief issue)

Recall from Figure 3 that subjects can use two types of evidence to form beliefs. The first is information about IIA (relation A), which may, or may not be diagnostic of IIF, and the second is market feedback (relation B) regarding the correspondence between reports and underlying asset values, which is diagnostic. Our two-part hypothesis for investor beliefs is:

H1 (IRH). *In steady state, investors' beliefs will not differ across settings.*

H1 (BELIEF PERSISTENCE). *In steady state, investors' beliefs will differ between inconsistent settings, NoNews settings, and consistent settings.*

The IRH (Investor Rationality Hypothesis) predicts that beliefs should not differ across our settings because investors discount the non-diagnostic IIA information in inconsistent settings (i.e., IIA-No/IIF-Yes and IIA-No/IIF-Yes settings) and focus only on the diagnostic market feedback about the auditor's IIF. The belief persistence hypothesis predicts that subjects may retain beliefs even after they receive evidence that these beliefs are erroneous.

To facilitate comparisons across the six settings, we construct an accuracy belief index (*PI*) that captures the two elements that we collected from investors. These two elements are (1) the investor's assessment of the auditor's IIF (investors could chose either IIF-Yes or IIF-No) and (2) the investor's confidence (investors could chose Very confident; Somewhat confident; or Not confident).[14] The *PI* is calculated for each investor by combining the accuracy of the prediction of the auditor's IIF (set to equal one if the investor's prediction was correct and zero otherwise) with the level of confidence (set to equal one if the investor was very confident; 0.8 if the investor was somewhat confident; and 0.6 if not confident). Hence, the *PI* of a "Very confident" ("somewhat confident," "not confident") investor whose belief of IIF is correct is 1.0 (0.8, 0.6, respectively). An investor whose belief is incorrect, but is "very confident" ("somewhat confident," "not confident"), receives a *PI* of 0.0 (0.2, 0.4, respectively).

The first panel of Table 3 summarizes the *PI* for the six settings, arranged in three-day groupings after definitive information was provided about IIF. Day 3 (day 4) is the first trading day after investors receive definitive information of the auditor's IIF status in the IIF-No (IIF-Yes) setting. That is, the computer screen indicates that the audit report error was either +20 on day 3 for the IIF-No settings (auditor is biased) and was –10 on day 4 for the IIF-Yes settings (auditor is unbiased). We first discuss results for the IIF-Yes settings followed by the results in the IIF-No settings.

{Insert Table 3 about here}

NoNews/IIF-Yes Setting.

Table 3, Panel A, shows that in the NoNews/IIF-Yes setting, the average *PI* for the 12 investors was 0.66 for the first four days, and 0.88, 0.91, 0.90, 0.92 for the next three-day groupings, leading to an average of 0.90 for days 5 – 15. The fact that the average *PI* did not reach 1.0 is an indication that some subjects failed to rely completely on the market feedback of the prior reporting errors of the auditor, received not only on day 3 or day 4 but on various subsequent days as well. The frequency distributions of the belief index for the six settings appear in Figure 4 as a time series and Figure 5 in cross section. Focusing on Figure 5, we see that slightly more than 50% of the subjects had a *PI* of 1.0. Note, however, that a high percentage of other subjects had a *PI* greater than 0.6 which means they also had correct beliefs but with less than complete confidence. A *PI* less than 0.6, in contrast, indicates that subjects had incorrect beliefs.

{Insert Figures 4 and 5 about here}

IIA-Yes/IIF-Yes Setting.

We first compare the NoNews/IIF-Yes setting with the IIA-Yes/IIF-Yes setting. In the IIA-Yes/IIF-Yes setting, investors had a *PI* of 0.99 in days 5 – 6, 0.99 in days 7 – 9 and a perfect *PI* of 1.0 for days 10 – 12 and 13 – 15. This resulted in an average *PI* over days 5 – 15 of effectively 1.0. In Figure 5, we see that 80% of the subjects in this setting had a *PI* of 1.0 (and very few had incorrect *PI*s, or a *PI* of 0.4 or less). Thus, the information about auditor appearance slightly raised the accuracy of subjects' beliefs of auditor independence in fact when consistent with market feedback, relative to the NoNews/IIF-Yes setting.

IIA-No/IIF-Yes Setting.

This is the first of our inconsistent settings. Subjects were informed that the auditors were not independent in appearance, but the market feedback indicated they were independent in fact. The average *PI* in this setting ranged between 0.68 and 0.73 for the different 3-day periods after days 1 – 4 with an overall average of only 0.70. Figure 5 indicates that only 40% of the subjects had a *PI* of 1.0 suggesting

that most of the subjects did not suppress the IIA information even though it conflicted with the market feedback. Hence, the accuracy of subjects' beliefs in this setting was qualitatively less than the belief accuracy of subjects who were in the NoNews setting and in the IIA-YES/IIF-Yes setting.

IIF-No settings.

The average belief index in the three IIF-No settings (for days 4 – 15) ranged from a high of 0.93, in the NoNews/IIF-No setting, to a low of 0.51 in the inconsistent setting, IIA-Yes/IIF-No. The average in the consistent IIA-No/IIF-No setting for days 4 – 15 was 0.84 which is lower that the 0.99 in the first consistent setting, IIA-Yes/IIF-Yes above. The frequency distributions for these three settings in Figure 5 confirm this overall pattern. First, less than 40% of the subjects in the IIA-Yes/IIF-No setting had a *PI* of 1.0, and an almost equal percentage had *PI* scores less than or equal to 0.40, indicating they had incorrect beliefs with some confidence. In contrast, almost 70% of the subjects had a *PI* of 1.0 in the NoNews/IIF-No setting, and slightly over 50% had a *PI* of 1.0 in the IIA-No/IIF-No setting; similarly, fewer subjects in both of these settings had incorrect beliefs with relatively high levels of confidence. Again, disclosures of non-audit services information decreased subjects' beliefs of auditors' IIF when the information conflicted with market feedback. Note that the largest increases in the *PI*s in all six settings occurred after investors received information regarding whether the auditor was or was not biased day 3 (4).

The lower part of Table 3 provides summaries of subjects' ability to forecast asset values relative to the auditors' reported asset values (*F-R*). The average differences again should be 0.00 in the IIF-Yes settings and -10.0 in the IIF-No settings. Consistent with the perception accuracy indices shown in the top part of Table 3, the average difference was significantly different from 0.00 in the IIA-No/IIF-Yes setting and significantly different from 10.0 in the IIA-Yes/IIF-No setting. The difference of –12.11 in the IIA-No/IIF-No setting was larger then -10.0, but not by a significant amount.

We first use an ANOVA to test the null hypothesis that all six setting induce equal *PI*'s for day 5 and day 15. This test rejects H1(IRH) at the 0.01 level.[15] We then perform a Tukey multiple comparison test and find that the *PI*'s in the inconsistent settings (IIA-No/IIF-Yes and IIA-Yes/IIF-No) are significantly lower than the *PI*'s in the four other settings ($p<0.01$). The *PI*'s in these other four settings for these two

days are not significantly different from each other. This finding was reinforced using approximate randomization.[16]

We next assess the extent to which subjects' beliefs of auditors' IIF affected the efficiency of the markets in the six settings.

Efficiency of Markets

In this section, we first compare asset prices to the auditors' reports of asset values. Actual share prices should equal reported values in the IIF-Yes (unbiased) settings, but be 10 less than the reported values in the IIF-No (biased) settings. We know from the above, that not all subjects had perfectly accurate beliefs, although they were close to perfect in the IIA-Yes/IIF-Yes setting. Yet, prices could still reflect the equilibrium values if the subjects with the correct beliefs take a dominant role in price setting. As a somewhat intervening step, we also compare subjects' forecasts of share prices with actual values. There should be zero average forecast errors if subjects had accurate beliefs and used their beliefs to forecast prices of shares of the asset.

Efficiency of Market prices (efficiency issue).

