ACADEMY OF ACCOUNTING AND FINANCIAL STUDIES JOURNAL

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LETTER FROM THE EDITORS

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As editors, we intend to foster a supportive, mentoring effort on the part of the referees which will result in encouraging and supporting writers. We welcome different viewpoints because in differences we find learning; in differences we develop understanding; in differences we gain knowledge and in differences we develop the discipline into a more comprehensive, less esoteric, and dynamic metier.

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ARTICLES

AN EXPERIMENTAL TEST OF THE RELATION BETWEEN AUDIT STRUCTURE AND AUDIT EFFECTIVENESS

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ABSTRACT

For many firms, the audit process became increasingly structured during the 1970s and 1980s. Dirsmith and McAllister [1982] view this increased structure as a defense against the threat of lawsuits and growing competition in the auditing profession. Cushing and Loebbecke [1986] express concern that extensive use of a structured audit process may cause auditors to become mechanistic in their thinking. They indicate that a structured audit approach may be designed to anticipate specific features of the typical audit environment to such a degree that it cannot be applied easily to atypical audit environments.

In this research it is hypothesized that, auditors from a structured firm may demonstrate higher audit effectiveness when performing a task in a "typical" audit situation than auditors from an unstructured firm. On the other hand, in "atypical" audit situations it is hypothesized that auditors from an unstructured firm may demonstrate higher audit effectiveness after controlling for level of experience.

The experiment used auditors from two Big Six accounting firms: a structured firm and an unstructured firm. The results indicate that in this atypical audit situation experienced auditors from unstructured firms perform significantly better than experienced auditors from structured firms. There were no differences in the typical audit situation.

INTRODUCTION

For many firms, the audit process became increasingly structured during the 1970s and 1980s. Dirsmith and McAllister [1982] view this increased structure as a defense against the threat of lawsuits, growing competition in the auditing profession, and high staff turnover. Structured decision aids, as a factor in a more structured audit approach, are designed to focus the auditor on relevant information to improve effectiveness, and to improve audit efficiency by eliminating the time needed to develop or organize individual approaches to the audit problems. Supporting the efficiency hypothesis, Gist [1994] showed that audit pricing by firms with a structured audit approach is lower, on average, than firms with an intermediate or unstructured audit approach.

Cushing and Loebbecke [1986, 43] express concern that extensive use of a structured audit process "... may cause the auditor to become mechanistic in his thinking, which could cause the auditor to fail to observe important facts, or to fail to reason through to appropriate

judgments and conclusions." They indicate that a structured audit approach may be designed to anticipate specific features of the typical audit environment to such a degree that it cannot be applied easily to atypical audit environments, such as those involving management fraud or bankruptcy. Sullivan [1984] suggests that structured audits may be ineffective because the auditors may disregard qualitative evidence.

Practitioners have also expressed concern about the effects of audit process structure on audit effectiveness. According to two Big Six partners, their firms have set up task forces to investigate the effects of audit process structure on their firm and staff. Understanding the relation between audit process structure and audit effectiveness is important not only to ensure quality decisions by the auditor but also to ensure proper training of auditors.

STRUCTURE AND AUDIT EFFECTIVENESS

Structured decision aids, structured manuals, and standardized training, as factors in a more structured audit process, are designed to focus the auditor on relevant information to improve effectiveness (i.e., impose a structure). Many firms developed models to ensure that all important variables are evaluated in the audit judgment process and are combined to lead to consistent decision-making (Cushing and Loebbecke 1986).

McDaniel [1990] examined the effect of audit program structure and performance. Based on the assumption that structured decision aids are designed to focus the decision maker on relevant information and that irrelevant information that impairs performance should receive little attention, she found that audit program structure increases audit effectiveness.

Bonner [1990] compared experienced auditors' performance across two firms.[1] She observed that experienced auditors from a firm with some structured guidance performed significantly better than experienced auditors without structured guidance in an analytical risk task. She concluded that her results were consistent with the idea that structured training and experience in a task creates task-specific knowledge of relevant cues which can aid in cue selection.

The tasks used by McDaniel [1990] and Bonner [1990] appear to represent "typical" audit situations. McDaniel's task required the subjects to locate errors (mainly booking errors) in an inventory listing. Subjects in Bonner were asked to assess the *relevancy of cues* in determining control risk and analytical risk, but not to actually assess such risks.

Based on the above research, it is hypothesized that when performing a task in a "typical" audit situation, auditors from a structured audit firm will demonstrate higher audit effectiveness as compared with auditors from an unstructured firm. It is also expected that inexperienced auditors from a structured firm will demonstrate higher audit effectiveness in the typical audit situation than inexperienced auditors from an unstructured firm. In this research, as in Bonner [1990], an "inexperienced" auditor is one who has enough experience in a particular task to possess some knowledge of the task. They have acquired this knowledge while attending staff training seminars and working on audits. Hence, it is also likely that the "inexperienced" auditor's knowledge will also be affected by the amount of audit structure. These expectations are captured in the following hypotheses:

Hypothesis 1A:	**Experienced auditors who have structured audit process experience will demonstrate higher audit effectiveness in a typical situation than experienced auditors who have unstructured audit process experience.**
Hypothesis 1B:	**Inexperienced auditors who have structured audit process experience will demonstrate higher audit effectiveness in a typical audit situation than inexperienced auditors who have unstructured audit process experience.**

Cushing and Loebbecke [1986] suggest that unstructured firms tend to use less structured guidance and leave more judgment to the field auditor.[2] Auditors in an unstructured audit firm tend to deal with problems on a case-by-case basis and are encouraged to deal with unanticipated financial reporting problems where the need for individual judgments is emphasized (Kinney 1986, Williams and Dirsmith 1988). In unstructured firms, many of the decisions made in the audit are "pushed-down" to the individual auditor at an earlier stage of development than in the structured firm. More of the audit process in an unstructured audit firm can be considered to be auditor-generated than in a structured firm. According to Craik and Lockhart [1972], self-generated hypotheses involve a deeper level of processing. "At deeper levels the subject can make more use of learned cognitive structures so that the item will become more complex" (Craik and Lockhart 1972, 679).

Waller and Felix [1984] propose that an auditor has a number of knowledge structures, where one or more knowledge structures might be applicable for "normal" audits, while alternate knowledge structures might be applicable for "problem" audits (e.g., those in which there is potential for auditability problems, management fraud or bankruptcy). If auditors in an unstructured audit firm process information at a deeper level, then they may develop richer knowledge structures earlier for "problem" audits as well as "normal" audits.[3] An auditor from a less structured firm is encouraged to modify a sample audit program as necessary under differing circumstances. The auditor would use his or her judgment to modify the audit program (i.e., add or delete steps in the audit program). According to McDaniel [1990], "auditors in the unstructured group were more likely to consider the program integratively and budget their time across all procedures and reduced testing in a few or all areas rather than elimination of an entire procedure or objective."

Since the auditors from the unstructured firm are aware that they will be modifying the audit program steps throughout the audit and will be required to use judgment for other procedures during the audit, they may develop a deeper understanding of the relationships within and between the audit program steps, the evidence gathered from other tests, and potential errors in the financial statements. This deeper understanding should modify the auditor's knowledge structures. If auditors discover discrepancies or inconsistencies, they may either attempt to resolve the issue or may ask for supervisory assistance. In either case, the discovery and resolution of the issue should enhance their knowledge structures.

Auditors in a structured audit firm, on the other hand, deal with audit situations by relying on predetermined audit programs and analytical models. For example, auditors from the structured audit firm follow a preprinted audit program to perform substantive audit

procedures. The auditors are not required (nor encouraged, unless problems arise) to modify the audit program. The auditors perform the stated steps to obtain the information needed to perform the task assigned.[4] Therefore, the auditors are less likely to be involved in the deeper level of cognitive processing while following the steps in an audit program. In using structured aids, the auditors' cognitive processes may be driven by standardized questionnaires or matrices rather than developing their own knowledge structures. McDaniel's [1990] results support this contention in that while performing the task under time pressure, nine auditors in the structured group eliminated an audit procedure entirely and seven of the nine eliminated the procedure that appeared last in the program instead of systematically reducing testing.[5]

In interpreting McDaniel's [1990] results, Gist [1994] suggests that effectiveness may suffer because the auditor ignores relevant considerations that are not in the audit program. It is hypothesized that experienced auditors who have received their experience from an unstructured firm likely will demonstrate higher audit effectiveness than experienced auditors from a structured audit firm in atypical situations.

Hypothesis 2A: Experienced auditors who have unstructured audit process experience will demonstrate higher audit effectiveness in an atypical audit situation than experienced auditors who have structured audit process experience.

Even though an "inexperienced" auditor has some experience, it is likely that an "inexperienced" auditor from either firm has insufficient experience to develop knowledge structures of "problem" audits such as audits involving management fraud, bankruptcy, and going-concern (Choo and Trotman 1991). Therefore, a difference in performance in the atypical case is not expected.

Hypothesis 2B: Inexperienced auditors who have unstructured audit process experience will not demonstrate significant differences in audit effectiveness in an atypical audit situation as inexperienced auditors who have structured audit process experience.

EXPERIMENTAL DESIGN

An experiment was conducted using auditors from two Big Six accounting firms:[6] one firm from the structured end of Cushing and Loebbecke's scale [1986], and one from the unstructured end.[7] The independent variables are two types of audit firm experience (structured and unstructured), two types of audit situations (typical and atypical), and two experience levels (inexperienced and experienced). The dependent variable is auditor effectiveness in performing the audit task. The typical case contained three "typical" errors (a credit memo not recorded, a credit memo not issued by year end, and the duplicate recording of a sale) and the atypical case contained an additional three "atypical" errors (fraudulent sales).

The dependent variable, effectiveness score, was computed as follows:

$$\text{Effectiveness score for the typical case} = \frac{\text{identified typical errors - incorrect items}}{3}$$

$$\text{Effectiveness score for the atypical case} = \frac{\text{identified typical errors + atypical errors - incorrect items}}{6}$$ [8]

Each firm provided subjects from six offices. Each office was sent ten cases (five atypical cases and five typical cases). The subjects were not randomly selected, however, the selected subjects were randomly assigned to a case. A partner in each office was asked to choose five "experienced" subjects, auditors who, in their opinion, perform at the "expert" level in an accounts receivable task. They were also asked to choose five "inexperienced" subjects auditors who have enough experience in the particular task to possess some knowledge of the task.[9]

Eighty-two of the 120 cases were useable.[10] The final subject pool consisted of 42 inexperienced auditors (24 from an unstructured firm and 18 from a structured firm) and 40 experienced auditors (21 from an unstructured firm and 19 from a structured firm). Across firms, inexperienced auditors had an average of 14.3 months of audit experience and experienced auditors 43.7 months. Based on t-tests, there are no significant differences of experience between firms within experience level. These results are described in Table 1.

