THE IMPACT OF INDUSTRY DISTRIBUTIONAL INFORMATION ON AUDITORS' ANALYTICAL PROCEDURES

Robert C. Zelin II, Minnesota State University, Mankato

ABSTRACT

The use of an analytical procedure technique that compares the various financial ratios of an entity with those of its related industry is an important and critical part of the audit process. Researchers have found that accounting ratio distributions within industries tend to be non-normal. Several psychological studies, exploring the distributional expectation behavior of individuals, reveal an apparent predisposition toward the presumption of symmetry when incomplete sample parameters are available as experimental cues. The purpose of this study is to examine the effect of varying amounts of distributional information on auditors' decision-making behavior. A laboratory experiment was conducted with experienced auditors serving as subjects. Subjects were randomly assigned to one of three groups: those given only the medians of the distributions of selected financial ratios, those given the upper and lower quartiles of the distributions, and those given the deciles of the distributions. Each participant read a short case, viewed distributional information for his or her treatment group for each of five ratios, and then recorded an upper and lower bound of investigation for each of the five ratios. The results indicate that the responses of individuals in the median group differed from those in the other two groups whereas the responses of individuals in the quartile and decile groups did not differ. Consensus was highest for individuals in the median group.

INTRODUCTION

The use of an analytical procedure technique that compares the various financial ratios of an entity with those of its related industry has been recommended by the Auditing Standards Board in two of its pronouncements: Statement on Auditing Standards No. 23 (SAS 23) and Statement on Auditing Standards No. 56 (SAS 56). Additionally, several articles have suggested that industry information should be incorporated into the analytical procedure process. Gallups and Hillison (1983) stated that industry information aids the auditor in the determination of the consistency of a client's financial information with comparable entities within the same industry classification. Coglitore and Berryman (1988) reviewed U.S. Securities and Exchange Commission actions and court decisions and concluded that analytical procedures would have aided in the detection of "revenue overstatements, fictitious sales and receivables, inadequate allowances for doubtful accounts, inventory overstatements, unrecorded liabilities for purchases, and commission expense underaccruals" (page 150). Among the analytical procedures recommended by the authors to aid in the detection process were the use of industry statistics and industry ratios. Since the use and

emphasis placed upon industry information appear to be on the rise, it is important for the auditing profession to investigate the efficacy of various components of industry information.

The principal objective of this paper is to examine the effect of varying amounts of financial ratio information on auditors' decision-making behavior. Within this context, the level of auditor consensus will be examined. The study of auditors' decision-making behavior is important because if an auditor makes an assumption in an analytical procedure setting and that assumption does not hold true, then the auditor may investigate something s/he need not or not investigate something s/he should. In the current audit environment in which fee competition is high and litigation risk is a continuous threat, the efficiency and effectiveness of audits is of utmost importance. The use of analytical procedures to highlight high-risk areas is critical to achieving effectiveness and efficiency. This provides the primary motivation for this study.

The relevant prior literature is discussed in the next section. This is followed by an overview of the experiment and statement of the hypotheses. Finally, the results of the study and conclusions are discussed.

LITERATURE REVIEW

This section includes a partial discussion of the history of analytical procedures, a review of the literature addressing the use of financial ratios in analytical procedures, a discussion of the distributional properties and sources of financial ratios, and a discussion of individuals' perceptions in an incomplete distributional information setting. After a review of the above material, three conclusions can be drawn. First, ratio analysis using industry data is of importance in the analytical procedure process. Second, industry ratios are skewed. Third, when individuals are asked about an unfamiliar distribution, they assume that the distribution is symmetric. When the above three observations are combined, several hypotheses may be generated.

Analytical Procedures and The Auditing Standards Board

The purpose of SAS No. 23 was to provide guidance in the application of analytical procedures, not to mandate their use. The statement listed five analytical procedures, among which was the comparison of an entity's financial information with that of its industry. SAS No. 56 was issued in an effort to strengthen the ASB's position on the importance of analytical procedures. The statement mandated that analytical procedures be employed during the initial planning stage and the concluding review stage of an audit. However, no specific analytical procedure was mandated. In agreement with SAS No. 23, the use of industry information was still recommended as an appropriate analytical procedure.