Our two-part hypothesis for market prices is:

H2 (EMH). *In steady state, asset prices will not differ across settings.*

H2 (BELIEF PERSISTENCE). *In steady state, asset prices will differ between inconsistent settings, NoNews settings, and consistent settings.*

The efficient market hypothesis assumes that prices will converge to impound all relevant information (and only relevant) information in all settings. However, prices may be affected by belief biases if these are systematic, and most or all investors hold incorrect beliefs.

Table 4 shows deviations of prices from their predicted values and the forecast errors across the six settings. The top part of the table shows the average price minus the report for various groupings. To illustrate, the average price minus the report for the 12 investors in the NoNews/IIF-Yes setting was 2.07 (first four days), and -0.46, -0.07, -1.07, and -0.42 for the next four three-day groupings. The average for

days 5–15 was 0.51. The average difference should be about 0.00 (unbiased reports) in the IIF-Yes settings (first three columns), and -10.0 (biased reports) in the IIF-No settings (columns 4, 5, and 6).

{Insert Table 4 about here}

As just noted, the average difference in the NoNews/IIF-Yes setting was -0.51, which is not significantly different from zero (using approximate randomization and each transaction as a data point). In addition, the average difference of 0.93 in the IIA-Yes/IIF-Yes setting does not differ significantly from zero. However, the average difference of -3.17 in the inconsistent IIA-No/IIF-Yes setting is significantly greater than zero ($p<0.01$). The average difference in the NoNews/IIF-No setting was -9.89 (not significantly different from -10), whereas the average difference was -6.65 and -6.67 in the IIA-Yes/IIF-No and IIA-No/IIF-No settings, respectively, which are both significantly different from -10 at the 0.01 level.

Recall that subjects in the two NoNews and the IIA-Yes/IIF-Yes settings had relatively accurate beliefs, and these resulted in efficient pricing. This would not allow us to differentiate across the EMH and belief persistent alternatives in these settings. However, in the two inconsistent settings, subjects had relatively inaccurate beliefs, which did lead to mispricing, relative to the economic predictions. In the IIA-No/IIF-Yes setting, prices were lower than the economic prediction whereas in the IIA-Yes/IIF-No, prices were higher than the economic prediction. Both are consistent with the belief persistence hypothesis, and contrary to the EMH. Note that prices in the IIA-No/IIF-No setting do not differ from prices in IIA-Yes/IIF-No setting, although the beliefs differed across the two settings. This suggests that belief errors were not the only source of pricing differences. One possible explanation is errors in forecast prices, a topic we turn to next.

Forecast Errors.

The bottom part of Table 4 provides the forecast errors, $(P - F)$ across the six settings. If beliefs were accurate, $(P - F)$ should be zero.

The average errors for days 5 – 15 were 0.47, 0.40, -1.86 for the NoNews/IIF-Yes, IIA-Yes/IIF-Yes and IIA-No/IIF-Yes settings, respectively. The corresponding averages for the three IIF-No settings

were – 0.56 (NoNews), 0.04 (IIA-Yes), and 5.44 (IIA-No). Hence, the largest forecast errors occurred in the IIA-No/IIF-Yes and the IIF-No/IIA-No settings, with actual prices below forecasted prices in the first and higher than forecasted prices in the second.

However, these averages could be somewhat misleading since they allow plus and minus errors to cancel out. It is reasonable to assume that subjects' profits would be adversely affected whether the forecast errors were positive or negative. For example, the average forecast error of 0.04 for the IIA-Yes/IIF-NO setting masks the fact that the forecast error during days 10 – 12 and 13 – 15 were 2.96 and -2.39 respectively.

Substituting averages of the absolute errors, the rankings change slightly. The average absolute forecast errors for days 4 – 15 were 0.79, 0.87, and 1.81 for the NoNews/IIF-Yes, IIA-Yes/IIF-Yes and the IIA-No/IIF-Yes settings, respectively, resulting in the same ranking as the above. The corresponding averages of absolute forecast errors for the three IIF-No settings were 0.93 (NoNews), 1.62 (IIA-Yes) and 5.44 (IIA-No), with the inconsistent setting of IIA-Yes/IIF-No setting now having the third largest average error (1.62).

The large average absolute forecast errors in the two inconsistent settings —IIA-No/IIF-Yes and IIA-Yes/IIF-No — are not surprising since both of these settings had low average belief indices. However, the large average absolute forecast error in the IIA-No/IIF-No setting is not consistent with the high perception index in that setting. Apparently, subjects in this setting did not rely on their correct beliefs in forecasting actual prices.

Distribution of investors' profits

Our third analysis focuses on investors' relative levels of profits across the different settings. Specifically, our alternate hypotheses are:

H3 (IRH). *In steady state, the distribution of investors' profits will not differ across settings.*

H3 (BELIEF PERSISTENCE). *In steady state, the distribution of profits will be less evenly distributed in inconsistent settings than in the NoNews and consistent settings.*

Table 5 summarizes the standard deviation of trading gains and losses for three-day groupings for all settings. To illustrate, under the NoNews/IIF-Yes setting, the measure was 90.61 for the first four days, and 68.35, 52.84, 60.36, 16.72 for the next four three-day groupings, leading to an overall average of 51.13. The lowest overall average standard deviation (34.73) occurred in the NoNews/IIF-No setting indicating a more uniform distribution of gains and losses. The next lowest average (47.22) occurred in the IIA-Yes/IIF-Yes setting. The highest average (67.16) occurred in the IIA-No/IIF-Yes setting, suggesting a much wider distribution of gains and losses. The next two highest averages occurred in the IIA-Yes/IIF-No and the IIA-No/IIF-No settings. The latter is not consistent with our hypothesis that there should be lower dispersion in the consistent settings.

{Insert Table 5 about here}

As an alternative approach, we measured payoff distributions by using the Lorenz curve, and added calculations of the Gini coefficient which indicates relative payoff inequities (see e.g., Due and Friedlaender 1981). This measure of payoff distribution is constructed as follows. First, we sort individual investors according to their profits, from lowest to highest. The second step involves a calculation of the cumulative fraction of total wealth for the investor with the least amount of profits, followed by the cumulative fraction of total wealth for the two investors who earned the two lowest profits, and so on, with the cumulative fraction of all wealth for all investors equal to 1. The Lorenz curve is a graphical depiction of wealth distribution with the fraction of cumulative wealth on the vertical axis, and the relative fraction of the population owning that wealth on the horizontal axis. If wealth is equally distributed among investors, the resulting curve would overlap the 45^{O} line. An unequal wealth distribution results in a convex curve lying below the 45^{0} line, with greater inequalities appearing further away from that line. The Gini coefficient is a numerical measure of inequality, where we divide the area between the 45^{0} line and the Lorenz curve, by the area of the triangle formed between the 45^{0} line, the X-axis, and the Y-axis. Figure 6 shows the Lorenz curves and the Gini coefficients for the six settings. A zero coefficient indicates an even distribution of profits.

{Insert Figure 6 about here}

For purposes of illustration, consider first the NoNews/IIF-Yes setting, shown in the upper left hand part of Figure 6. As noted above, the 45^0 line reflects an even distribution of wealth, with each segment of the population receiving an equal percentage of the total wealth. In the case of the NoNews/IIF-Yes setting, we see that the first 20% of the population received less than 10% of the wealth. On the opposite extreme, the top 20% received about 30% of the wealth. Thus, the more concave the Lorenz curve, the greater the disparity of payoffs. The Gini coefficients for the six settings are shown on the figure and reproduced below.

	IIF-Yes	**IIF-No**
NoNews	21.5%	24.3%
IIA-Yes	19.9%	21.5%
IIA-No	30.2%	33.1%

It is difficult to conduct statistical analyses of the Gini coefficient, but for our purposes it is a useful qualitative measure of wealth distribution across the six settings. The measure suggests that the three IIF-No settings (second column) had greater wealth dispersions than the three IIF-Yes settings. The largest dispersions, occurred in the two IIA-No settings (third line above). The two IIA-Yes settings had the lowest coefficients indicating more uniform distributions relative to the distributions in the other four settings, but only marginally over the two NoNews settings (top line above).