The experiment employed a case with two versions involving a partial audit of accounts receivable and sales accounts. One version, representing the "typical" audit situation, included information regarding accounts receivable and sales that contained "normal" errors (e.g., a credit memo not issued by year-end). The second version, representing the "atypical" audit situation, was identical to the typical case, except for the additional inclusion of fraudulent sales in the year under audit and reversal of the fraudulent sales in the first quarter of the subsequent year. The fraudulent sales were reflected in the client's financial information and returned accounts receivable confirmations. Each participant was asked to assume that they were working on the current year's revenue cycle audit work for an existing audit client. The case materials included instructions, client background information, client-prepared information (e.g., accounts receivable aging schedule, accounts receivable balance and sales for 5 years), audit workpapers (e.g., audit program, control worksheet of accounts selected for positive confirmation, returned confirmations with exceptions), and additional information (e.g., documentation for accounts confirmed with exception, quarterly and monthly sales).[11]

The participants were asked to indicate on the workpapers in red pencil any errors and/or unusual items that they were not able to clear with the given information. The errors indicated in the workpapers were used to assess audit effectiveness. The participants were also asked to complete a computerized questionnaire designed to assess the subject's judgment of the likelihood of fraud in their particular case.[12] Since the experimenter was not present at the experiment, a computerized questionnaire containing controls was used to prevent the subjects

from changing their previous responses. It took the participants an average of 78 minutes to complete the case.

RESULTS

Hypothesis 1A predicted that experienced auditors from a structured firm will be more effective in a typical audit situation than experienced auditors from an unstructured firm. To test this hypothesis, the unstructured firm's twelve experienced auditors' effectiveness scores were compared to the structured firm's ten experienced auditors' scores in the typical case using either Mann-Whitney-Wilcoxon (MWW)[13] and approximate randomization procedures[14]. There was no significant difference between the experienced auditors from the two firms on the typical case using the MWW Procedure or approximate randomization procedures. These results are described in Table 2. The nonsignificant results of testing Hypothesis 1A may indicate that experienced auditors from both firms possessed enough expertise to perform well in the typical case.

Hypothesis 1B predicted that inexperienced auditors from a structured firm will demonstrate higher audit effectiveness in a typical audit situation than inexperienced auditors from an unstructured firm. The effectiveness scores of the unstructured firm's eleven inexperienced auditors were compared to the structured firm's seven inexperienced auditors on typical case. Differences were significant (p=.026) using the MWW Procedure, as shown in Table 2. This is supported with results from the approximate randomization technique (p=.041). The median effectiveness score of 0.6667 for the inexperienced auditors from the structured firm suggests that they may gain expertise quicker than the inexperienced auditors from the unstructured firm.

Hypothesis 2A predicted that in an atypical situation experienced auditors from an unstructured firm would demonstrate higher audit effectiveness than experienced auditors from a structured firm. To test this hypothesis, the unstructured firm's nine experienced auditors' effectiveness scores were compared to the structured firm's nine experienced auditors' scores on the atypical case using the MWW Procedure and approximate randomization procedures. As shown in Table 2, the effectiveness scores of the unstructured firm's experienced auditors were found to be significantly higher than the structured firm's experienced auditors' scores as predicted (p=.053 using the MWW Procedure and p=.056 using approximate randomization). The median effectiveness score of 0.8333 for the experienced auditors from the unstructured firm in the atypical audit situation support the argument that they have deeper thought structures than the experienced auditors from the structured firm.

Hypothesis 2B predicted that inexperienced auditors from both firms will demonstrate similar audit effectiveness in an atypical audit situation. The effectiveness scores of the unstructured firm thirteen inexperienced auditors were compared to the structured firm's eleven inexperienced auditors on atypical case. As predicted the effectiveness scores did not significantly differ with either test (see Table 2).

There are limitations concerning the firms, the use of cases and the administration of the experiment. First, only two firms were studied, therefore different firms might produce

different results. Use of cases abstracts real-world audits and thus limits external validity. To help mitigate this concern, the cases were developed with the assistance of managers from both firms participating in the study and comments from the pilot study were incorporated into the final cases. The subjects performed the experiment independently rather than as a part of an audit team. Since the time and setting when the research instruments were completed was not under the researcher's control there is the potential problem of collaboration between subjects. There is no evidence to indicate that collaboration occurred.

CONCLUSIONS

The results suggest that in this atypical audit situation the experienced auditors from unstructured firms perform significantly better than experienced auditors from structured firms. This evidence supports the contention that auditors from the unstructured firm may develop deeper thought processes. The results are consistent with Cushing and Loebbecke's [1986] concern that the structured audit environment may be designed to anticipate specific features of the typical audit environment to such a degree that it cannot be easily applied to atypical environments.

Firms are, of course, very concerned with audit effectiveness. Discussions with partners indicate that two Big Six accounting firms have set up task forces to investigate the effect of the use of a structured audit technology. The results of this study may provide some support for the hypothesis that too much structure in the audit process may lead to lower audit effectiveness for certain tasks. For some audit areas, the firms may want to continue considering becoming less structured and/or develop training programs and procedures to ensure that auditors have compensating learning experiences. Training programs could emphasize the importance of understanding the audit procedures and how they relate to recognizing potential problems.

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Table 1: Subjects' Experience Level by Firm by Case					
	Atypical Case		Typical Case		
	Unstructured Firm	Structured Firm	Unstructured Firm	Structured Firm	All Subjects
Inexperienced Number of Subjects	13	11	11	7	42
Audit Months Mean Median	14.6 13.0	14.5 16.0	13.6 13.0	16.2 14.0	
Number of Audits Mean Median	10.3 10.0	9.2 10.0	9.2 10.0	14.3 15.0	
Experienced Number of Subjects	9	9	12	10	40
Audit Months Mean Median	46.0 49.0	40.4 34.0	47.5 47.5	39.4 38.0	
Number of Audits Mean Median	25.3 25.0	22.3 19.0	31.3 25.0	25.1 22.0	
All Subjects	22	20	23	17	82

Table 2: Audit Effectiveness Scores				
	Unstructured Firm	Structured Firm	Mann-Whitney-Wilcoxon P-value	Approximate Randomization P(Ran)
Typical Case Experienced (H1A) Inexperienced (H1B)	0.1667 0.3333	0.3333 0.6667	0.237 0.026	0.265 0.041
Atypical Case Experienced (H1A) Inexperienced (H1B)	0.8333 0.4167	0.5000 0.6667	0.054 0.348	0.056 0.363

ENDNOTES

1. The two firms used in Bonner (1990) experiments were both in the medium range on the dimension of firm structure as categorized by Kinney (1986). They were chosen to be similar on that dimension so that firm structure could not account for any firm differences in results.

2. Unstructured firms emphasize pre-engagement planning and the use of detailed internal control questionnaires, but the remainder of the audit process is not described in a detailed, integrated, quantitative manner.

3. In the context of this research, the "problem" audit situation is the "atypical" audit situation.

4. Biggs et al. (1988) found that the seniors' acquisition of information concerned obtaining the information needed to perform the task assigned, whereas the managers gathered information to understand the client and the its business problems.

5. Mock and Wright's (1993) data also supports this result.

6. Confidentiality assurances given to offices participating in the current study preclude identification of firms by name.

7. A limitation in this experiment is that the firms may have become more or less structured since the time of Cushing and Loebbecke's classification. Discussions with managers, managing office partners, and partners at the national office of both firms participating in the study indicated at the time of the experiment their firm could still be considered "structured" or "unstructured" in accordance with Cushing and Loebbecke's classification. The Cushing-Loebbecke measures were based on reviews of firm audit manuals and related documents, and discussions with "key informants."

8. Including the number of incorrectly identified items in the effectiveness score is supported by Bedard and Chi (1993) and Bonner (1994, 220), "Using proper strategies encompasses using relevant cues and not using irrelevant cues." Results based on an effectiveness score without the number of incorrectly identified items were similar.

9. Ideally, one should use the achieved level of task-specific knowledge and ability as a measure of expertise (Bonner and Pennington 1991). Measuring task-specific knowledge and ability, however, is difficult and thus recommendations from partners were used as a surrogate for experience in this research.

10. Twenty-four of the cases were not returned by the offices (ten were from one office that decided not to participate), ten were incorrectly performed (one office manager copied the cases and had their participants complete both cases),and four of the returned disks were unreadable.

11. A pilot study was performed to assess whether (1) the experimental materials were sufficient to guide auditors to achieve the stated objectives, (2) that the task could be completed in a reasonable time period, and (3) that the planned experience level of the auditors was appropriate for the given task. Minor changes were made in the instructions and the case and additional client information was added as a result of the pilot test.

12. To test the validity of the fraud manipulation, responses to the following question were analyzed, "What is your estimate of the probability of the existence of material management fraud in this case?" The median response was 30% in the atypical case, which contained fraudulent sales, and 20% in the typical case. The Mann-Whitney-Wilcoxon Procedure was performed to compare the estimated probability of fraud across the cases. Overall, the results are significant at the .10 level (p=.092). Subjects seemed to differentiate the two experimental conditions.

13. The Mann-Whitney-Wilcoxon Procedure was used to test the hypotheses. The MWW Procedure is a nonparametric test for two independent samples that tests the difference between the medians of two groups (Gibbons 1985). Given that the data are independent auditor judgments where normality should not be assumed, the usage of MWW seemed appropriate.

14. In addition, an approximate randomization procedure was performed for each hypothesis to support the results from the MWW Procedure. The advantage of approximate randomization is that the difference of ranks of the medians is not ignored as in the MWW Procedure. It is also useful in situations when there are small sample sizes and a possible violation of the normality distribution assumption, even when the observations are not a random sample drawn from the population (Noreen 1989). The test statistic of approximate randomization is based on the actual distribution of all the data. The approximate randomization procedure involves randomly shuffling one variable relative to another variable. The test statistic (median) for the shuffled data were compared to the original test statistic (the median of the unshuffled data). The significance level of the median is determined to be: (NGE + 1)/(NS + 1), where NGE is the number of coefficients greater than or equal to the nonrandom estimate of the coefficient, and NS is the number of random shuffles of the observations. If the variables are related, then the value of the test statistic for the original data should be unusual relative to the values of the test statistic that is obtained after shuffling.

THE ASSOCIATION OF CASH FLOW COMPONENTS WITH CORPORATE BOND RETURNS

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ABSTRACT

Statement of Financial Accounting Standard No. 95 requires United States corporations to present a statement of cash flows for fiscal years ending after July 15, 1988 (Financial Accounting Standards Board, 1987). This paper focuses on the usefulness of statement of cash flow information to corporate bondholders. Empirical results are consistent with corporate bondholders pricing net cash flow from operating activities and total accruals. In contrast, no association is reported between corporate bond returns and net cash flow from investing activities nor net cash flow from financing activities.

INTRODUCTION

The Financial Accounting Standards Board (FASB) has identified investors and creditors as the primary users of corporate financial reporting information; financial reporting should provide information to help investors and creditors assess the amount, timing, and uncertainty of future cash flows (FASB, 1978). The magnitude of the corporate debt market relative to the corporate equity market reinforces the prominence of corporate bondholders as a significant user of financial reporting information. In 1992, for example, new issues of corporate bonds amounted to $471.1 billion compared with new issues of equity securities (common and preferred) of only $78.5 billion. Accounting research on the effects of accounting earnings and other accounting phenomena on security prices has focused predominantly on corporate equity securities, though. Relatively few studies have examined the association between accounting signals and corporate bond returns (Reiter, 1990). Both Reiter (1990) and Jin (1992) have emphasized the need for additional accounting research using data from the corporate bond market.