Accounting Research In Analytical Procedures

One of the first studies that offered empirical support for the use of analytical procedures was conducted by Hylas and Ashton (1982). Using a sample of 200 audit engagements, the authors found

that analytical procedures signaled more financial statement errors than any other error detection technique.

With regard to the use of financial ratios in an analytical procedure setting, Holder (1983) used thirty-five senior accountants to create an analytical procedure program and to write an audit risk identification memorandum. From his review of the analytical procedure programs, the author indicated that financial ratios are important to auditors in the analytical procedure phase of an audit.

Through the administration of a survey, Biggs and Wild (1984) found that 89.4% of the respondents performed "standard ratio analysis" at some point during the audit. The 269 respondents in the Daroca and Holder (1985) study were asked to state the percentage of audits for which an analytical procedure was applied in practice. The procedure of comparing client and industry information was found to be applicable in 42% of the audits and was applied "always or usually" 30%, "sometimes" 38.8%, and "rarely or never" 31.2% of the time.

In an attempt to update the previous analytical procedures studies, Ameem and Strawser (1994) surveyed one hundred Big Six firm auditors and ninety smaller CPA firm auditors. The auditors surveyed were asked to estimate the frequency of use of six analytical procedures during the course of an audit. Their allowable response range varied from never (1) to always (7). For all respondents the analytical procedure with the greatest usage (6.55 for smaller CPA firms and 6.43 for Big Six firms) was comparisons involving the prior year's audited balance. Within the Big Six firms, ratio analysis ranked third (5.0) in use and did not differ significantly from scanning (second in use) and judgmental trend analysis (third in use). Within the smaller CPA firms, ratio analysis ranked fourth (4.7) and did not differ significantly from judgmental trend analysis (third in use).

Distributional Properties of Ratios

Deakin (1976) used nineteen fiscal years of data from the COMPUSTAT 1800 Company file to investigate the distributional properties of eleven financial accounting ratios. When the year with the greatest number of data points was examined, the author discovered that only total debt to total assets emulated a normal distribution. All of the remaining ratio distributions were skewed. In a replication and extension of Deakin's study, Frecka and Hopwood (1983) utilized COMPUSTAT data from 1950 to 1979 with a population size range of 346 to 1,243 firms (depending upon the year studied) and concluded that all of the ratios, spare one (which differed from the Deakin study), exhibited departures from normality based on skewness and kurtosis. Foster (1986) utilized the information provided in the 1983 edition of Robert Morris Associates' Annual Statement Studies (ANSS) in order to estimate skewness using a less precise but speedier calculation. His results confirm the skewness documented by Deakin and Frecka and Hopwood.

Distributional Perceptions of Individuals

Several psychological studies have found that when subjects are unsure of the symmetry of a distribution, a symmetric distribution is assumed. Nisbett and Kunda (1985) examined individuals' perceptions of social distributions. A portion of the subjects participating in the experiment was asked to estimate a distribution for seventeen behavioral items based upon the subject's perception

of fellow students' responses to each behavioral item. Another group of subjects was asked to estimate the distribution of fellow students' responses to twenty-one attitudinal items that were either classified as questions or as objects. The authors found that the subjects exhibited a substantial bias in favor of hypothesizing distributions that were unimodal symmetric. Similar results were found in another distributional expectation study conducted by Flannagan, Fried and Holyoak (1986).

OVERVIEW OF THE EXPERIMENT

In designing the experiment, two major hypotheses were proffered. The first hypothesis addresses the area of auditor consensus. It was hypothesized that among the three experimental groups, the group that received the most information would demonstrate the greatest amount of consensus. The second hypothesis addresses the area of auditor decision behavior. That is, auditor decisions should be influenced by the amount of information received.