We also investigated whether the profits that investors earned were associated with the relative accuracies of their beliefs. Figure 7 provides a graphical illustration of individual investors' cumulative profits over the 15 trading days, and the individual investor's belief index, averaged over the 15 trading days, for each of the six settings.

{Insert Figure 7 about here}

The graphical depiction generally shows a lack of correlation between an individual investor's average belief index and the trading profits of that investor. Note that the highest and lowest individual investor's

profits occurred in the IIA-No/IIF-Yes setting which had a relatively high Gini coefficient of 30.2%. In contrast, investors' beliefs were most accurate, and least dispersed, in the IIA-Yes/IIF-Yes setting, which is consistent with the low Gini coefficient of 19.9% in this setting.

5. Conclusions

In this study, we investigated the extent to which security prices are affected by the SEC's rule requiring client firms to disclose non-audit fees paid to their auditors. The SEC believes that non-audit fee information will allow investors to better judge the degree to which the auditors are independent in fact. Presumably, high relative percentages of non-audit fees (lack of independence in appearance) would raise doubts about the auditors' independence in fact.

The disclosure requirement has been in effect only long enough to generate one full year of archival data that could be used to assess the real market impact of disclosing non-audit fees. We designed a market experiment that focuses on the impact of non-audit information on investors' behavior in the context of experimental markets. The experimental method allowed us to control for the presence or absence of auditor independence in fact (IIF) coupled with the presence or absence of auditor independence in appearance (IIA). In one market regime, investors did not receive any information about whether the auditor provided non-audit services. In a second regime, investors were explicitly informed that the auditor did not provide any non-audit services (auditor was IIA), which raised the probability the auditor was unbiased. In our third regime, investors were told that the auditor provided non-audit services (not IIA) that could adversely affect auditors' independence in fact (IIF). We manipulated IIF by having the auditor issue biased (IIF-No) or unbiased (IIF-Yes) reports.

Our results indicate that the disclosure of information about non-audit services did not increase the accuracy of investors' belief of the auditor' degree of independence in fact except in the setting in which the auditor was IIA-Yes and IIF-Yes. Investors' beliefs were most accurate in this setting. However, information about auditor's IIA significantly reduced the accuracy of investors' beliefs of auditors' IIF when the auditor was independent in fact but not independent in appearance, or when the auditor was independent in appearance but not independent in fact. One of our more interesting results was that

investors' beliefs of auditor independence in the settings in which they did not receive any information about non-audit services were only slightly less accurate than beliefs in the IIA-Yes/IIF-Yes setting. In the NoNews settings, investors had to rely on the feedback information generated by actual asset payouts and auditors' reports to infer auditors' IIF.

Higher degrees of belief accuracy in the NoNews and IIA-Yes/IIF-Yes settings led to more efficient markets in the sense that actual prices in those settings were closer to their predicted equilibrium prices. In contrast, prices were furthest from their predicted equilibrium prices in markets in which investors received information about the auditors' non-audit services (IIA-Yes or IIA-No) that was inconsistent with the auditor's independence (IIF-No or IIF-YES). Finally, investors' profits were less equitably distributed in the two settings in which the auditors were not independent in appearance — that is, IIA-No/IIF-Yes and IIA-No/IIF-No.

We did observe some surprising results in our markets. As noted earlier, investors received feedback information on the differences between the audit report and actual values by day 3 (4) that indicated with certainty whether the auditor was biased or unbiased. Yet, those in settings in which we provided information about non-audit services continued to allow the disclosures to influence their forecasts and their trading even if the disclosures conflicted with the facts. The critical question is whether such belief persistence occurs in natural markets wherein it would be much more difficult to ascertain any association between non-audit services and auditor independence.

Of course, our results are subject to the usual caveats regarding the degree to which our experimental markets are rich enough to give insights into the actual market effects associated with the new disclosures of non-audit fees. One limitation is that instead of disclosing the actual amount of non-audit fees, we fixed the level of non-audit services and merely informed investors that the auditors' provision of non-audit services was either material (raised the likelihood of biased reports) or immaterial (raised the likelihood of unbiased reports). This was simply because we had no benchmark for determining what level of non-audit fees would be viewed by investors as being material.

We also did not examine how auditors might respond to disclosures of non-audit fees received from clients since we used computerized auditors to generate the audit reports. It is conceivable that

auditors recognition of investors' adverse reactions to the disclosure of non-audit fees would motivate them to change the levels of non-audit services provided to clients. Since we also used a computerized manager in our settings, we could not investigate whether observed adverse reactions of investors would encourage managers to reduce the level of non-audit services they purchase from their auditors. The Enron collapse provides some clues about how the future market for non-audit services might evolve. For example, several client-firms have decided to discontinue obtaining their non-audit services from their audit firms. Similarly, some of the large audit firms seem more receptive to having additional limits imposed on the relative amounts of non-audit services they could provide to their client-firms. It is not clear, however, whether smaller audit firms have take the same position on this issue. These new trends suggest fruitful avenues to pursue in the future.

Finally, we are not aware of convincing empirical evidence indicating the extent to which independence in appearance is a good proxy for independence in fact in actual markets. Audit firms are constantly faced with economic incentives to be retained by their client-firms (e.g., reduced costs of future audits, economic rents received from providing additional audit related and non-audit related services – e.g., SEC filings and taxes. The benefits from being retained pose a constant threat to auditor independence.

Appendix 1
Background on audit fee disclosures

The controversy over the disclosure of non-audit fees has a precedent in SEC Accounting Series Release (ASR) 250, which required disclosures of the magnitude of various categories of non-audit fees by client firms effective with their 1978 proxy statements. This rule was adopted to provide more opportunity for security holders to evaluate "registrants' relationships with independent accountants." (1992 SEC Guidelines, page 1853). The disclosures were to be used by the Commission to monitor the nature and extent of non-audit services provided by accountants over time, thereby creating an empirical base for further rules on independence.

Auditing firms, however, objected to ASR 250, maintaining that the release ignored the potential adverse effects on client firm's decisions to acquire non-audit services from their auditors and perhaps the willingness of audit firms to supply various services. The profession also claimed that ASR 250 seemed to ignore the significant benefits accruing to client firms from having their auditors provide such services created by positive externalities arising from the provision of audit and non-audit services to the same client.

The debate leading up to the issuance ASR 250 reflects the SEC's long-standing belief that investors' confidence in the independence of auditors could be adversely affected by the knowledge of the economic ties between auditors and their clients because of the provision of non-audit services. In other words, it is argued that investors' will have lower confidence in auditors who lack independence in appearance. Presumably, the adverse reactions by investors would then encourage client firms to restrict the non-audit services acquired from their audit firms.

After examining the actual ASR disclosures reported by client firms during 1978-1980, the SEC issued ASR 296, which rescinded ASR 250. The reasons given were that the disclosures of non-audit fees did not appear to suggest severe threats to independence and because of the added monitoring practices required in the AICPA's SEC Practice Section. These costs included reports to firms' audit committees of the total fees paid to their auditors (SEC Guidelines, 1992, page 1855).

Several researchers tried to determine what effect(s) the ASR 250 disclosures had on client and auditor decisions and on stockholder reactions to the disclosures. In one study, Scheiner and Kiger (1982) examined the percentages of non-audit services across 16 of the largest audit firms and concluded that, in general, the percentages of such services did not represent a large source of fees to the audit firms. Moreover, the non-audit service that accounted for the highest percentages of fees was the provisions of tax services. These results were tentative since they were based on only one year of data provided under ASR 250. In a later study, Scheiner (1984) examined whether the percentages of fees provided by the largest audit firms varied from the three years prior to the effective date of ASR 250 and the first year after the issuance. He concluded that there were negligible changes in these percentages between the pre-and post-

ASR 250 years. Finally, Glezen and Millar (1985) studied stockholder approval ratings of their auditors during pre- and post-ASR 250 and concluded that the approval ratings stayed constant and even increased slightly between the two time periods. Overall, these three studies support the SEC's view that ASR 250 would not have severe adverse effects on client and audit firms' decisions. Note that these three studies did not address the effect(s) of ASR 250 disclosures on market prices of securities of firms receiving non-audit services from their auditors. Moreover, the lack of significant changes in stockholder, client and auditor behaviors could have been because of the relatively small percentages of non-audit services provided by audit firms during the late 1970s.