Information on cash flows is one area of financial reporting that may be particularly important to creditors as they evaluate default risk, i.e., the probability that future cash flows generated by the debtor will not provide for the timely payment of principal and interest. This appears to be one motive for the increased worldwide emphasis on cash flow reporting as reflected by recently issued standards in New Zealand (New Zealand Society of Accountants, 1987), South Africa (South African Institute of Chartered Accountants, 1988), the United Kingdom (Accounting Standards Board, 1991), Australia (Australian Accounting Research Foundation, 1991), and Hong Kong (Hong Kong Society of Accountants, 1992). In the United States, Statement of Financial Accounting Standard (SFAS) No. 95 requires business

enterprises to present a statement of cash flows for fiscal years ending after 15 July 1988 (FASB, 1987). As discussed later, SFAS No. 95 implies that the statement of cash flows provides useful information to corporate bondholders for default risk assessment.

The purpose of this paper is to examine whether cash flow components, as defined by SFAS No. 95, are associated with holding period returns on a sample of seasoned corporate bonds. Empirical evidence of association between holding period returns on corporate bonds and total accrual and/or cash flow components would be consistent with bondholders' use of total accruals and/or cash flow components to assess default risk of corporate bonds.

The remainder of this paper is organized as follows. Section two reviews empirical bond and stock market research related to this study. Section three states the research hypotheses addressed by this paper. Section four discusses the research methodology utilized, and section five presents empirical results. A summary and recommendations for future research are presented in section six.

LITERATURE REVIEW

A substantial body of accounting research has examined the usefulness of earnings and earnings components to corporate stockholders (Lev and Ohlson, 1982; Bernard, 1989; Neill et al., 1991). In contrast, relatively little empirical research has been conducted on the usefulness of earnings, earnings components, or cash flow components to corporate bondholders. The relative nonavailability of bond return data, alleged inefficiency in the corporate bond market, and shortcomings of the market model as an adequate representation of the bond return generating process are factors which may explain this lack of empirical evidence.

The usefulness of funds flow information has been examined in two contexts where default risk of corporate bonds was the underlying construct of interest: 1. bankruptcy prediction (Gentry et al., 1985a, 1985b; Casey and Bartczak, 1985; Aziz and Lawson, 1989), and 2. bond rating prediction (Gentry et al., 1988; Ketz and Maher, 1990). The empirical evidence linking funds flow components to default risk is mixed, however. In general, this research has failed to consistently demonstrate that funds flow information has incremental information content relative to accounting earnings in this context.

The association of cash flow components with stock returns has been examined by Livnat and Zarowin (1990). They examined the incremental information content of three major cash flow components prescribed by SFAS No. 95 (FASB, 1987), and subcomponents thereof. With respect to net cash flow from operating activities (NCFO), their results supported results from Bernard and Stober (1989): disaggregation of net income into NCFO and total accruals did not provide incremental information content relative to disclosure of their arithmetic sum. Further disaggregation of NCFO into five subcomponents yielded a significant increase in explanatory power, though. These results supported the inference that two or more of the subcomponents of NCFO were incrementally useful, conditioned on net income. With respect to financing and investing cash flows, Livnat and Zarowin (1990) reported that disaggregation of net cash flow from financing activities (NCFF) improved the

association with stock returns, while disaggregation of net cash flow from investing activities (NCFI) yielded no improvement.

Equity market studies have traditionally related stock returns to unexpected accounting signals to infer information content. Positive associations between unexpected accounting signals and excess stock returns provide the basis to infer that the accounting signal reflects value relevant information to stockholders. Corporate bondholders are similarly interested in the success of their investment as reflected in total return.

Rather than focus on bankruptcy prediction or bond rating prediction as done in previous corporate bond market research, the approach used in this study was to measure the usefulness of accounting signals to corporate bondholders by relating unexpected accounting signals directly to corporate bond returns. Bankruptcy and bond ratings are imperfect measures of default risk. Bankruptcy is a dichotomous measure, and bond ratings are polychotomous measures of an underlying construct that is continuous. Burgstahler et al. (1989) noted this measurement problem in their study that related changes in default risk to equity returns. Bahnson and Bartley (1992) reported that relative predictive ability of cash flow measures increased as the definition of failure was broadened along a continuum from bankruptcy to technical default.

This paper relates changes in default risk, as reflected in holding period returns on corporate bonds, to unexpected accounting signals in an effort to reduce measurement error in default risk. Annual holding period returns on a sample of corporate bonds were regressed on the three major cash flow components identified by SFAS 95, NCFO, NCFI, and NCFF, along with total accruals. The definitions for the cash flow components and total accruals are included in the Appendix, and follow the definitions used by Livnat and Zarowin (1990).

HYPOTHESES

Motivated by the increased worldwide emphasis in cash flow reporting in general, and the FASB's increased emphasis on solvency reporting in particular, this paper tested several hypotheses designed to provide evidence of the usefulness of cash flow reporting to corporate bondholders. In SFAS No. 95 the FASB argued that the statement of cash flows should provide useful information to creditors for default risk assessment (FASB, 1987, p. 2).

The information provided in a statement of cash flows, if used with related disclosures and information in the other financial statements, should help investors, *creditors,* and others to (a) assess the enterprise's ability to generate positive future net cash flows; (b) *assess the enterprise's ability to meet its obligations,* its ability to pay dividends, and its need for external financing...(emphasis added). This assertion is empirically tested with the following hypotheses:

H1: Aggregate NCFO has incremental information content to corporate bondholders conditioned on total accruals, aggregate NCFI, and aggregate NCFF.

H2: **Total accruals has incremental information content to corporate bondholders conditioned on aggregate NCFO, NCFI, and NCFF.**

H3: **Aggregate NCFI has incremental information content to corporate bondholders conditioned on total accruals, aggregate NCFO, and aggregate NCFF.**

H4: **Aggregate NCFF has incremental information content to corporate bondholders conditioned on total accruals, aggregate NCFO, and aggregate NCFI.**

The hypotheses require that each accounting signal being tested must attain incremental information content after controlling for the effects of the remaining three accounting variables.

METHOD

Hypotheses were tested with a pooled, cross-sectional ordinary least squares regression model estimated for a sample of seasoned corporate bond issues. The dependent variable in the regression model was annual holding period bond returns. The independent experimental variables were first-differenced accounting signals, deflated to mitigate potential problems resulting from heteroskedasticity of error terms; additional independent variables were included to control for sources of variance in holding period bond returns unrelated to the test variables.

Published bond issue information was collected manually from *Moody's Bond Record* for industrial firms. Bonds issued by governmental entities, utilities, and financial institutions were excluded. If information was available on more than one bond issue per firm, the bond issue with the greatest market value of debt outstanding was included based on the premise that bond issues with greater amounts outstanding would be more liquid, and more likely to reflect publicly available information. To ensure uniformity in the disclosure of accounting data, only firms with December 31 fiscal year ends were included. Firms with insufficient financial data available on Compustat PC Plus to estimate the experimental variables were omitted. The final sample included 454 bond returns for the five year period 1986-90. Approximately 73 percent of sample bonds were investment-grade, 24 percent were below-investment-grade, and 3 percent were not rated. Forty percent of sample bond issues were listed on the New York or American exchange, with the remainder unlisted.

Table 1 presents descriptive statistics for selected financial items, namely total assets, total long-term debt, and total liabilities and for selected attributes of the bond issues, namely coupon rate, yield-to-maturity, maturity year, and market value of debt outstanding per bond issue. Mean total assets, mean total debt, and mean total liabilities (in millions) for all firms covered by Compustat and included in the complete database of bond returns were $4,721.95, $1,443.79, and $3,318.29, respectively. Sample firms tended to be larger as measured by total assets, total long-term debt, and total liabilities.

Table 1
Descriptive Statistics for Selected Quantitative Sample Attributes (n=454)

Item	Mean	Std Dev	Minimum	Maximum
Financial (Mil. $):				
Assets-total	7,631.36	15,610.21	58.17	173,297.00
Debt-total	2,707.19	8,293.36	15.46	97,111.00
Liab.-total	5,607.57	13,342.11	46.31	148,082.25
Bond Issue:				
Coupon rate (%)	9.70	2.10	4.60	17.30
YTM (%)	10.45	1.75	6.21	19.67
Maturity year	2000.44	7.84	1988.00	2019.00
Market value out (Mil. $)	164.64	191.26	2.80	1,299.00

The dependent variable used was annual holding period returns, calculated as end of the year price minus beginning of the year price plus the annual coupon rate divided by beginning of the year price plus accrued interest. Annual holding period bond returns were measured from January 1 through December 31. To allow for delayed release of financial statements, annual holding period returns were also calculated for an alternative return window, April 1 through March 31.Accounting signals are most likely to reflect information useful for assessment of firm-specific default risk. Extraneous sources of variance in annual holding period bond returns could reduce the power of the hypotheses tests. Empirically, holding period bond returns were regressed on the experimental accounting variables conditioned on several control variables referred to collectively as the control model.

An extensive review of the financial economics literature was done to identify variables for inclusion in the control model. The bond return generating process tested by Weinstein (1983) served as the foundation for this control model; Weinstein posited a general model that allowed for nonstationarity of bond beta, and provided a role for additional factors beyond the market index. Based on predictions from option pricing theory, Weinstein hypothesized that bond betas were an increasing function of time to maturity and the default risk premium, and a decreasing function of the coupon rate and the risk-free rate. Call and sinking fund provisions also influence bond betas since both alter the duration of the bond, and bond betas are increasing functions of duration. Bond beta, or the sensitivity of the return on bond issue i to the market return index in period t, is modeled as a function of the following variables:

$$B_{it} = f\{\text{term to maturity-coupon rate-risk free rate+default premium-call probability-sinking fund}\}$$

$$B_{it} = \beta_1 + \beta_2 MATUR_{it} + \beta_3 COUP_i + \beta_4 RF_t + \beta_5 DRP_{it} + \beta_6 CALL_i + \beta_7 SF_i$$

where:	**$MATUR_{it}$**	**=**	**Years to maturity date for bond i at period t**
	$COUP_i$	**=**	**Coupon, or stated, rate for bond i**
	Rf_{it}	**=**	**Risk-free interest rate, measured as the yield on a government bond matched with respect to coupon rate and maturity date for bond i at the beginning of period t**
	DRP_{it}	**=**	**Default risk premium on bond i at the beginning of period t, measured by the difference between the yield on corporate bond i and the yield on a government bond matched with respect to coupon rate and maturity date**
	$CALL_{it}$	**=**	**Call probability for bond i at period t, measured by the coupon rate divided by the call price at time t**
	SF_i	**=**	**Sinking fund provision for bond i, measured by a dichotomous variable with zero indicating no sinking fund provision and one indicating the presence of a sinking fund provision**

The control model included the return on a market index as one control variable. Equation (1) was embedded in the control model to allow bond betas to differ across bond issues and over time. In addition to the market index, each of the variables posited to influence beta were also included as separate control variables. Consequently, term to maturity, coupon rate, risk-free rate, default risk premium, call probability, and sinking fund, were allowed to *indirectly* effect bond returns via their influence on beta, and also exert *direct* effects on the dependent variable.