Experienced auditors were randomly assigned to one of three experimental treatment groups based on the amount of distributional information provided to each subject with regard to five specific ratios. All subjects were informed that they were planning an audit engagement for a medium-sized pharmaceutical company. They were also informed that the company had been in existence for five years and that an audit had never been conducted. They were then told that their firm's policy mandated the use of industry information in the planning phase of an audit whenever prior period financial statements had not been audited. Following the above information, the participants were provided a description of the pharmaceutical industry and the manner in which the industry information was gathered. The subjects were then given a description of the industry information that they were to receive. The information varied by treatment group. The industry median group was told how a median is calculated; the quartile group was told how a quartile is calculated; and the decile group was told how a decile is calculated. Following the above discussion, the subjects were asked to view five ratios and their related industry statistic(s) (one for the median group, three for the quartile group and nine for the decile group). They were then asked to estimate an upper and lower bound beyond which they would investigate. The upper and lower bound response has been used in previous analytical procedure studies, including Kinney and Uecker (1982), Biggs and Wild (1985) and Heintz and White (1989). Even though the upper and lower bound response is not common in auditing practice, SAS 56 suggests its potential use. The SAS states that when an auditor plans the analytical procedure to be employed, s/he should determine the acceptable range that would not warrant further investigation.

Ratios Selected for the Experiment

Based upon the findings of Holder (1983), Daroca and Holder (1985) and Ameen and Strawser (1994) with regard to the use and meaningfulness of ratios in an audit, five ratios were selected for use in this study. The ratios are presented in Table 1. The ratios reflect a cross section of four standard ratio classifications: liquidity, profitability, activity and stability.

TABLE 1
RATIOS SELECTED FOR THE EXPERIMENT

Ratio Name	Calculation
Current	Current Assets/Current Liabilities
Acid Test	Quick Assets/Current Liabilities
Gross Margin	Gross Margin/Net Sales
Inventory Turnover	Net Sales/Inventory
Debt to Total Assets	Total Liabilities/Total Assets

The information required to calculate the above ratios was obtained from DATEXT CD/Corporate. In order to be included in the database, a corporation must: (1) have filed a report (10-K, 20-F or Registration Statement) with the Securities and Exchange Commission during the last 18 months, (2) have, at a minimum, 500 shareholders and (3) have, at a minimum, $5 million in total assets.

The DATEXT CD/Corporate database was selected for the study because neither of the other external sources, Robert Morris Associates nor Dun and Bradstreet Credit Services, reported all of the ratios needed for the study. The use of information from DATEXT CD/Corporate should satisfy the "Availability and Reliability of Data" section of SAS 56, which attaches a higher level of reliability to data obtained from independent sources as opposed to sources within the entity.

The pharmaceutical preparations industry (SIC Code 2834) was selected because it had a large number of companies within one four-digit SIC code. A manufacturing industry was selected because the majority of auditors are familiar with the manufacturing sector.

The initial sample of companies extracted from DATEXT/CD Corporate included one hundred corporations in the pharmaceutical preparations industry. Two constraints were applied to the sample. The first was that the reported information had to fall within a one year time period. The second was that only medium-sized companies with total assets between $1 and $100 million would be selected. The constraints were invoked in order to control for time and company size. After the application of the constraints, the sample sizes fell into a range of forty-one to fifty-one, depending upon the ratio observed.

In order to study the reaction of auditors to a distribution that was not skewed, the industry information relating to the current ratio was transformed into a normal distribution. Thus, subjects viewed four skewed distributions and one normal distribution.

STATEMENT OF HYPOTHESES

The hypotheses proffered within this section may be classified into two subsections: auditor consensus and auditor decision behavior.

Auditor Consensus

The concept of auditor consensus has been examined by many accounting researchers. Consensus is deemed to be important to auditors because of the subjective nature of auditing. A high level of consensus among auditors indicates that auditors are making similar decisions under a constant information set. A high level of consensus does not indicate that the best decision has been made; however, in an experimental auditing situation, Ashton's (1985. p. 173) results indicated "a consistent, highly positive relationship between consensus and accuracy." If auditors are properly attending to the information provided in the three different experimental treatments, then one would expect the level of consensus to increase from the median experimental treatment to the quartile experimental treatment and to the decile experimental treatment for each ratio. Auditor consensus will be measured by the variance, a measure of within-group variability. Thus, the first set of hypotheses posited for the proposed experiment follow the general form of:

$$H_O: \text{VARIANCE}_t \mid r,b = \text{VARIANCE}_{t+1} \mid r,b$$
$$H_A: \text{VARIANCE}_t \mid r,b > \text{VARIANCE}_{t+1} \mid r,b$$

where r and b remain constant for each between-treatment comparison (t) and: r=ratio viewed (1=current, 2=acid test, 3=gross margin, 4=inventory turnover, and 5=debt to total assets), b=bound elicited (1=upper and 2=lower) and t=treatment assigned (1=median-only, 2=quartile and 3=decile).