Appendix 2
General Electric's disclosure of audit fees (2000)

INDEPENDENT AUDITORS FEES In addition to retaining KPMG LLP to audit the consolidated financial statements for 2000, the Company and its affiliates retained KPMG, as well as other accounting and consulting firms, to provide various consulting services in 2000, and expect to continue to do so in the future. The aggregate fees billed for professional services by KPMG in 2000 for these various services were:

Audit Fees: $23.9 million for services rendered for the annual audit of the Company's consolidated financial statements for 2000 and the quarterly reviews of the financial statements included in the Company's Forms 10-Q;

Financial Information Systems Design and Implementation Fees: $11.5 million for services rendered in connection with the design or implementation of hardware or software systems that aggregate source data underlying the financial statements or generate information that is significant to the financial statements taken as a whole; and .

All Other Fees: $13.8 million for tax services; $15.5 million for non-financial statement audit services such as due diligence procedures associated with mergers and acquisitions; and $38.9 million for all other services consisting primarily of information technology consulting and assistance for systems not associated with the financial statements.

Although the Company expects to continue to retain KPMG and other firms to assist in the design and implementation of its financial information systems, GE managers make all management decisions with respect to such systems, and are responsible for evaluating the adequacy of such systems and for establishing and maintaining the Company's system of internal accounting controls.

1. The SEC received thousands of comment letters and held many hours of public hearings, with many witnesses. McNamee (2000) considers the debate between the SEC and the accounting profession over the independence rule as one of the nastiest regulatory fights in years and believes that the battle is still not over.
2. Clients must disclose in their annual proxy statements three general items: the fees for the audit, fees for I/T consulting, and fees for all other services provided by their auditors during the last fiscal year. In addition, firms must disclose whether the audit committee has concluded that the provision of the non-audit services is compatible with maintaining auditor independence. See appendix 1 for a discussion of the SEC's previous requirement of audit fee disclosures and appendix 2 for GE's disclosure for 2000.
3. Independence is argued to enhance the credibility of financial statement on two grounds. First, independent auditors increase the likelihood that financial statements conform to Generally Accepted Accounting Principles (GAAP). Second, investors are more likely to rely on the financial statements if the auditor is independent. Under this set of arguments, auditor independence plays a central role in enhancing the credibility of financial statements and any threat to auditor independence has undesirable effects on capital markets (SEC 2000).
4. After a period of time, auditor independence in fact might be inferred from lawsuits and SEC sanctions. However, until that time there is uncertainty about IIF.
5. Investors' reactions may depend on market efficiency, an issue which is now actively debated (see e.g., Shleifer, 2000 and SEC 2000). Related research on the efficiency of experimental markets includes Ackert et al. 1996; Bloomfield and Libby 1996; Bloomfield and Wilks 2000: Dietrich et al 2001; Ganguly et al. 1994; Kachelmeier 1996b; and Libby et al. 2001.
6. These numbers are based on a search of Dow Jones News Retrieval for the past 12 years. The average number of articles that mentioned auditor independence prior to 1999 was about 9 per year, thus there was a six fold increase in articles dealing with auditor independence from 1990-1997 to 2000-2001.
7. See Kachelmeier 1996a and Libby et al. 2000 for discussions of research that combines economic and psychology-based hypotheses.
8. We computerized the VC and auditor to provide controls over the settings for the investors, which are the focus of our investigation. See Calegari, Schatzberg and Sevcik (1998); Dopuch and King (1991); and Kachelmeier (1991) for examples of experimental research dealing with strategic auditor issues.
9. The instructions are available upon request.
10. We adopted a two-minute trading day based on feedback from subjects who participated in pilot sessions. Other experimental studies have trading periods that range from two minutes to five minutes. The difference in the length of the trading period appears to be somewhat dependent on the speed and usability of the trading software. Our software was relatively fast in transferring information and subjects indicated they felt the software was easy to use. We used 15 days because this gives subjects opportunities to learn with repeated interactions, and yet allow the session to be completed in two hours (a typical time period for experimental sessions).
11. Subjects were paid $1 for each correct forecast for three randomly selected days. We did this to provide some economic incentives for accurate predictions, but without the payments being so large as to overshadow incentives associated with trading.
12. In the IIF-No settings, the report is ¥20 greater than the true value for day 3 and under the IIF-Yes settings, the report is ¥10 less than the true dividend for day 4.
13. Other psychological biases that are related to this bias include anchor and adjusting (where subjects do not update optimally after receiving reliable evidence) and representativeness bias (where subjects place too much evidence on unreliable evidence). See Bloomfield et al 2001 for a discussion of research on these and related issues.

14. Figure 2 shows the computer screen that investors used to submit information on these two elements.
15. The data used in this test was each subject's PI for the particular day. Thus with 12 subjects for each of the six settings, the data set consisted of 72 independent observations.
16. Under the approximate randomization approach a test statistic is generated from the actual data; then the data are combined and divided repeatedly and the statistic is computed for each of the random divisions. The *p*-values represent the percentage of times the statistic from the random divisions is less than the test statistic for the actual data using 40,000 replications. See Edgington (1980) for a discussion of the approximate randomization method.

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TABLE 1
Experimental parameters

Issue	**Experimental parameters**
Number of market sessions	Twelve sessions (two in each setting)
Length of session, including instruction time	Two and a half hours
Number (type) of investors in each session	Six investors (business school students)
Number of trading days in each session	Fifteen trading days
Length of trading days	Two minute trading days
Share and cash endowment each trader receives at the beginning of each trading day	Eight shares and 2,000 yen (experimental monetary units)
Trading rules	Computerized continuous double auction (i.e., all investors can buy and sell shares) with short sales allowed
Dividend values (D) and distribution of the values in yen (experimental monetary units)	$D \sim U$ (1.00, 2.00)
Errors in IIF-Yes settings	$e_{IIF\text{-}Yes} \in \{-10, 0, 10\}$; $E(e_{IIF\text{-}Yes}) = 0$
Errors in IIF-No settings	$e_{IIF\text{-}No} \in \{0, 10, 20\}$; $E(e_{IIF\text{-}No}) = 10$
Process that determines reports, R_q, $q \in$ {IIF-Yes and IIF-No}	$R_q = D + e_q$
Wording used in the experiment to operationalize the treatment levels related to independence in appearance	**IIA-Yes**: The auditor is not providing other services to the venture capitalist. Such an auditor is commonly perceived to have a high likelihood of issuing reports without bias. **IIA-No:** The auditor is providing other services to the venture capitalist. Such an auditor is commonly perceived to have a high likelihood of issuing reports with bias. **NoNews:** No News.