In addition to the variables suggested by Weinstein (1983), the book value of long-term debt was included as a control variable intended to proxy for the size of the issuer and the marketability of the firms' securities. Since option pricing theory provides no role for firm size as a determinant of risky debt valuation, Weinstein (1983) did not include a size variable in his model. However, Ogden (1987) found option pricing theory was not size invariant. The book value of long-term debt has no theoretical relationship with bond beta, but was expected to be inversely related to holding period bond returns because of the assumed relationship with marketability/liquidity. The following is a complete specification of the control model:

$$HPR_{it} = \beta_0 + \beta_{it} RM_t + \beta_8 MATUR_{it} + \beta_9 COUP_i + \beta_{10} RF_t + \beta_{11} DRP_{it}$$

$$+ \beta_{12} CALL_i + \beta_{13} SF_i + \beta_{14} DEBT_{it} + \epsilon_{it}$$

where:	**HPR_{it}**	**=**	**Holding period return for bond i in period t, defined as the end of period bond price plus the coupon rate minus the beginning of the period bond price divided by the beginning of the period bond price plus accrued interest**
	Rm_t	**=**	**Return on market index for period t, defined as the corporate component of the Salomon Brothers Broad Investment-Grade bond index**
	$DEBT_{it}$	**=**	**Book value of total debt for firm i at time t, defined as total long-term debt [9] plus debt in current liabilities [34]**
	ϵ_{it}	**=**	**Residual return for bond issue i at time t**

Substitution of (1) into (2) resulted in eight main effects, six interaction terms, and an intercept term, for a total of 15 parameters to be estimated in the control model:

$$HPR_{it} = \beta_0 + \beta_1 RM_t + \beta_2 RM_t * MATUR_{it} + \beta_3 RM_t * COUP_i + \beta_4 RM_t * RF_t + \beta_5 RM_t * DRP_{it} + \beta_6 RM_t * CALL_i + \beta_7 RM_t * SF_i + \beta_8 MAT_{it} + \beta_9 COUP_i + \beta_{10} RF_t + \beta_{11} DRP_{it} + \beta_{12} CALL_i + \beta_{13} SF_i + \beta_{14} DEBT_{it} + \epsilon_{it}$$

All hypotheses were tested by regressing holding period returns on experimental variables, given the control model variables specified in Equation (3). To the extent that experimental variables were correlated with control model variables, hypothesis tests were biased towards insignificance.

Experimental variables were constructed from Compustat PC Plus data items. These definitions for NCFO, NCFI, and NCFF, as well as specific Compustat PC Plus data items, are reported in the Appendix. The unexpected portion of each accounting signal at time t was measured as the first-difference of the respective signals, which assumed market expectations were captured by a random walk model. To alleviate potential problems from heteroskedasticity of error terms, all accounting signals were deflated by book value of total debt.

Hypotheses were tested with the following pooled, cross-sectional ordinary least squares regression model:

$$HPR_{it} = \beta_0 + \beta_1 RM_t + \beta_2 RM_t * MATUR_{it} + \beta_3 RM_t * COUP_i + \beta_4 RM_t * RF_t + \beta_5 RM_t * DRP_{it} + \beta_6 RM_t * CALL_i + \beta_7 RM_t * SF_i + \beta_8 MATUR_{it} + \beta_9 COUP_i + \beta_{10} RF_t + \beta_{11} DRP_{it} + \beta_{12} CALL_i + \beta_{13} SF_i + \beta_{14} DEBT_{it} + \beta_{15} NCFO_{it} + \beta_{16} TACC_{it} + \beta_{17} NCFIit + \beta_{18} NCFF_{it} + \epsilon_{it}$$

where all variables retain their previous definitions and:

$NCFO_{it}$	=	**Annual net cash flow from operating activities for firm i in period t**
$TACC_{it}$	=	**Annual total accruals for firm i in period t**
$NCFI_{it}$	=	**Annual net cash flow from investing activities for firm i in period t**
$NCFF_{it}$	=	**Annual net cash flow from financing activities for firm i in period t**

Hypotheses 1, 2, 3, and 4 predicted β_{15}, β_{16}, β_{17}, and β_{18} respectively, would be nonzero, consistent with incremental information content for each aggregate cash flow component and total accruals.

RESULTS AND DISCUSSION

Results from estimation of Equation (4) using ordinary least squares (OLS) regression on the pooled sample of 454 bond returns measured over the January 1 - December 31 return window are reported in Table 2. The F-test for overall model significance was significant ($p < .0001$) and explanatory power as reflected by adjusted R-square was .4664.

Hypothesis one examined the association between NCFO and annual holding period returns on corporate bonds, given total accruals, NCFI, and NCFF. This hypothesis was strongly supported ($p < .0003$). This evidence is consistent with the view that corporate bond investors value the information reflected by unexpected changes in NCFO.

Hypothesis two examined the association between bond returns and total accruals, given NCFO, NCFI, and NCFF. This hypothesis was also strongly supported ($p < .0004$), consistent with total accruals providing incremental information content to corporate bond investors, conditioned on the three major cash flow components. Equity market research has strongly supported this finding, but this issue had not previously been examined in the context of the debt capital market. The empirical evidence reported in Table 2 is consistent with the FASB's conceptual framework; total accruals, and by extension accrual-based earnings, provide useful information to creditors about future cash flows.

Hypotheses three and four examined the incremental information content of NCFI and NCFF, respectively. As reported in Table 2, neither hypothesis was supported by the sample data. Neither NCFI nor NCFF provided incremental information in the sample of corporate bonds examined. However, each of these values reflect the arithmetic sum of several subcomponents, and additional research is necessary to determine whether any subcomponents of NCFI or NCFF provide incremental information content to corporate bondholders.

Table 2

OLS Estimation of Equation (4) for the January-December Return Window (n=454)

Model F = 23.00	**p value = 0.0001**		**Adjusted R-square = .4664**	
White's χ^2 = 95.14			**p value = 0.9975**	
	Parameter			**Variance Inflation**
Variable	**Estimate**	**t**	**p-value**	**Factor**
Net Cash Flow from Operating Activities	**0.0388**	**3.664**	**0.0003**	**24**
Total Accruals	**0.0414**	**3.580**	**0.0004**	**24**
Net Cash Flow from Investing Activities	**0.0047**	**0.095**	**0.3423**	**2**
Net Cash Flow from Financing Activities	**-0.0044**	**-0.755**	**0.4505**	**2**

Two model diagnostics are reported. White's (1980) test for heteroskedasticity revealed no significant problems. Variance inflation factors exceeded the rule-of-thumb cutoff of ten for both experimental variables NCFO and TACC, indicating potential problems from multicollinearity (Neter et al., 1990). In spite of this high collinearity, these parameter estimates attained significance.

Table 3 reports the results of estimating Equation (4) using holding period bond returns measured over the alternative return window, April-March. Results using the alternative return window were not qualitatively different from those reported in Table 2 using the

January-December return window. Hypotheses 1 and 2 were strongly supported with p-values of 0.0023 and 0.0031, respectively. Hypothesis three was not supported with returns from either return window. Hypothesis four received stronger support with the April-March return window ($p < 0.0758$) than with the January-December return window ($p < 0.4505$), but attained statistical significance in neither.

Table 3

OLS Estimation of Equation (4) for the April-March Return Window (n=454)

Model F = 22.45	**p value = 0.0001**		**Adjusted R-square = .4601**	
White's χ^2 = 101.57			**p value = 0.9833**	
Variable	**Parameter Estimate**	**t**	**p-value**	**Variance Inflation Factor**
Net Cash Flow from Operating Activities	**0.0271**	**3.071**	**0.0023**	**23**
Total Accruals	**0.0287**	**2.973**	**0.0031**	**23**
Net Cash Flow from Investing Activities	**0.0004**	**0.094**	**0.9254**	**2**
Net Cash Flow from Financing Activities	**-0.0089**	**-1.780**	**0.0758**	**2**

SUMMARY AND EXTENSIONS

The purpose of this paper was to examine whether cash flow components, as defined by SFAS No. 95, were associated with holding period returns on a sample of seasoned corporate bonds. Empirical evidence reported in this study was consistent with corporate bond investors pricing net cash flow from operations and total accruals. In contrast, net cash flow from investing and financing activities were not priced in the sample examined. Empirical results support the contention that accrual-based earnings provide information content to a specific user group, corporate bond investors. These results complement equity market research which has generally supported this hypothesis as well.

This study could be extended in several ways. First, the three major cash flow components represent aggregate values which are composed of numerous subcomponents defined in the Appendix. The model estimated in this study implicitly required the response coefficients associated with all subcomponents of, say NCFO, to be equal. Future research could relax these restrictions and examine whether decomposition of aggregate cash flow components improves the association with corporate bond returns.

Second, factors which moderate the association between cash flow components and corporate bond returns could also be investigated. Earnings response coefficient literature based on equity market research strongly supports the hypothesis that earnings response coefficients are not cross-sectional nor intertemporal constants. Likewise, there is no a priori reason to believe cash flow response coefficients are constant across bond issues, across firms, or over time.

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APPENDIX

Appendix

Variable (Acronym)	Definition [COMPUSTAT Data Item No.]
Collections from Customers (COLL)	Sales [12] - Change in Accounts Receivable [Δ2]
Payments to Suppliers, Employees, etc. (PMTS)	Cost of Goods Sold [41] + Change in Inventory [Δ3] + Change in Other Current Assets [Δ68] + Change in Other Assets [Δ69] - Change in Accounts Payable [Δ70] - Change in Other Current Liabilities [Δ72] - Change in Other Liabilities [Δ75]
Taxes Paid (TAX)	Tax Expense [16] - Change in Taxes Payable [Δ71] - Change in Deferred Taxes and ITC [Δ35]
Interest Paid, net (INTI)	Interest Expense [15] - Interest Income [62]
Other Operating Cash Flows (OOCF)	Special Items [17] + Nonoperating Income (Expense): Excluding Interest Income [190] + Extraordinary Items and Discontinued Operations [48]
Net Cash Flow from Operating Activities (NCFO)	COLL + OOCF - PMTS - TAX - INTI
Total Accruals (TACC)	Net Income before Extraordinary Items [18] - NCFO
Capital Expenditures (CAPS)	PPE Capital Expenditures [128]
Acquisitions (ACQ)	Acquisitions from the Statement of Changes in Financial Position [129]
Investments and Advances to Unconsolidated Subsidiaries, net (SUBS)	Change in Investments and Advances to Unconsolidated Subsidiaries, Equity Method and Others [Δ31 + Δ32]
Net Purchases of Minority Interest (MIN)	Minority Interest in Income [49] - Change in Minority Interest [Δ38]
Proceeds from Retirement of Property, Plant, and Equipment (PRO)	CAPS + ACQ - Change in Gross PPE [Δ7] - Change in Intangibles [Δ33] - Depreciation and Amortization [14] + Change in Accumulated Depreciation [Δ7-Δ8]
Net Cash Flows from Investing Activities (NCFI)	CAPS + ACQ + SUBS + MIN - PRO
Net Issuance of Debt (NDEBT)	Change in Long-term Debt [Δ9] + Change in Current Maturities of Long-term Debt [Δ34]
Net Issuance of Common Stock (NCSTK)	Change in Total Common Equity [Δ60] + Common Dividends [21] + Preferred Dividends [19] - Net Income [172]
Net Issuance of Preferred Stock (NPSTK)	Change in Carrying Value of Preferred Stock [Δ130]
Dividends Paid (DIVI)	Common Dividends [21] + Preferred Dividends [19]
Net Cash Flows from Financing Activities (NCFF)	NDEBT + NCSTK + NPSTK - DIVI

A TEST OF INVESTOR COGNIZANCE IN THE MARKET'S REACTION TO DIVIDEND ANNOUNCEMENTS

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ABSTRACT

This paper examines the empirical relationship between market reactions to dividend announcements and investor cognizance. In this study, we find that, inconsistent with the prediction of the investor cognizance hypothesis, there is an insignificant relationship between price reactions to first dividend announcements after the stock is newly listed on the major stock exchange and the proxies for the breadth of investor cognizance. This finding is in sharp contrast to the positive relationship between the price reaction to dividend initiations and dividend yield reported by Michaely, Thaler, and Wormack (1995) and the positive relationship between the price reaction to dividend initiations and investor cognizance reported by Kang, Jo, and Kim (1996). However, the above results should be interpreted in care because firm size is potentially an important variable that may capture the plausible nonlinear effect of investor cognizance on price reactions.