From the above general format, twenty separate hypotheses will be generated. An example alternative hypothesis is:

$$H_A: \text{VARIANCE}_1 \mid 1,1 > \text{VARIANCE}_2 \mid 1,1$$

where: r=1 is the current ratio, b=1 is the estimated upper bound, t=1 is the median-only group and t=2 is the quartiles group.

Auditor Decision Behavior

As previously stated, the amount of distributional information for a particular ratio will vary among the three experimental groups. The quartile group receives less information than the decile group but more than the median-only group. Individuals in the decile group should have a better indication of the shape of the distribution than individuals in the quartile and median-only groups. To a lesser extent, individuals in the quartile group should also have a better basis for judging the distribution than individuals in the median-only group. If individuals in the median group are assuming a symmetric distribution or are applying a heuristic (ie. ten percent change rule), then their

responses to the upper- and lower-bound questions should differ from those of individuals in the other two groups. Individuals in the quartile group will have two additional industry distributional data points from which to make their upper- and lower-bound judgments. Armed with this information, the subjects should have an indication as to the direction of the skewness, and their responses should differ from those of the median group. Individuals in the decile group should be best able to approximate the shape of the industry distribution. The bounds selected by subjects in this group should closely reflect their preferences, since they are exposed to a relatively complete information set.

Based upon the above discussion, the following hypothesis is offered:

$$H_O: \text{Bound}_M \mid r,b = \text{Bound}_Q \mid r,b = \text{Bound}_D \mid r,b$$
$$H_A: \text{Bound}_M \mid r,b \ \ \text{Bound}_Q \mid r,b \ \ \text{Bound}_D \mid r,b$$

where r and b remain constant for each between-treatment comparison and: r=ratio viewed (1=current, 2=acid test, 3=gross margin, 4=inventory turnover, and 5=debt to total assets), b=bound elicited (1=upper and 2=lower), M=median-only group, Q=quartile group and D=decile group.

The above general hypothesis generates ten sub-hypotheses (one for each ratio and each bound). The above comparisons are necessary because it is important to determine the effect of increasing amounts of industry information.

RESULTS OF THE STUDY

The Subjects Participating in the Study

The subjects who participated in the study resided in one of two major metropolitan centers. The majority of the subjects worked for three of the Big Six accounting firms. One of the three Big Six firms was used in both of the metropolitan centers. The remainder of the subjects participating were employed by a large regional firm. However, the large regional firm was larger in terms of number of employees than two of the three Big Six firms.

In all circumstances, the offices desired to administer the experiment on their own. The method of administration either involved the experiment being completed at a firm training session or within the office. The firm administrator was told to instruct the subjects that they should work on their own, that their responses would remain anonymous and that their responses would not affect their job performance evaluations.

Fifty-seven of the returned packets were usable. The fifty-seven packets were equally distributed among the three treatment groups: median, quartile and decile. The educational background of the subjects was quite homogeneous. With the exception of three individuals, all possessed a bachelor's degree in business with accounting as their major. Forty-nine subjects were Certified Public Accountants. In terms of their position title, fifty were classified as audit seniors, two were classified as audit supervisors and five were classified as audit managers. The length of

an individual's audit experience ranged from one year and two months to nine years and four months. The average tenure was three years and ten months. The number of different audits completed by participants fell into one of five categories: nine had completed between ten and twenty audits, fourteen had completed between twenty and thirty audits, eighteen had completed between thirty and forty audits, three had completed between forty and fifty audits, and eleven had completed greater than fifty audits. The number of times that an individual had been responsible for planning an audit ranged from one to fifty, with the mean being 15.44 audits. In terms of experience in the industry used in the experiment, two had experience in the pharmaceutical industry. In terms of the level of confidence with their answers to the questions in the experiment, subjects reported a moderate level of confidence. The mean for all treatment groups was 3.65 on a seven-point Likert scale, with 1 representing extremely confident and 7 representing not confident at all. The standard deviation for all treatment groups was 1.19.