TABLE 2
Experimental design and notation for experimental settings

		Independence in appearance treatment (IIA)		
		Investors have no information on the appearance of independence **(NoNews)**	Investors have information that indicates the auditor is IIA **(IIA-Yes)**	Investors have information that indicates the auditor is not IIA **(IIA-No)**
Independence in fact treatment (IIF)	Auditor is IIF: information is not biased **(IIF-Yes)**	Denoted as **NoNews/IIF-Yes**	Denoted as **IIA-Yes/IIF-Yes**	Denoted as **IIA-No/IIF-Yes**
(i.e., quality of information)	Auditor is not IIF: information is biased **(IIF-No)**	Denoted as **NoNews/IIF-No**	Denoted as **IIA-Yes/IIF-No**	Denoted as **IIA-No/IIF-No**

TABLE 3
Average Perception Index (PI)* and Average Deviation of Forecast from the Report ($F - R$)†

		Setting | (IIF-Yes)				Setting | (IIF-No)		
	Days	NoNews/ IIF-Yes	IIA-Yes/ IIF-Yes	IIA-No/ IIF-Yes	Days	NoNews/ IIF-No	IIA-Yes/ IIF-No	IIA-No/ IIF-No
Average Perception Index	1 – 4	0.66	0.77	0.37	1 – 3	0.41	0.34	0.67
	5 – 6	0.88	0.99	0.68	4 – 6	0.93	0.62	0.82
	7 – 9	0.91	0.99	0.69	7 – 9	0.93	0.59	0.82
	10 – 12	0.90	1.00	0.73	10 – 12	0.96	0.51	0.86
	13 – 15	0.92	1.00	0.67	13 – 15	0.93	0.67	0.86
	5 – 15	0.90	1.00	0.70	4 – 15	0.94	0.60	0.84
Average Deviation of Forecast from the Report ($F - R$)	1 – 4	2.73	1.73	-2.42	1 – 3	-1.67	1.44	-4.42
	5 – 6	-0.42	0.42	-2.00	4 – 6	-8.97	-7.11	-14.94
	7 – 9	-1.39	-0.83	-1.03	7 – 9	-10.83	-8.36	-9.47
	10 – 12	-2.22	0.83	-1.81	10 – 12	-10.56	-4.94	-14.19
	13 – 15	0.28	1.67	-0.61	13 – 15	-6.94	-6.33	-9.83
	5 – 15	-0.98	0.53	-1.30	4 – 15	-9.33	-6.69	-12.11

H1(IRH). *In steady state, investors' beliefs will not differ across settings.*
H1(BELIEF PERSISTENCE). *In steady state, investors' beliefs will differ between inconsistent settings, NoNews settings, and consistent settings.*

*The perception index (*PI*) equals 1.0 if an investor had the correct perception of the auditor (biased or unbiased) with complete confidence; if only somewhat confident, the index would be 8.0; if not confident, the index would be 6.0; if the investor had an incorrect perception, the index would be 4.0, 2.0 and 0.0 respectively.
†(*F -R*) is the investor's forecast of a price minus the auditor's reported value; the difference should be zero in the IIF-YES settings and -10.00 in the IIF-No settings

TABLE 4
Average deviation of price from report ($P - R$), and from forecast ($P - F$)

		Setting | (IIF-Yes)				Setting | (IIF-No)		
	Days	NoNews/ IIF-Yes	IIA-Yes/ IIF-Yes	IIA-No/ IIF-Yes	Days	NoNews/ IIF-No	IIA-Yes/ IIF-No	IIA-No/ IIF-No
Average Deviation Of Price from the Report ($P - R$)	1-4	2.07	2.46	-2.41	1-3	-1.31	0.86	0.77
	5-6	-0.46	0.98	-0.99	4-6	-9.26	-7.90	-6.01
	7-9	-0.07	0.49	-4.17	7-9	-10.10	-8.00	-5.40
	10-12	-1.07	0.02	-3.72	10-12	-11.00	-1.98	-7.48
	13-15	-0.42	2.27	-3.06	13-15	-9.20	-8.72	-7.78
	5-15	-0.51	0.93	-3.17	4-15	-9.89	-6.65	-6.67
Average Deviation Of Price from the Forecast ($P - F$)	1-4	-0.66	0.73	0.00	1-3	0.35	-0.59	5.18
	5-6	-0.05	0.57	1.01	4-6	-0.29	-0.79	8.93
	7-9	1.31	1.32	-3.15	7-9	0.73	0.36	4.07
	10-12	1.15	-0.82	-1.91	10-12	-0.44	2.96	6.71
	13-15	-0.70	0.60	-2.45	13-15	-2.25	-2.39	2.05
	5-15	0.47	0.40	-1.86	4-15	-0.56	0.04	5.44

H2 (EMH). *In steady state, asset prices will not differ across settings. Price (P) should equal the auditor's report of asset value (R) in the IIF-Yes settings and be a minus 10.00 in the IIF-No settings.*

H2 (BELIEF PERSISTENCE). *In steady state, asset prices will differ between inconsistent settings, NoNews settings, and consistent settings.*

TABLE 5
Standard deviation of individual investors cumulative trading profits

	Setting | (IIF = Yes)				Setting | (IIF = No)		
Days	NoNews/ IIF-Yes	IIA-Yes/ IIF-Yes	IIA-No/ IIF-Yes	Days	NoNews/ IIF-No	IIA-Yes/ IIF-No	IIA-No/ IIF-No
1 – 4	90.61	71.60	86.39	1 – 3	67.52	79.99	107.67
5 – 6	68.35	28.38	47.75	4 – 6	42.09	48.58	51.62
7 – 9	52.84	52.66	89.84	7 – 9	41.42	70.43	75.78
10 – 12	60.36	68.39	78.75	10 – 12	37.09	73.61	62.56
13 – 15	16.72	19.13	33.34	13 – 15	8.13	34.52	33.63
5 – 15	51.13	47.22	67.16	4 – 15	34.73	58.39	57.38

Lower standard deviations indicate more evenly distributed profits across investors in the respective settings.

Figure 1 Computer screen used by investors to input their predictions of the auditor type, their confidence level, and share value