INTRODUCTION

In this study, we focus on the relationship between investor cognizance about firm and market price reactions to first dividend announcements since initial stock listing either on the New York Stock Exchange (NYSE) or the American Stock Exchange (AMEX) and conjecture that investor awareness is expected to be an important determinant of market reaction to dividend announcements for those stocks newly listed on the major stock exchanges. Specifically, we ask whether the price reactions to dividend announcements since the firm's initial stock listing on the major stock exchanges are economically significant and hypothesize that price reactions to dividend announcement of less-recognized stocks, i.e., small firms, may be different from that of highly recognized stocks, i.e., large firms, mainly due to the differences in investor awareness.

Recently there has been considerable interest in the theory of market equilibrium in imperfect financial markets. Merton (1987) and Brennan and Hughes (1991) suggest that investors trade only those securities that they know about and investors obtain this knowledge from financial intermediaries such as security analysts, brokerage firms, and stock exchanges. Diamond and Verrecchia (1991) suggest that disclosure of information improves future liquidity of a firm's securities which, in turn, increases demand for the firm's securities. They

further show that revealing public information which enhances the breadth of *investor cognizance* and thereby reduces the extent of information asymmetry may increase firm value. This investor cognizance hypothesis suggests that information acquisition about firms and formation of expectations regarding their future prospects are indispensable elements of the daily operations of firms and the investment community. This investor cognizance hypothesis has interesting new perspectives on the firm's daily operation for investment, financing, and dividend decisions. However, the empirical validity of the investor cognizance hypothesis has not been closely examined in literature except in the study of Kang, Jo, and Kim (1996) where the investor cognizance hypothesis was examined using the announcements of dividend initiation. They report that the dividend yield and the number of years after stock listing that capture investor cognizance are crucial determinants of price reactions to dividend initiations.

We hypothesize that price reactions of widely recognized firms that are listed on a major exchange are statistically significant. We also examine whether price reactions to the initial dividend announcements of stocks with low dividend yield may be different from that of stocks with high dividend yield because Michaely, Thaler, and Wormack (1995) report that dividend yield is an important determinant of price reaction around announcements of dividend initiations.

Previous studies of dividend announcements generally agree with the view that dividend payments serve as signals to market participants and price reactions to initial dividend announcement effects are positive. For instance, Asquith and Mullins (1983), Healy and Palepu (1988), and Michaely, Thaler, and Wormack (1995) all find significant and positive abnormal returns on the initiation of dividends using daily stock return data. These studies support the predictions of the efficient market hypothesis in the sense that market responses to the good news of dividend initiations are positive. However, it is surprising that these studies do not address the fundamental issue of how market price responds when the breadth of investor cognizance toward future firm performance evolves.

To examine the price implication of investor cognizance, we employ the age of the firm, the size of the firm, trading volume, and the number of years listed on the NYSE or AMEX when firms first announce dividend payment because it is natural to expect that investor cognizance is broader for stocks that are listed on a major exchange. Our empirical results indicate that first, for those firms which announced dividends after their stocks listed on the NYSE or AMEX, the abnormal return on the announcement of initial dividends is not significant. These results are in sharp contrast with the earlier findings of positive abnormal returns for the case of dividend initiations reported by Asquith and Mullins (1983), Healy and Palepu (1988), and Michaely, Thaler, and Wormack (1995). However, the above results should be interpreted in care because firm size is potentially an important variable that may capture the plausible nonlinear effect of investor cognizance on price reactions.

Our contribution to the literature is two folds. First, we examine price reactions to first dividend announcements after the stock is listed on a major stock exchange. Thus, this study first investigates the effect of stock listing on market perception. Second, when we consider an investor cognizance dimension using the firm size, we were partially able to explain differential dividend announcement effects, which were not clearly explored before. We

interpret these findings to mean that the firm size that captures investor cognizance may be a crucial determinant of price reactions to dividend initiations.

The remainder of the paper is organized as follows. In Section 2, we present a description of our sample. This is followed by a brief description of our methodology and variable definitions in Section 3. In Section 4, we examine the price reactions to the event of dividend announcements. Section 5 concludes the article.

SAMPLE

Using the Center for Research in Security Prices (CRSP) tapes, we collect all New York Stock Exchange (NYSE) / American stock Exchange (AMEX) firms that announced dividend payments from 1990 to 1994. We define a dividend announcement as the first cash dividend payment reported on the CRSP Master file. The following filters are used for inclusion in our sample: i) Daily stock returns for the period 1/01/1990 - 12/31/1994 should be available from the data base constructed by CRSP at the University of Chicago. ii) Declaration dates of dividend payments should be available in the annual cumulative issues of *Moody's Dividend Record* and *Standard and Poor's Dividend Record*, and announcement dates of dividends were available in the different annual issues of the *Wall Street Journal Index*. iii) The firms should not be subsidiaries, investment companies according to the Investment Company Act of 1940, depositary units, established by spin-offs, or those which paid dividends before their merger. iv) The firms should pay regular dividends and the dividends should not be specified as the return of capital. v) We further delete financial institutions, i.e., bank holding companies, insurance companies, mutual funds and public utilities, from the sample to avoid the confounding effects of regulation on corporate dividend decisions. vi) The age of the firm should be available from the Million Dollar Directory published by Dun and Bradstreet.

In total, our final sample comprises 75 firms for our sample period. A dividend announcement date is the date when news about the amount of the dividend, the ex-dividend date, and the date payable that the dividend first appear in the Wall Street Journal. Dividend yield is calculated by dividing the amount of the annual dividend by the stock price of 10 trading days before the announcement of dividends. For the cases where the stock price of 10 trading days before the announcement of initial dividends was not available, the next available date was chosen to get the stock price.

METHODOLOGY

For price reactions to dividend announcements, we adopt the event methodology based on the market model of Brown and Warner (1980) and the abnormal return measure is estimated as follows,

$$R_{it} = \alpha_i + \beta_i R_{mt} + u_{it}, \qquad (1)$$

where R_{it} is the daily rate of return of security i on day t, R_{mt} is the observed market return on day t, β_i is covariance(R_{it},R_{mt})/variance(R_{mt}), α_i is $E(R_{it}) - \beta_i E(R_{mt})$, where E( ) is an expectation operator, and u_{it} is the disturbance term of security i on day t. It is assumed that u_{it} is

normally distributed with mean zero, and is independently and identically distributed through time. However, the methodology will be fairly robust to departures from normality. The regression coefficients, α_i's and β_i's, are estimated using the OLS regression of security returns on market index returns. The estimation is based on a sample of observations obtained from the 1995 CRSP Daily Stock Return File and a value weighted market portfolio of NYSE and AMEX issues from the 1995 CRSP Daily Stock Index File. Using the equally weighted market index instead of the value-weighted market index does not change the results in the subsequent sections. See Brown and Warner (1980) for the effect of the choice of market index on the various tests. The estimation period begins 30 trading days before the initial dividend announcement, and all available observations for the next 60 trading days are used.

An abnormal return is estimated using:

$$XR_{it} = R_{it} - E(Rit), \tag{2}$$

where XR_{it} is the excess return for security i on day t, $E(R_{it})$ is the expected rate of return on security i on day t conditional on the market return calculated from taking the expectation on both sides of equation (1) and using the regression coefficient estimators.

Average excess returns for each relative day are calculated by,

$$AXR_t = \frac{1}{N}\sum_{i=1}^{N} XR_{it}, \tag{3}$$

where N is the number of securities with excess returns during day t.

Daily cumulative average excess returns, CAXR, are calculated by summing average excess returns over event time as follows:

$$CAXR = \sum_{t=j}^{k} AXR_t, \tag{4}$$

where the CAXR is for the period from t = j days until t = k days. A two-day average excess return is calculated for each dividend announcement examined. A two-day average excess return is necessary to capture the whole effect of a dividend announcement. In most cases, the Wall Street Journal announcement of dividends follows the actual announcement by a day. If a dividend is announced before the market closes, then the market response actually occurs that day. If a dividend is announced after the market closes, the market response occurs with a lag of one trading day. The two-day excess return, TWOXR, is calculated as,

$$TWOXR = AXR_{-1} + AXR_0, \tag{5}$$

where AXR_{-1} is the AXR on the day prior to the published dividend announcement in the Wall Street Journal, and AXR_0 is the AXR on the announcement date.

To test whether TWOXR is statistically different from zero, the following t-statistic is used,

$$t(TWOXR) = (TWOXR \cdot \sqrt{N})/S(TWOXR), \tag{6}$$

where S(TWOXR) is the cross-sectional standard deviation of the two-day excess returns, and N is the number of firms in the sample.

We use the following regression model to assess the effect of the dividend yield and the proxies for the breadth of investor cognizance on the magnitude of excess returns.

$$TWOXR_i = \alpha + \beta_1 YLD_i + \beta_j \left(\sum_{j=2}^{5} AWARENESS_{ij}\right) + \epsilon_i, \quad (7)$$

where YLD_i is the dividend yield of firm i, $AWARENESS_{ij}$ is the measure of investor cognizance of firm i for variable j where j = 2 to 5, and ϵ_i is the disturbance term of security i with usual properties. In order to capture investor cognizance (AWARENESS), we use four variables including the age of the firm, time interval between stock listing and dividend payment, firm size measured by the product of the market price and the number of shares of outstanding, and trading volume measured by the number of shares traded.

Existing empirical results, e.g., Asquith and Mullins (1983) and Eades (1982), indicate that β_1 is positive. The coefficient of primary interest in equation (7) is β_j. If β_j's are positive, we can see the investor cognizance aspects of dividends are captured by chosen variables. To further test the potential nonlinear effect of investor cognizance on market reaction, we also examine the relationship between the excess returns and the dummy variables of dividend yield and investor awareness using the following regression:

$$TWOXR_i = \alpha + \beta_1 YLD\ DUMMY_i + \beta_j \left(\sum_{j=2}^{5} AWARENESS\ DUMMIES_{ij}\right) + \epsilon_i \quad (8)$$

Since the data inspection suggests that much of the variation is achieved when the age of the firm reaches 50, the time interval between stock listing and dividend payment reaches 0.26, firm size reaches 250 million dollars, trading volume reaches 40,000 shares, and dividend yield reaches 0.02 percent, we use these as the threshold values of AWARENESS DUMMIES, i.e., age dummy, interval dummy, size dummy, volume dummy, and yield dummy which are the indicator variables that equal 1 for the values greater than the threshold values and equal 0 for the values less than the threshold values. To examine the sensitivity of this arbitrary choice, we replicate the regression analysis with other threshold values. Although the magnitude of estimated elasticity changes when the different threshold values are employed, the sensitivity of the price reactions to dividend announcements with respect to the AWARENESS DUMMY variables remains qualitatively unchanged.