Tests of Hypothesis One

The first hypothesis addressed the issue of auditor consensus. It was hypothesized that the level of consensus would differ from the median experimental treatment to the quartile experimental treatment and to the decile experimental treatment for each ratio. Consensus was measured through the use of variance, whereby the lower the variance, the greater the consensus.

A variance was calculated for each ratio at the upper-bound level and the lower-bound level for each of the three treatment groups. The variances are presented in Table 2. An examination of Table 2 reveals that, generally, consensus did not increase from the median to the quartile to the decile group. On the whole, the group that received the median ratio information exhibited a higher level of consensus than either of the two other experimental groups. Three possible explanations to this unexpected finding exist. First, the subjects in the median treatment group may have employed some form of a heuristic. For instance, the subjects may have envisioned a similarly shaped distribution and set their upper and lower bounds based upon the perceived distribution. Second, the subjects in the quartile and decile information groups may have possessed varying levels of belief in the information they were presented. Thus, based upon their belief level, the subjects may have discounted or adjusted the information presented. This would be especially true if the participant expected a normal distribution and was presented a skewed distribution. In order to reconcile the incongruent information presented with his or her expectation of a normal distribution, the subject may have revised and/or ignored the data points supplied. Of the five ratios presented, one, the current ratio, was manipulated in order to emulate a normal distribution. This manipulation was performed in order to examine the manner in which a subject reacts to a symmetric distribution. When one examines the variances presented in Table 2 for the current ratio, the variances for the three treatment groups do not appear to differ substantially. This conclusion is supported when statistical tests are applied to the data. Third, the subjects in the decile category may have experienced information overload. The concept of information overload suggests that an increase in information may cause subjects' responses to increase in terms of variability. [Einhorn (1971), Payne (1976) and Casey (1980)]

TABLE 2
COMPARISON OF VARIANCES BY CELL

	Median Variance	Quartile Variance	Decile Variance
Quick Ratio - LB	0.116	0.375	0.100
Quick Ratio - UB	0.139	4.328	5.980
Current Ratio - LB	0.280	0.215	0.416
Current Ratio - UB	0.386	0.381	0.486
Inventory Turnover - LB	0.664	0.356	0.609
Inventory Turnover - UB	0.340	3.320	2.750
Debt/Total Assets - LB	18.401	122.251	27.450
Debt/Total Assets - UB	10.178	188.110	184.418
Gross Margin - LB	8.966	52.901	98.106
Gross Margin - UB	8.295	145.364	72.371

In order to test the hypothesis that the variances were equal for each of the three treatment groups for a particular ratio bound, both the Hartley test and Cochran test for testing several variances for homogeneity were employed. Since the distribution varied from ratio to ratio, bound to bound, and treatment to treatment, a need arose for both tests to be utilized. According to Sachs (1984), either the Hartley or Cochran test should be used when the data are normally distributed, slightly skewed, or more peaked than normal. In Table 3, the Hartley and Cochran test results are presented for the case where the variances of all three treatment groups are compared.

In applying both the Hartley and Cochran test for testing several variances for homogeneity, significance was found for all of the ratios with the exception of current ratio–upper-bound, current ratio–lower-bound and inventory turnover ratio–lower-bound. The lack of significance for the current ratio bounds may have resulted from the expectation of symmetry being met. That is, if the subjects expected the ratio information to be symmetrically distributed and the data conformed to that expectation, then a finding of no significance for either bound of the current ratio should not be surprising. In Table 4, the variances of the median group are compared to those of the quartile group. The results appear to confirm the conclusions drawn from the findings presented in Table 3. When the variances for the quartile and decile groups were tested for homogeneity, only the quick ratio--upper bound and the debt to total assets--lower bound were significant. Thus, as presented in Table 5, for the majority of ratios and bounds, the variances did not differ between the quartile and decile groups. In Table 5 the variances of the quartile group are compared to those of the decile group. In most cases the results of the Hartley test agree with those of the Cochran test.