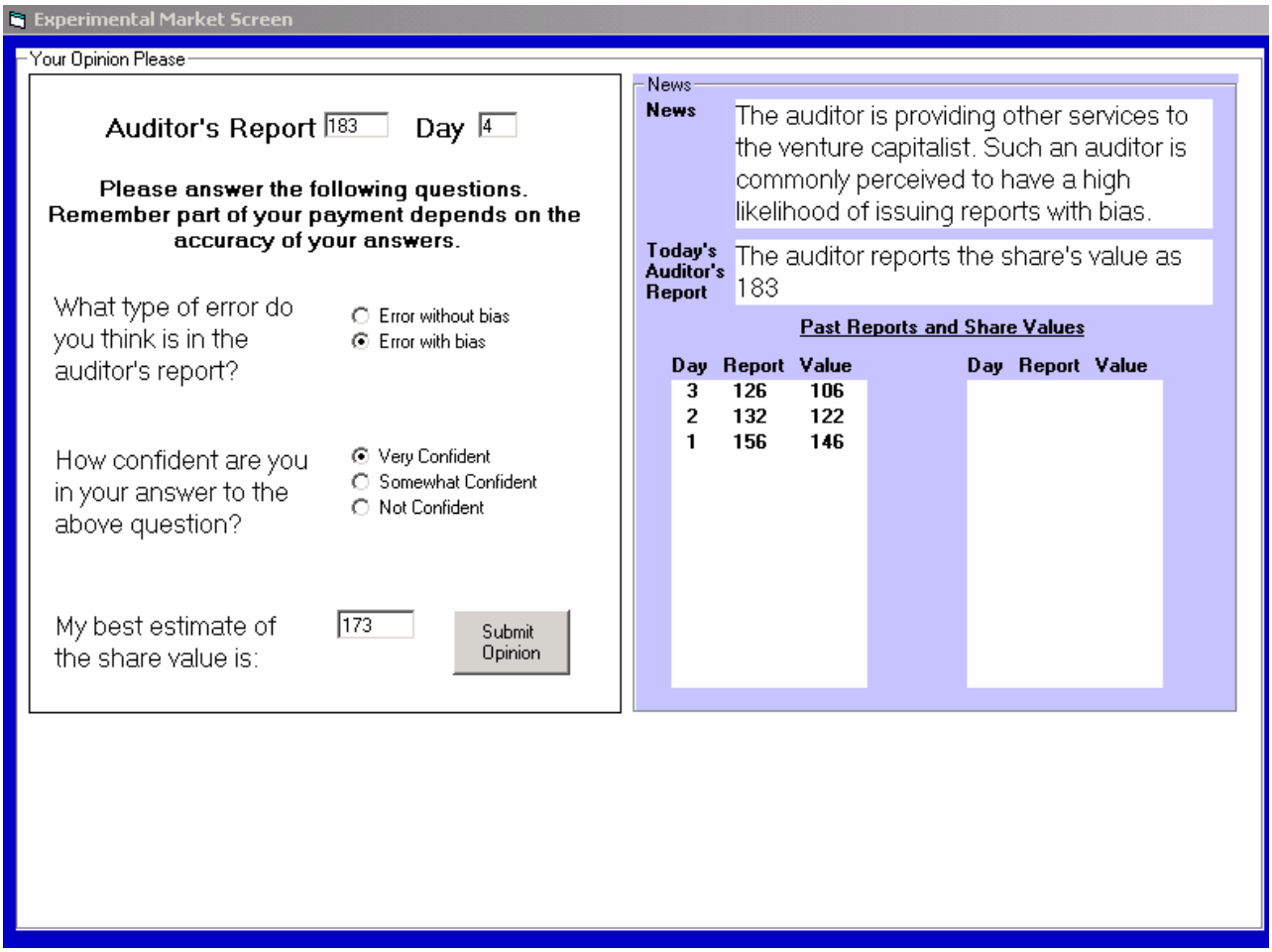


Figure 2 Computer screen used by investors for trading

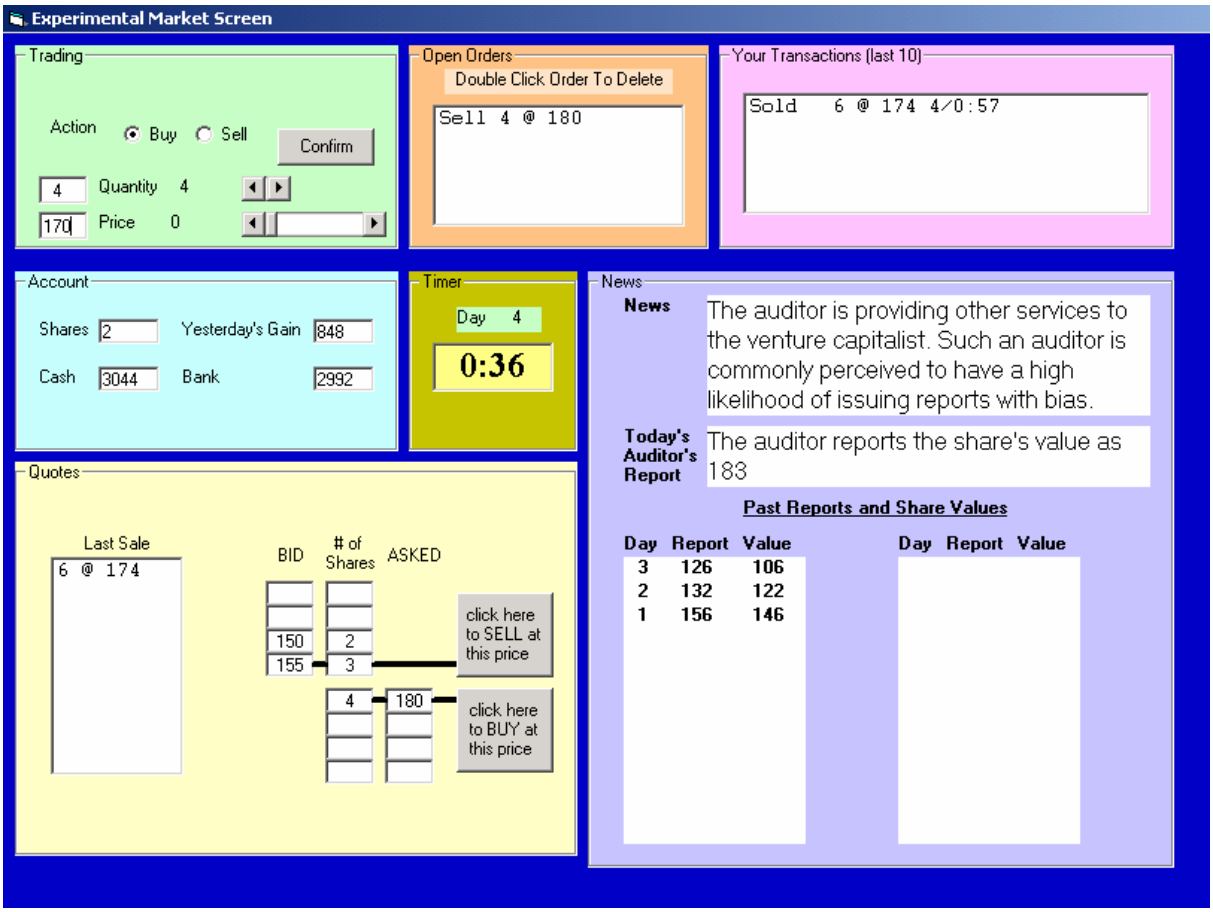
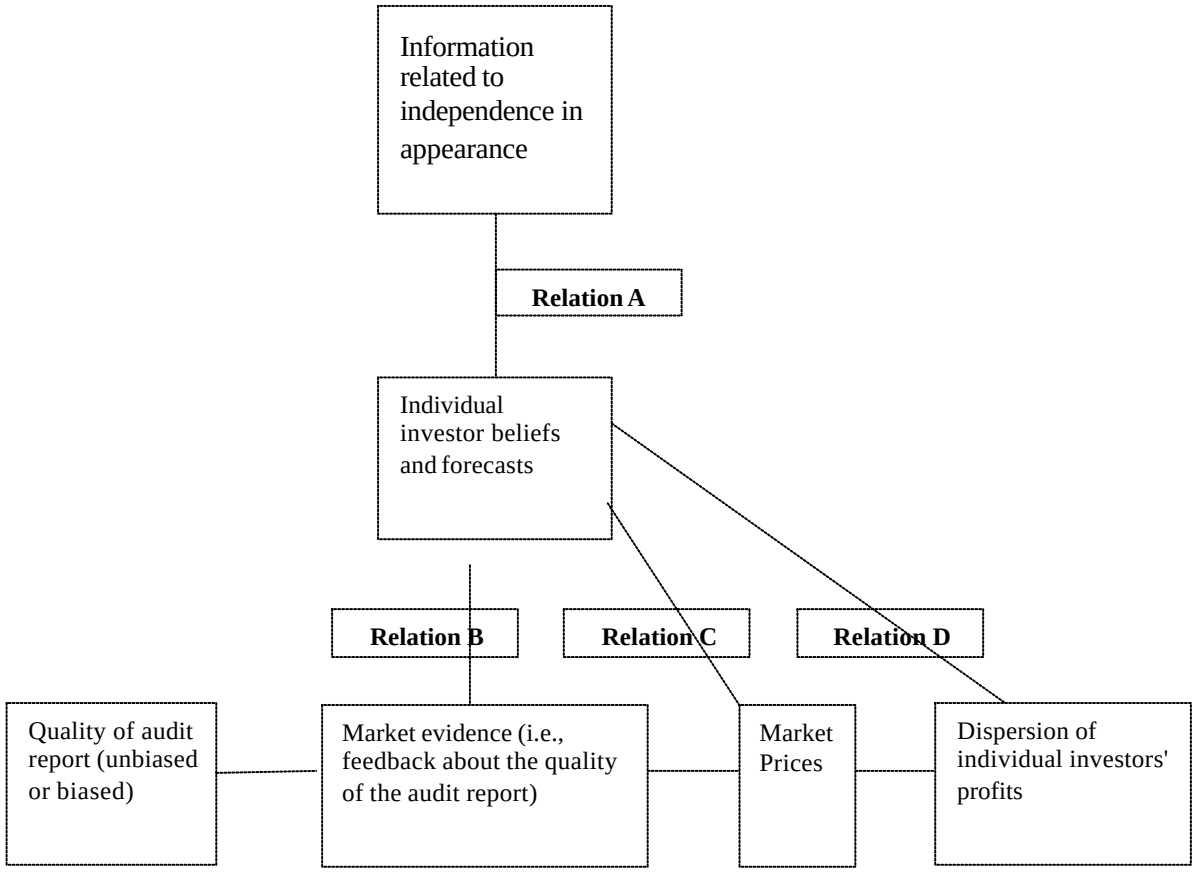


Figure 3 Framework relating independence in appearance to beliefs, prices, and dispersion of investors' profits



Relation A: Addresses whether information about independence in appearance influences individual investor's beliefs.