RESULTS

Table 1 presents descriptive statistics of the variables. For each variable we provide the mean, standard deviation, median, and selected percentile values during the study period. The table shows that, on average, our sample of firms is about 40 years old. The mean value of firm size is 529 million dollars; the median value is 255 million dollars.

TABLE 1: DESCRIPTIVE STATISTICS

	Mean	Standard Deviation	Median	Percentile 5	25	75	95
Age of the Firm	39.9	39.0	29	1	7	64	134
Time Interval between Listing and Dividend	0.61	0.74	0.25	0.25	0.25	0.50	2.0
Firm Size[a]	529	783	255	38	129	518	2,855
Trading Volume[b]	103	307	202	11	59	829	3701
Dividend Yield[c]	0.022	0.019	0.016	0.003	0.008	0.030	0.072

[a] In millions of dollars.
[b] In thousands (number of shares).
[c] Dividend yield is the ratio of the annual dividend to the share price of the ten-days before dividend announcement.

Before proceeding to a multivariant analysis of the investor cognizance hypothesis, it is informative to examine whether the bivariant relations between the key variables are also consistent with the hypothesis. The correlation matrix of the variables is provided in Table 2. According to the investor cognizance hypothesis, the positive correlation between the two-day excess return and other key variables is expected for our sample firms. Surprisingly, however, the two-day excess return variable is not significantly correlated with the proxy for the breadth of investor cognizance. We suspect that is because the two-day excess return may not be statistically significant for the event of first dividend announcements after stock listing.

TABLE 2: CORRELATION MATRIX OF VARIABLES

	Return	Age	Interval	Firm Size	Trading Volume	Dividend Yield
Two-Day Excess	1.000	0.005	0.109	-0.050	-0.113	-0.031
Return		(0.9638)	(0.3534)	(0.6689)	(0.3341)	(0.7899)
Age		1.000	-0.157	-0.077	-0.142	0.238
			(0.1795)	(0.5127)	(0.2258)	(0.0400)
Time Interval between			1.000	-0.033	-0.052	-0.241
Listing and Dividend Payment				(0.7768)	(0.6588)	(0.0374)
Firm Size				1.000	0.210	-0.145
					(0.0707)	(0.2158)
Trading Volume					1.000	-0.126
						(0.2807)
Dividend Yield						1.000

* Numbers in parentheses are p-values

Table 3 presents a 5-day window of results from two days before to two days after the dividend announcement in order to report market reactions.

Table 3

Market-adjusted Returns for a Five-day Window from Two Days Before to Two Days after the First Announcement of Dividend Payment for Corporations since Initial Stock Listing

This table reports market-adjusted returns for first dividend announcement since initial stock listing either on New York Stock Exchange (NYSE) or American Stock Exchange (AMEX) during the period of 1990-1993.

	Abnormal Returns for Initial Announcement since Stock Listing (75)[a]	T-Value
-2[b]	-0.070	-0.281
-1	0.062	0.192
0	-0.059	-0.188
1	0.058	0.266
2	-0.240	-0.682

[a] number of cases [b] two days before announcement day

The empirical results indicate that abnormal returns around the dividend announcement date are not significant. These results confirm our earlier conjecture that first dividend announcements after stock listing are not perceived to be positive by market participants. In particular, abnormal returns to dividend initiations around a two-day window are not significant, approximately -0.001 percent. This finding is in direct contrast to the 3.4 percent abnormal returns to dividend initiations over a three-day event window of Michaely, Thaler, and Wormack (1995).

The regression outcomes reported in Table 4 further confirm the insignificant association of two-day excess returns ($TWOXR_i$) and the proxy for the breadth of investor cognizance. In particular, the results from equation (7) presented in Models (1) and (2) suggest that the estimated coefficients of the variables that capture the breadth of investor cognizance are insignificant. We interpret these results to mean that the breadth of investor cognizance is not strong enough to generate abnormal returns in the market.

However, the impact of the size dummy on two-day excess returns based on equation (8) is positive and significant and presented in Models (3) and (4). Although the effects of other dummy variables on the market's reaction are not significant, the size dummy results show that the increase in the abnormal return is partially caused by the abnormal returns of the firm size that may capture the potential nonlinear effect of firm size on investor awareness. Overall, the impact of investor cognizance on the price reaction to dividend announcements after stock listing is insignificant or at best weak. Therefore, it seems that market participants do not reformulate their perceptions toward a firm's future performance simply based on the firm's first announcement of dividend payment after new listing on the major exchange. This

result should be viewed as a supplementary finding of Kang, Jo, and Kim (1996) who report the positive relationship between the breadth of investor cognizance and price reactions to dividend initiations.

TABLE 4: REGRESSION RESULTS

This table reports regression results of two-day excess returns ($TWOXR_i$) on the variables that may capture investor cognizance. The numbers in parentheses are t-values. ** and * denote significance at the 0.05 and 0.10 levels respectively.

	(1)	(2)	(3)	(4)
Intercept x 10^3	-0.99 (-0.13)	0.24 (0.03)	-0.65 (-0.87)	-0.68 (-0.70)
Age of the Firm x 10^5	0.17 (0.02)	0.63 (0.06)		
Time Interval between Listing and Dividend Payment (Interval) x 10^2	0.46 (0.85)	0.43 (0.77)		
Firm Size x 10^9	-0.87 (-0.17)	-1.02 (-0.20)		
Trading Volume x 10^7	-0.14 (-1.03)	-0.14 (-1.04)		
Dividend Yield		-0.05 (-0.24)		
Age Dummy x 10^2			-0.19 (-0.22)	-0.19 (-0.22)
Interval Dummy x 10^2			0.99 (1.28)	1.01 (1.22)
Size Dummy			0.02 (2.03**)	0.02 (1.96*)
Volume Dummy			-0.02 (-1.72)	-0.02 (1.68)
Yield Dummy x 10^3				0.41 (0.05)
Adjusted R^2	0.029	0.030	0.032	0.018

CONCLUSION

This paper has examined the empirical relationship between investor cognizance and price reactions to first dividend announcements after the stock is listed on the major stock exchange. In contrast to previous empirical results of dividend initiations, the announcement of dividend payment itself does not generate an increase in the stock price when we consider the sample firms that announce first dividend after their stocks were listed on the NYSE or AMEX. The empirical results do not support the importance of the breadth of investor cognizance. However, the above results should be interpreted in care because the firm size is potentially an important variable that may capture the plausible nonlinear effects of investor cognizance on price reactions.

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FINANCIAL HEALTH OR INSOLVENCY? WATCH TRENDS AND INTERACTIONS IN CASH FLOWS

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ABSTRACT

Cash flow theory states that firms must obtain cash equilibrium to remain solvent. Certain events can cause a firm to lose cash equilibrium. Strategies managers can pursue to regain equilibrium affect different types of cash flows (operating, investing, and financing). Consequently, a firm's level of cash maintained and cash flows can indicate whether the firm remains financially healthy or becomes insolvent (unable to pay debts when due). The FASB and cash flow theory suggested that the trends and interactions among/between the types of the cash flows should provide the most useful information in assessing the likelihood of impending insolvency. Consequently, this paper examines the trends and interactions among cash flows preceding financial insolvency.

Comparison of insolvent firms and matching healthy firms reveals interesting trends and interactions between the different cash flows prior to the insolvency event. Healthy firms maintain somewhat stable cash flows. Insolvent firms, however, experience negative and declining operating flows and a diminished ability to obtain funds through financing activities eventually facing a negative financing flow. Consequently, insolvent firms must sell off assets to pay financing obligations which leads to a positive flow from investing activities. Selling off assets reduces operating cash flows and provides less collateral for future borrowing. Thus, the trends and interactions can indicate whether or not a firm is headed for financial problems. Attaining a balance among the flows is a key to regaining financial health.

INTRODUCTION

Many firms face financial difficulties at some time. Once facing the initial problems, however, some firms regain financial health while others slide into distress that leads to an inability to pay debts as they come due (insolvency). What distinguishes firms that remain healthy and those that eventually become insolvent? More and more, analysts are looking at cash flows to answer that question. This study examines the usefulness of information provided on the cash flow statement to determine if cash flow trends and interactions indicate whether or not a firm will eventually become unable to meet its financial obligations and/or declare bankruptcy.

CASH FLOW INFORMATION IN THE FINANCIAL STATEMENTS

In Statement of Financial Accounting Concepts No. 1 (par. 37) the FASB noted that a goal of financial reporting is to provide information to help users assess prospective net cash inflows. Financial statement users, accountants, and the FASB noted that cash flow information should help investors and creditors predict future cash flows. In SFAS No. 95, the FASB required disclosure of additional cash flow information by replacing the statement of changes in financial position with the cash flow statement. The FASB stressed the importance of trends and interactions among the types of flows in SFAS 95: flows from investing, financing, and operating activities. When a firm faces financial difficulties, investing, financing, and operating flows can indicate how management is attempting to deal with the difficulties. However, accounting researchers have ignored the trends and interactions in cash flows and have primarily examined only cash flows from operations.

CASH EQUILIBRIUM, CASH FLOWS, AND FINANCIAL DISTRESS

Financial distress is often defined as insolvency, the inability to pay obligations as they come due. How much cash-on-hand the company maintains, how the company obtains cash, and where it spends cash can indicate whether a company remains financially healthy or becomes distressed. Cash flow theory states that a firm achieves financial health and stability by maintaining an equilibrium in cash flows where available funds equal the firm's cash needs. (See an article by Ward, 1995, for a complete discussion of cash flow theory.) These issues were originally considered in ARB No. 37, issued in November, 1948. However, ARB No. 37 was revised in 1953 to include consideration of stock purchase plans and recast as Chapter 13B of ARB No. 43. Events triggering an unexpected drop in cash flow can upset cash flow equilibrium and force a company to take corrective action. Events causing the drop in cash flow include a recession and resulting decline in sales, price or wage increases, increased competition, and management behavior.

Cash flow theory suggests that losing cash equilibrium creates financial stress on the firm. The way management tries to restore cash flow equilibrium dictates future cash flows. Managers attempt to regain equilibrium by: borrowing money or issuing capital stock, cutting dividends, cutting costs, or liquidating assets. If equilibrium is not regained, the firm progresses through more severe stages of stress and may become unable to pay financial obligations. At each stage, management attempts to take appropriate action to regain cash equilibrium. Management's success dictates whether a firm recovers or progresses toward eventual insolvency.

Because the strategies managers can pursue affect different types of cash flows (operating, investing, and financing), information from the cash flow statement may indicate what stage of financial stress a firm is in, and provide information about management actions to regain cash equilibrium. Cash flow theory indicates that the trends in the three gross cash flows and interactions among these cash flows provide insight into a firm's future solvency. However, researchers have primarily looked at the three cash flows separately and have not placed emphasis on their trends and interactions. Thus, results from research testing the

usefulness of cash flows have been somewhat disappointing; only cash flows from operations has shown consistent usefulness in predicting insolvency.