TABLE 3
COMPARISON OF VARIANCES BY CELL - ALL TREATMENT GROUPS

	Cochran Statistic	Sign. Level	Hartley Statistic	Sign. Level
Quick Ratio - LB	0.638	0.010	3.896	0.050
Quick Ratio - UB	0.572	0.050	43.085	0.010
Current Ratio - LB	0.457	NS	1.934	NS
Current Ratio - UB	0.388	NS	1.278	NS
Inventory Turnover - LB	0.408	NS	1.867	NS
Inventory Turnover - UB	0.518	NS	9.755	0.010
Debt/Total Assets - LB	0.727	0.010	6.644	0.010
Debt/Total Assets - UB	0.482	NS	18.487	0.010
Gross Margin - LB	0.613	0.01	10.941	0.01
Gross Margin - UB	0.643	0.01	17.524	0.01

TABLE 4
COMPARISON OF MEDIAN TO QUARTILE VARIANCES USING THE COCHRAN AND HARTLEY TESTS

	Cochran Statistic	Sign. Level	Hartley Statistic	Sign. Level
Quick Ratio - LB	0.763	0.050	3.226	0.050
Quick Ratio - UB	0.969	0.010	31.187	0.010
Current Ratio - LB	0.565	NS	1.301	NS
Current Ratio - UB	0.504	NS	1.014	NS
Inventory Turnover - LB	0.651	NS	1.867	NS
Inventory Turnover - UB	0.907	0.010	9.755	0.010
Debt/Total Assets - LB	0.869	0.010	6.644	0.010
Debt/Total Assets - UB	0.948	0.010	18.487	0.010
Gross Margin - LB	0.855	0.010	5.890	0.010
Gross Margin - UB	0.946	0.010	17.524	0.010

TABLE 5
COMPARISON OF QUARTILE TO DECILE VARIANCES USING THE COCHRAN AND HARTLEY TESTS

	Cochran Statistic	Sign. Level	Hartley Statistic	Sign. Level
Quick Ratio - LB	0.796	0.010	3.896	0.050
Quick Ratio - UB	0.580	NS	1.382	NS
Current Ratio - LB	0.659	NS	1.934	NS
Current Ratio - UB	0.561	NS	1.278	NS
Inventory Turnover - LB	0.631	NS	1.713	NS
Inventory Turnover - UB	0.547	NS	1.207	NS
Debt/Total Assets - LB	0.816	0.010	4.454	0.010
Debt/Total Assets - UB	0.505	NS	1.020	NS
Gross Margin - LB	0.650	NS	1.854	NS
Gross Margin - UB	0.668	NS	2.009	NS

In summary, with variance serving as a surrogate for consensus, consensus was not found to increase from the median group to the quartile group to the decile group. In fact, consensus was found to be highest among the group that received the smallest amount of information, the median group. Two possible explanations for this phenomenon are that individuals in the median group may have employed some heuristic and/or individuals in the quartile and decile groups may have possessed differing levels of belief in the information presented to them. When the Hartley and Cochran tests were employed to test the equality of variances for each treatment and each ratio, it was found that for the majority of comparisons in which the median group was compared to either the quartile or decile group, the variances were not equal. When the tests were applied to comparisons of the quartile and decile groups, in the majority of the cases, the variances were found to be equal. Thus, if consensus is truly a surrogate for accuracy, it does not appear that auditor decision-making accuracy is enhanced by increasing the amount of industry distributional information.

Tests of Hypothesis Two

The second hypothesis addressed the question of auditor decision behavior. Since the amount of distributional information for a ratio varied among the three experimental groups, the upper and lower bounds set by individuals in the median group should differ from those set by individuals in the quartile group, which in turn, should vary from those set by individuals in the decile group. As individuals are exposed to greater amounts of distributional information, their bounds of investigation should change.