Relation B: Addresses whether information of the correspondence of reports and underlying values influences individual investor's beliefs.

Relation C: Addresses whether information about independence in appearance influences market prices.

Relation D: Addresses whether information about independence in appearance influences investors' profits.

Figure 4 Perception Index (*PI*) vs. Trading Day, averaged over all investors in a given setting

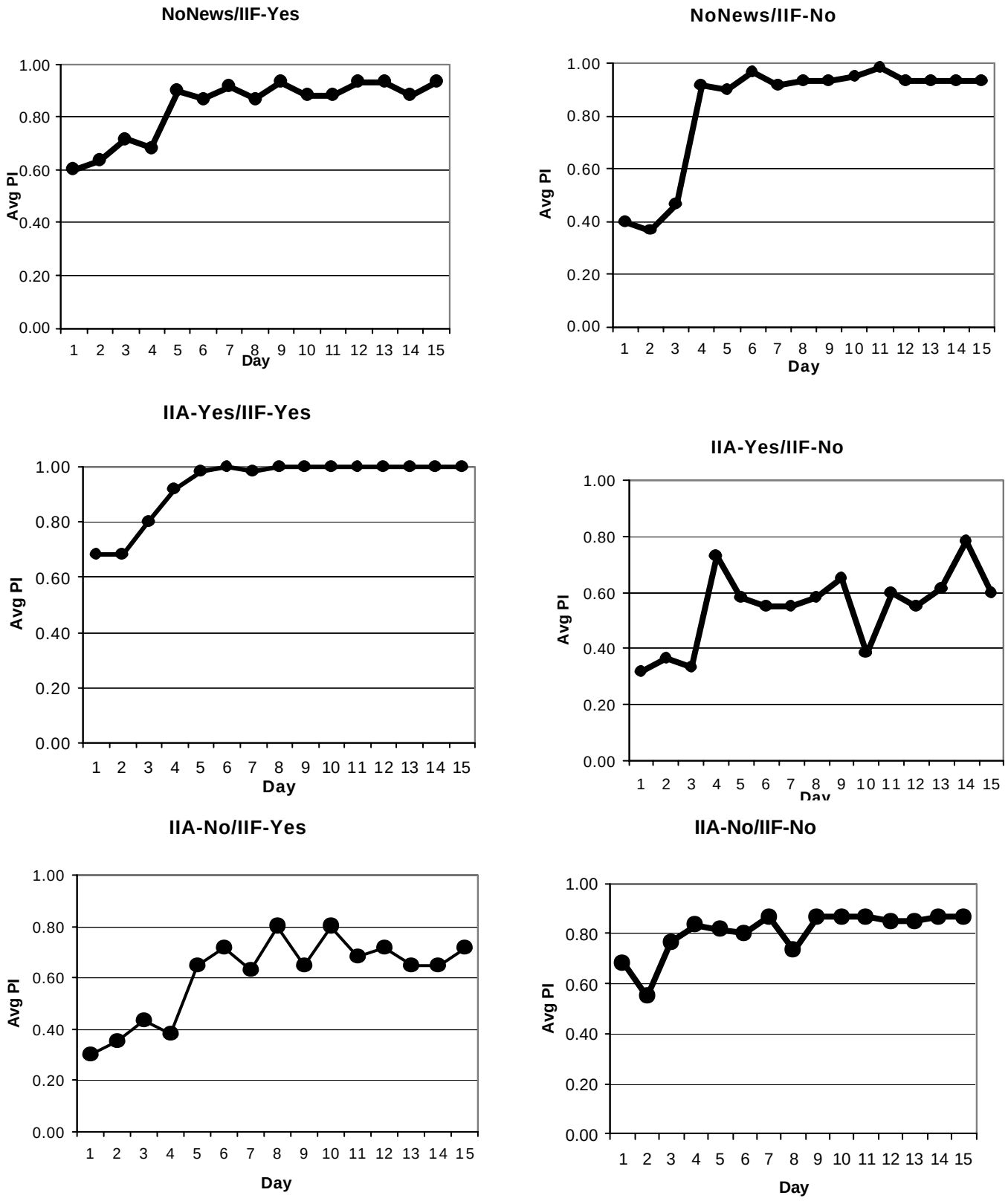


Figure 5 Distribution of the Perception Index, by setting

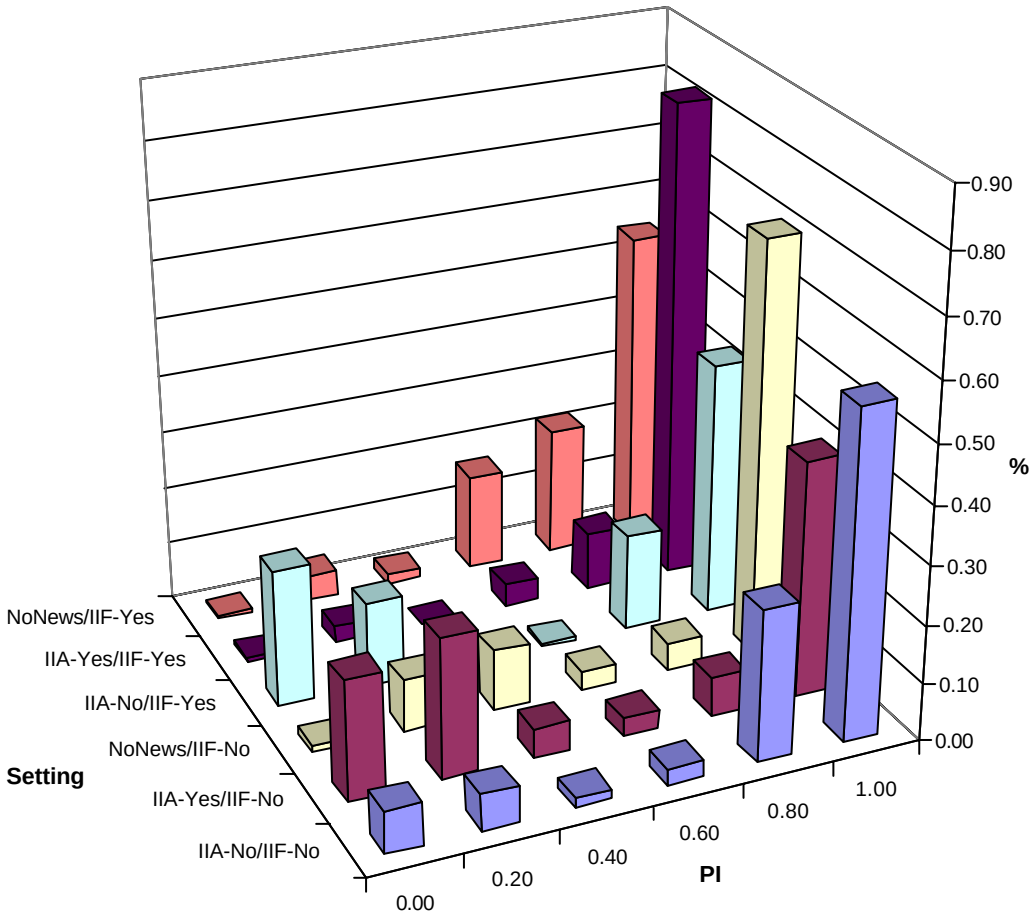


Figure 6 Lorenz Curves and Gini Coefficients

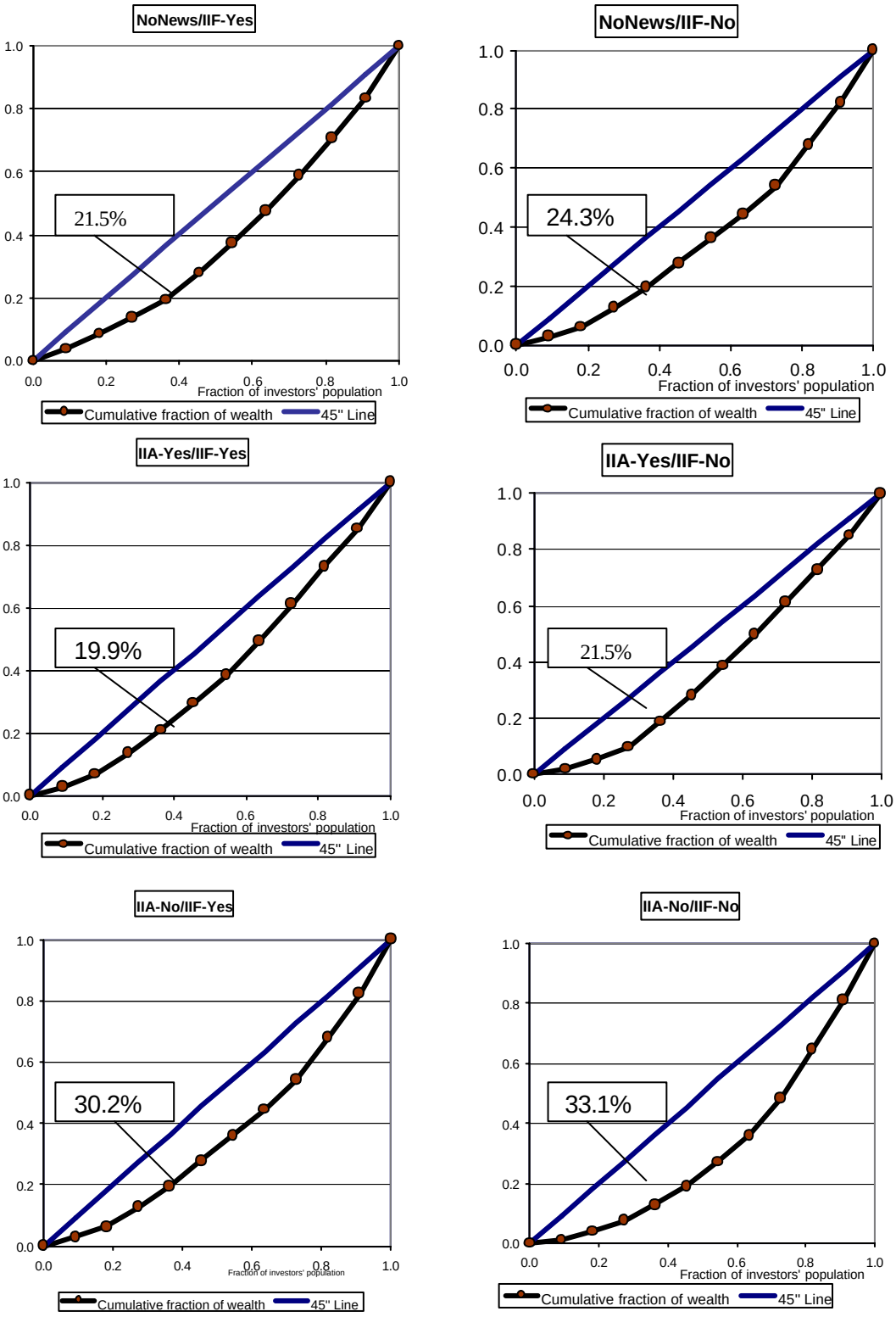
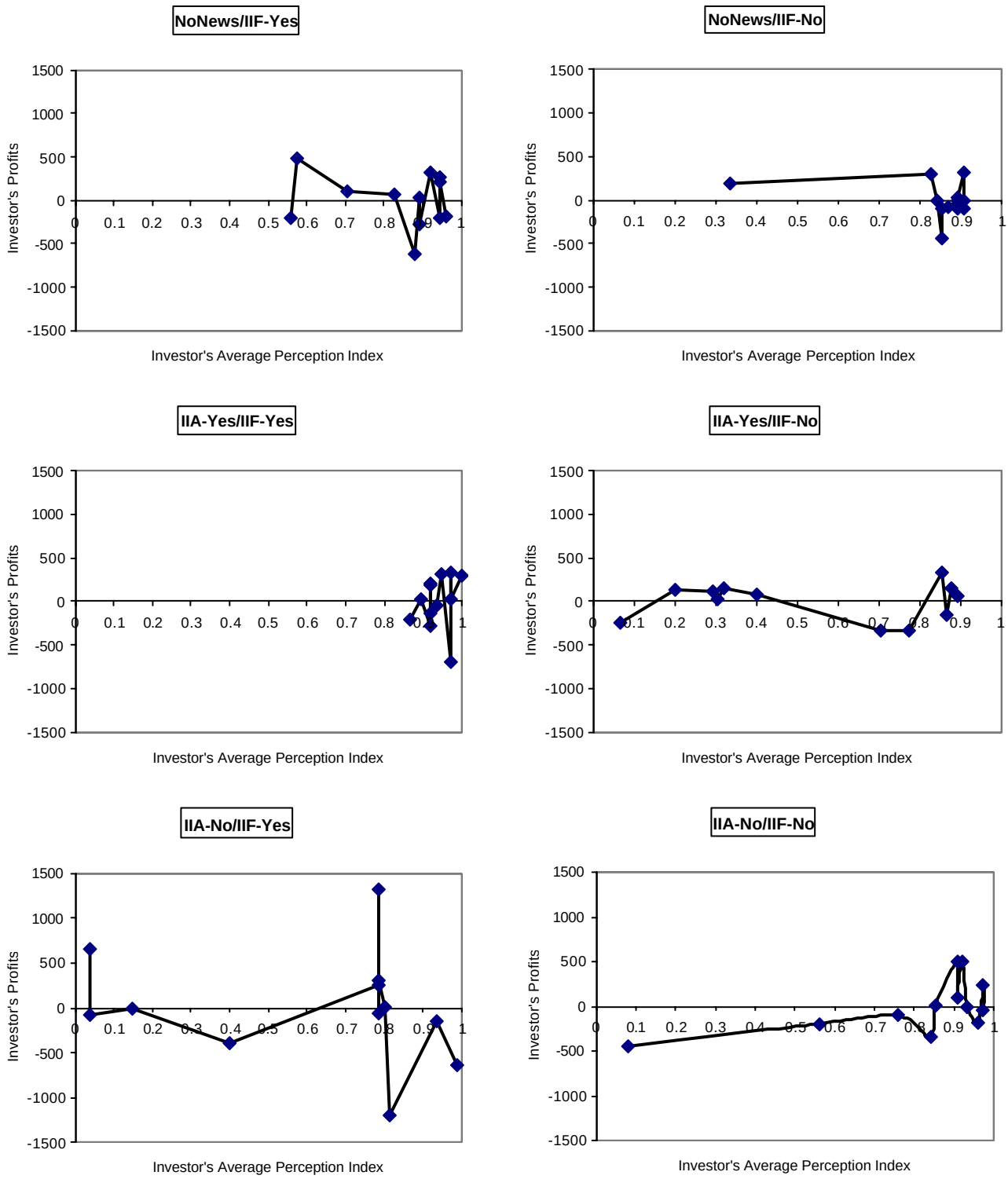



Figure 7 Individual investors' cumulative profits vs. each investor's average Perception Index over all trading days