INFORMATION ANALYZED

To study the ability of trends and interactions of the three gross cash flows to provide insight into future insolvency, we compared cash flows from firms that became insolvent to cash flows from matching solvent firms. To develop our sample, we defined insolvent firms as those that either declared bankruptcy, missed debt payments or received favorable debt accommodations in 1990, 1991, or 1992. We then randomly matched these firms with firms from the same industry that did not experience insolvency. The final sample included 114 insolvent firms and 264 matched solvent firms.

We examined financial information from the firms three, two, and one year prior to the distress event. Thus, the analysis included information from: (1) 1987, 1988, and 1989 for 1990 firms; (2) 1988, 1989, and 1990 for 1991 firms; and (3) 1989, 1990, and 1991 for 1992 firms. The analysis only included information for three years prior to insolvency because we examine the actual cash flows presented on the statement of cash flows, not estimated cash flows as used in previous studies. The earliest data we analyzed came from 1987, the first year all firms prepared statements of cash flows.

Because cash flows are the focus of this study, the analysis included the following variables as a percentage of operating assets: (1) cash at year end; (2) cash flows from operations (CFFO); (3) cash flows from investing (CFFI); and (4) cash flows from financing (CFFF). The U.S. entered a recession in 1990. Consequently, results in this study reflect firms' management of cash flows while entering difficult economic conditions.

RESULTS AND DISCUSSION

Table 1 presents the variables' means for the healthy and insolvent firms. The means indicate differences between the two groups for all three cash flows. However, the means by themselves are stagnant in time and do not tell the full story. Plotting the means across time can reveal important trends and interactions among the cash flows. Figures 1 through 4 show the trends in cash items as a percentage of operating assets for the healthy and insolvent firms. Figures 2 through 4 plot the means for each cash flow separately across three years. As one would expect, Figure 1 reveals that healthy firms maintain a higher level of cash than insolvent firms and that insolvent firms exhibit a declining cash percentage. In Figure 2, the healthy firms show a positive CFFO while the insolvent firms show a declining, negative CFFO.

Figures 3 and 4 reveal some interesting trends as the distressed firms approach their insolvency date. Figure 3 shows that distressed firms move from investing in assets (negative CFFI) three years prior to distress, to selling off assets (positive CFFI) one year prior to insolvency. The trend n CFFF for insolvent firms in Figure 4 illustrates the fact that these firms lose their ability to obtain outside funds as insolvency approaches. One year before the

event, insolvent firms pay more back than they receive from financing. Healthy firms retain relatively stable investing and financing cash flows in comparison to the insolvent firms.

TABLE 1: MEAN RATIOS OF HEALTHY AND INSOLVENT FIRMS

Ratio[1]	Three Years Prior to Insolvency		Two Years Prior to Insolvency		One Year Prior to Insolvency	
	H[2]	I	H	I	H	I
Cash %	9.1	7.2	7.9	6.3	8.9	4.6
CFFO	6.2	-1.4	5.2	-2.0	5.7	-5.5
CFFI	-9.9	10.6	-8.1	-4.4	-6.5	0.6
CFFF	4.3	9.3	1.8	5.4	2.1	-2.5

[1] Cash % = (cash on hand/operating assets) x 100
CFFO = (cash flows from operations for the year/operating assets) x 100
CFFI = (cash flows from investing for the year/operating assets) x 100
CFFF = (cash flows from financing for the year/operating assets) x 100
[2] H = Healthy firms I = Insolvent firms

Plotting the three cash flows together for each group of firms provides more insight into the importance of trends in cash flows. Figure 5 plots the three cash flows across time for the healthy firms while Figure 6 plots the three cash flows across time for the insolvent firms. Figure 5 shows that healthy firms maintain fairly stable cash flow patterns, even during the period preceding a recession. Note that healthy firms' CFFO and CFFF decline slightly from year three to year two, but recover in year one, the year preceding their matched firms' default or bankruptcy. Healthy firms offset the slight drop in CFFO by investing and borrowing less. However, they still maintain an outflow in CFFI and an inflow in CFFF. The key to remaining solvent is stability in the firm's cash flows over time. Management is successfully maintaining cash flow equilibrium. This behavior is consistent with cash flow theory.

Figure 6 plots the trends and relationship among the cash flows of insolvent firms prior to their distress event. These firms have lost their cash equilibrium and are on a collision course with insolvency. The trend for each cash flow is much more severe for the insolvent firms (steeper slopes) than for the healthy firms.

Figure 6 shows that increasingly negative CFFO reduces the firms' ability to obtain funds through financing activities. Consequently, these firms begin to invest less from three to two years prior to the distress event. Less investment results in even less cash generated from operations and further decreases the firms' ability to obtain outside financing. From two to one year prior to the insolvency event, insolvent firms actually must pay more back to outside financing sources than they are able to obtain, generating negative CFFF.

Insolvent firms must eventually sell off long-term assets to pay their financing obligations. However, lack of new investment and selling off existing long-term assets appears

to negatively impact a company's operations. (CFFO's negative slope increases between years two and one.) Eventually, CFFO declines to more of an outflow than the company spends on new investment (CFFI), creating an interaction point (interaction 1 in Figure 6). CFFI also interacts with CFFF as the firm loses the ability to borrow additional funds (interaction 2 in Figure 6). As described in cash flow theory, these trends and interactions among/between CFFO, CFFI, and CFFF are the strongest indicators that a firm is headed toward insolvency.

CONCLUSIONS

Comparisons of insolvent firms (those that filed bankruptcy, or defaulted on, or received favorable accommodations on loans) and matching firms reveals differences in cash items. As no surprise, we found that firms that become insolvent maintain a lower cash balance as a percentage of their operating assets in the years leading to the distress event than firms that avoid distress.

Analysis with cash flow variables reveals that the *trends and interactions* among/between CFFO, CFFI, and CFFF (as a percentage of operating assets) are the most important indicators of whether or not a company will maintain financial health or will become insolvent. Healthy firms maintain somewhat stable cash flows even when entering a recession. However, insolvent firms experience declining CFFO and a diminished ability to obtain funds through financing activities prior to insolvency. Consequently, distressed firms must sell off assets to pay off financing obligations leading to a positive flow from investing activities and a negative financing flow.

These actions by insolvent firms create two interactions. These interactions show that insolvency is likely unavoidable when a company experiences levels of CFFO and CFFF outflows that require offsetting inflows from CFFI. These interactions and trends in all three cash flows provide evidence of future insolvency. The interactions occur approximately one and two years before ultimate insolvency. However, prior researchers have failed to look at these trends and interactions.

This study provides evidence that the cash flow statement and the classification of cash flows by activities can provide useful information. Creditors should carefully scrutinize the credit worthiness of customers exhibiting dangerous trends and interactions in their cash flows. Negative CFFO combined with decreasing CFFF and an increasing inflow from CFFI is a strong signal of impending insolvency. Also, results indicate that accountants should help managers be vigilant in protecting the firm's cash equilibrium. Firms should act quickly to restore equilibrium after it is lost; delay can lead to the death spiral of selling off assets and evaporating credit.

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A VESTED PRESENT VALUE APPROACH TO VALUING EMPLOYEE STOCK OPTIONS

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ABSTRACT

In the wake of the stock compensation debacle, this paper proposes an alternative approach to valuing employee stock options, that overcomes the theoretical problems of APB 25 and the measurement and reliability problems of the option pricing models recommended in Financial Accounting Standard (FAS) 123.

The FASB initially responded to this issue with an Exposure Draft that used option pricing models to measure the amount of compensation expense. This would have significantly increased the amount of compensation expense many corporations would have had to recognize related to employee stock options. The extremely negative reaction the FASB received in response to this proposal caused the Board to compromise and issue Statement No. 123, Accounting for Stock-Based Compensation. Statement 123 does not require companies to expense the fair value of employee stock options. Instead, the new rules encourage companies to recognize stock-based compensation expense based on its fair value at the grant date. Companies can continue following the existing accounting rules (the intrinsic value method of APB 25 which often results in no compensation expense), provided that pro forma disclosures are made of what net income and earning per share would have been had the new fair value method been used. These disclosures, while beneficial, do not communicate the true economic substance of the employee stock option transaction and consequently do not adequately substitute for expense recognition. While the FASB can be criticized for its measurement techniques, it should be supported for attempting to require the proper measurement of compensation.

This paper offers an alternative "Vested Present Value" approach for recognizing compensation expense that overcomes some of the measurement problems associated with the option valuation methods recommended in Statement 123. This technique measures compensation expense for both fixed and variable options on the vesting date because it is the date that (i) the employee has performed under the option contract, and (ii) the company is obligated to issue shares at the option price. Each year the cumulative compensation amount would be determined by taking the present value of the expected compensation cost on the vesting date. The expected compensation cost would then be marked to market at the end of each period until the vesting date when the actual cost would be known. This approach provides financial statement effects that are neutral, verifiable, and properly match the expense to the periods of employee service, while overcoming the measurement problems associated with the option pricing models of FAS 123.

INTRODUCTION

The Financial Accounting Standards Board's (FASB) Stock Compensation project is one of the most controversial projects that the FASB has considered since its inception over two decades ago. In the early 1980's, the FASB was asked by the Securities and Exchange Commission, the AICPA's Accounting Standards Executive Committee, large accounting firms, industry representatives, and others to reconsider accounting for stock-based compensation. In June 1993, the FASB issued an Exposure Draft (ED) on an accounting standard that would have replaced Accounting Principles Board Opinion No. 25, Accounting for Stock Issued to Employees (APB 25) requiring fair value accounting for stock-based compensation. After lengthy debate and considerable controversy, the FASB issued Statement of Financial Accounting Standards No. 123, Accounting of Stock-Based Compensation (FAS 123).

FAS 123 encourages, but does not require, companies to recognize compensation expense for stock options and other equity instruments issued to employees based on the fair value techniques recommended in the Exposure Draft. Companies that do not adopt the fair value method are required to apply the previously existing accounting rules outlined in APB 25. Although fair value expense recognition for stock-based compensation is not mandatory, FAS 123 does require companies using the APB 25 guidelines to disclose pro forma net income and earnings per share under the fair value method. In addition, all companies with stock-based plans are required to make detailed disclosures about plan terms, exercise prices, and the assumptions used in determining fair value.

This paper reviews the issues surrounding accounting for stock-based compensation, and proposes an alternative vested present value method" for recognizing stock-based compensation expense during the service period. The first part of the paper discusses the historical development of accounting for stock-based compensation. The next section reviews the authoritative literature to discuss the major theoretical issues surrounding the stock-based compensation debate. Section III presents an alternative method for recognizing compensation expense that provides a potentially more reliable measure of total compensation cost than either FAS 123 or APB 25. Finally, section IV summarizes our conclusions and discusses the theoretical benefits that the proposed method provides over the other two methods.

ACCOUNTING FOR STOCK-BASED COMPENSATION

The controversy over accounting for stock based compensation is not a new issue. Many of the same issues that the FASB has debated over the last ten years were originally discussed by the Committee on Accounting Procedure (CAP) in 1953 in Chapter 13B of Accounting Research Bulletin (ARB) No. 43. (These issues were originally considered in ARB No. 37, issued in November 1948. However, ARB No. 37 was revised in 1953 to include consideration of stock purchase plans and recast as Chapter 13B of ARB No. 43.) Chapter 13 considers whether stock option plans are compensation and, if so, when this cost should be measured. The Committee determined that options do have value and should be measured on

the date they are granted. However, because these instruments are unique and subject to various restrictions, the Committee recognized that it would be impractical to measure this value. Consequently, it recommended that compensation cost be recorded for the excess of the fair value of the shares over the option price. Realizing that market quotations of stock price were not necessarily conclusive evidence of fair value, the Committee was careful in referring to the fair value of the shares optioned rather than the market quotation of the shares.