The general null hypothesis, that the bound for a particular ratio will not differ among two treatment groups, generated thirty sub-hypotheses. Ten comparisons each were made between the median and quartile groups, between the median and decile groups, and between the quartile and decile groups. In order to test each hypothesis, the Kruskal-Wallis One-Way Analysis of Variance by Ranks was used. The results of the Kruskal-Wallis analysis are found in Table 6. When the Kruskal-Wallis One-Way Analysis of Variance by Ranks was performed in order to determine if the responses to a ratio at a certain bound came from different populations, the statistics revealed that for all ratios at all bounds, with the exception of the upper bound of the current ratio, the responses did differ. As presented in Table 7, when a multiple comparison between treatments was performed, the finding was that in every ratio response situation, when the quartile group was compared to the decile group, no difference was found. Thus, not only are the variances of the two groups similar, but the responses made by the subjects also seem to come from the same population. In the cases where the median group was compared to the decile group, no group difference on the current ratio upper bound was found for both comparisons. In addition, no difference between the median and quartile groups was found for the debt to total assets ratio.

TABLE 6
COMPARISON AMONG TREATMENTS
USING THE KRUSKAL-WALLIS STATISTIC

	Kruskal-Wallis Statistic	Probability Greater Than
Quick Ratio - LB	8.83	0.00121
Quick Ratio - UB	16.28	0.00030
Current Ratio - LB	8.40	0.01500
Current Ratio - UB	1.56	0.45740
Inventory Turnover - LB	14.13	0.00090
Inventory Turnover - UB	15.27	0.00050
Debt/Total Assets - LB	28.21	0.00010
Debt/Total Assets - UB	6.39	0.04100
Gross Margin - LB	21.38	0.00010
Gross Margin - UB	15.00	0.00060

TABLE 7
MULTIPLE COMPARISONS BETWEEN TREATMENTS
USING THE KRUSKAL-WALLIS
ONE-WAY ANALYSIS OF VARIANCE BY RANKS

	Median to Quartile	Median to Decile	Quartile to Decile
Quick Ratio - LB	10%	5%	NS
Quick Ratio - UB	5%	5%	NS
Current Ratio - LB	5%	5%	NS
Current Ratio - UB	NS	NS	NS
Inventory Turnover - LB	5%	5%	NS
Inventory Turnover - UB	5%	5%	NS
Debt/Total Assets - LB	5%	5%	NS
Debt/Total Assets - UB	NS	5%	NS
Gross Margin - LB	5%	5%	NS
Gross Margin - UB	10%	5%	NS

A possible explanation as to why the median treatment group differed from the quartile and decile treatment groups is that, in many cases, the individuals in the median group selected upper and lower bounds that were closer to the median supplied in the instrument than did individuals in the other two groups. Since the individuals in the median group were not cognizant of a ratio's range, they tended to respond in a conservative manner. An examination of subjects' responses reveals that the majority of responses to the upper-bound question for individuals in the median group typically fell no higher than the 58th percentile. In contrast, the responses of individuals in the quartile and decile groups extended to higher percentiles. An examination of the lower bound of investigation reveals a similar finding. The majority of responses for individuals in the median group typically fell no lower than the 44th percentile. Once again, the responses of individuals in the quartile and decile groups extended to lower percentiles. Thus, in the planning stages of an audit, if an auditor sets his or her lower and upper bounds of investigation at the 44th and 58th percentiles, respectively, then the probability that additional audit work will have to be performed is quite high. The performance of additional audit procedures will cause over-auditing to occur.

CONCLUSION

In summary, auditors seemed to be responsive to the varying informational content of industry distributional parameters only when the median group was compared to either the quartile or decile groups. When responses from the quartile group were compared to responses from the decile group, auditors did not seem to be responsive to the additional information provided. This finding implies that an auditor may derive adequate information from simply viewing quartile information, which is readily available in most libraries. The more costly information, in terms of time and money,

needed to construct the deciles may not be necessary. In addition, auditors may find that the decile information is too detailed for use in the planning stages of an audit. The quartile data may provide sufficient information for the types of decisions auditors must make.

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