In the early 1970's, as the use of employee stock options became more prevalent and the compensation plans became more complex, the Accounting Principles Board revisited the question of accounting for stock issued to employees. APB 25 requires that compensation expense be measured on the first date at which both the number of shares and the amount to be paid for the shares (the exercise price) are known. If both the exercise price and number of shares are known (or fixed) at the grant date (referred to as a fixed plan), compensation expense should be recorded for the difference between the market price of the stock and the exercise price on the grant date (APB 1972, ¶ 24).

When the number of shares or the exercise price is not known at the grant date, APB 25 requires that an expense be recognized for the excess of the stock's market price over the exercise price (i.e., intrinsic value) on the exercise date. Prior to exercise, compensation expense is estimated each period based on the award's intrinsic value. Thus, compensation expense for these plans (referred to as variable plans) varies each period up to the measurement date (APB 1972, ¶ 29).

The fair value method of FAS 123 measures expense at the grant date for both fixed and variable plans. FAS 123 does not apply to noncompensatory stock plans. An employee stock purchase plan that satisfies all of the following conditions is considered a noncompensatory plan:

1. **The plan incorporates no option features.**
2. **The discount from the market price does not exceed the greater of (a) a per-share discount that would be reasonable in an offer of stock to stockholders or others or (b) the per-share amount of stock issuance costs avoided by not having to raise a significant amount of capital by a public offering.**
3. **Substantially all full-time employees may participate.**

All other plans are classified as compensatory and are subject to the requirement to recognize compensation cost in accordance with FAR 123 or APB 25.
Under this method, the fair value is estimated on the grant date using an option-pricing model (for example, the Black-Scholes or a binomial model) that takes into account the exercise price and expected life of the option, the current price of the underlying stock, its expected volatility, expected dividends, and the risk-free interest rate for the expected term of the option. This fair value estimate is not subsequently adjusted for changes in the price of the underlying stock or its volatility, the life of the option, dividends on the stock, or the risk-free interest rate.

If a company elects to use the fair value method but it is not possible, or feasible, to reasonably estimate the fair value using the models mentioned above; then, the fair value can be determined using the market price and other factors on the first date they become available,

which generally is the vesting date. Firms not electing the fair value technique will continue to use the methods identified in APB 25. In the next section, we identify and discuss some of the conceptual issues and concerns surrounding accounting for stock-based compensation.

THEORETICAL JUSTIFICATION FOR EXPENSE RECOGNITION

The primary controversies surrounding the issue of accounting for stock based compensation include whether these instruments represent an expense that should be recognized in the income statement and, if so, when they should be recognized and how they should be measured. These issues are simple to state and understand, but their resolution is complex and highly controversial.

Recognition of Compensation Cost

The first issue that must be considered is whether stock compensation is an expense that should be recognized in the income statement. Expenses are defined as "outflows or other using up of assets or incurrences of liabilities...from providing goods or services" (FASB 1985). Wolk and Rozycki (1994) argue against recognizing an expense. Their argument is that even though employee stock options are valuable to the recipient, they do not represent the consumption of an asset or incurrence of a liability by the granting entity. As such, there is no cost to the company and no expense should be recognized in the income statement.

This reasoning, however, seems to suggest that the form of the compensation rather than its substance should drive expense recognition and is inconsistent with existing accounting principles. Specifically, the issues surrounding the valuation of employee stock options and the recognition of stock compensation expense are similar to those associated with valuing and recognizing expenses for defined benefit pension plans. In arriving at its decision to recognize pension costs in the period in which the employee renders the service, the FASB focused on the fact that a defined benefit pension plan represents an exchange between the employer and employee. The employee provides services, and in exchange the employer provides an amount of retirement income (SFAS No. 87, ¶ 79). Pension costs are, therefore, contingent upon future events and require estimates of future events which determine the future benefits that will be paid (SFAS No. 87, ¶ 82). While these estimates generate uncertainties that make it difficult to measure the amount of pension cost to be recognized, the FASB noted that cost recognition over the employee's service period was a fundamental objective (SFAS No. 87, ¶ 95) and that information based on such estimates is useful (SFAS No. 87, ¶ 82).

Stock based compensation possesses a number of characteristics that are qualitatively similar to those of defined benefit pension plans. As with defined benefit pensions, stock based compensation is the result of an exchange between the employer and employee just as a defined benefit pension plan. The employee provides services, and the employer provides stock options whose value is contingent on future stock price. Thus, similar to defined benefit pensions, stock based compensation involves exchanging services in the current period for an

unquantified amount of compensation in a later period that is contingent upon a future event. Because of this contingency, estimates are necessary to value employee stock options and determine the amount of cost to be recognized. While it is true these estimates generate uncertainties about value and the costs to be recognized, cost recognition should be the fundamental objective and information based on estimates can be useful just as it is with defined benefit pension plans.

Given the similarities between stock based compensation and defined benefit pension costs, an expense should be recognized for employee stock options just as pension costs are recognized for defined benefit pension plans. The FASB agreed with this assessment in their exposure draft on stock based compensation, noting that nonrecognition of employee stock option costs produces financial statements that are neither credible nor representationally faithful (FASB 1993). (This view is further supported in SFAS No. 87 where the FASB notes that "Footnote disclosure is not an adequate substitute for recognition" and "The usefulness of financial statements are impaired by each omission of an element that qualifies for recognition.") However, in December 1994 the FASB moved away from an expense recognition position to a "disclosure only" approach. In announcing this decision, the Board stated that "there wasn't enough support for the basic notion of requiring expense recognition," even though they remained convinced that options have value and are compensation (Beresford 1995). Disclosure, however, does not eliminate the need to recognize compensation cost stemming from the employee stock options in the financial statements. Paragraph 9 of FASB Concepts Statement No. 5 states:

> **"Since recognition means depiction of an item in both words and numbers, with the amount included in the totals of the financial statements, disclosure by other means is *not* recognition. Disclosure of information about the items in financial statements and their measures that may be provided by notes or parenthetically on the face of financial statements, by supplementary information, or by other means of financial reporting is not a substitute for recognition in financial statements for items that meet recognition criteria" (FASB 1984).**

If one accepts that stock-based compensation should be recognized as an expense, then the more difficult issues of when and how that cost is to be measured must be addressed.. The next two sections discuss the problems of determining the value of these options.

Measurement Date

In the early 1950's the Committee on Accounting Procedure noted that the principal problem surrounding accounting for stock-based compensation was how it was to be measured. Chapter 13 of Accounting Research Bulletin 43 discusses six possible dates for measuring compensation expense related to stock based compensation: the date the plan is adopted (adoption date), the grant date, the vesting date, the earliest possible exercise date, the actual date the options are exercised (exercise date), the date the grantee disposes of the stock acquired (disposal date). The committee quickly eliminated the adoption and disposal dates because they are not relevant to identifying the costs to the granting corporation. The

committee also noted that the date on which the grantee may first exercise the option will generally coincide with the actual exercise date and, as such, there is no substantive difference between these dates. Later the FASB considered the three remaining dates (grant date, vesting date, and exercise date) and concluded that valid conceptual arguments support measuring compensation on each of these dates (FASB, 1993).

The grant date is the date the employer determines the number of options to be granted to the employee and the terms of those options. Grant date accounting involves recording an asset for an amount equal to the options fair value on the grant date, and amortizing the asset ratably over the period(s) that the related employee services are rendered. The grant date is theoretically appealing because it is the date the employer commits to the transaction and the employee, by continuing to work for the required service period, controls whether the options are exercised.

The appropriateness of this argument is illustrated by the Committee on Accounting Procedures comment that if the option "were granted as a form of supplementary compensation other than as an integral part of the employment contract.....it follows that the value of the option at that time (grant date) .... which for accounting purposes constitutes whatever compensation the grantor intends to pay". The committee also noted that the grant date is "the date on which the corporation forgoes the principal alternative use of the shares which it places subject to option" (Committee on Accounting Procedure 1953).

An alternative to the grant date approach is to measure compensation expense on the date the employee fulfills all the service requirements of the compensation agreement and the option vests. The vesting date is the date on which the grantee has performed any conditions precedent to exercise of the option (Committee on Accounting Procedure 1953). As such, this is the first time that the employer is obligated to allow the options to be exercised. Prior to vesting the employee stock option agreement is merely an executory contract between the employer and employee. Only after the employee has provided the services required under the option agreement is the employer obligated to make the options described in the employment contract available to the employee. Employees that do not provide the service stipulated under the option agreement do not earn the right to exercise the options allotted to them.

Advocates of vesting date measurement also consider it to be consistent with accounting for the issuance of similar equity instruments to third parties for cash (FASB 1993, ¶ 87). Swieringa (FASB 1987, p. 560) uses the analogy of accounting for a warrant that is contingent on an uncertain future event. Prior to vesting, the employee does not have the right to exercise the option because they have not provided all the services required under the exchange agreement. As noted above, the stock compensation agreement is still an executory contract between the parties. Once the employee has provided the requisite services required under the stock compensation agreement, the options vest and the employee has the right to exercise the options during the exercise period. In effect, the employee is now in the same position as the holder of a stock purchase warrant, in that he or she has the right to acquire shares of stock at a certain price during a specified period. The choice of when to ultimately exercise the option is then an individual investment decision of the employee. Thus, any subsequent change in the market price should not affect the company's total compensation cost.

The recognition of compensation expense over the service period focuses attention on the vesting date (FASB 1987, p. 559). The accrued compensation expense is estimated at the end of each service period until the vesting date when the actual total compensation cost is known. There are some measurement problems for the intervening period between the date of grant and the vesting date, but these are not uncommon accounting problems.

The third potential measurement date is the date the option is exercised by the employee. Proponents of using the exercise date argue that employee stock options are a contingency until they are exercised or lapse. Thus, the ultimate value of these options cannot be determined until the exercise date (Bohan 1979). The accounting under this approach would be similar to the accounting for stock appreciation rights, where compensation costs would be accrued each year until they are exercised or lapse (Balsam 1994). This method has the advantage of being simple and straightforward. It also produces symmetry between the compensation cost recognized by the employer and the value received by the employee. However, as pointed out in the vesting date discussion above, the services have been performed and the options earned over the vesting period. The decision to exercise is an individual investment decision that is determined based on personal preferences, such as risk preferences (see Huddart 1994). Thus, using the exercise date as the measurement date would lead to compensation expense being a function of personal investment decisions rather than the services performed by the employee.

Each of the possible measurement dates discussed above have conceptual merit and were considered by the FASB in their deliberations prior to issuing the exposure draft. Most Board members thought that a reasonable conceptual case could be made for either the vesting date or the grant date (FASB 1993, ¶ 99). In the exposure draft, the FASB decided to focus on grant date measurement because this is the date that both parties agree to the terms of the stock compensation arrangement. Some FASB members were concerned about the volatility in interim reported compensation cost that might result from using the vesting date or the exercise date. However, FASB Chairman Beresford, in an interview shortly after the ED was issued, stated that "most FASB members agree that the vesting date is at least as conceptually appropriate for measuring option value as the grant date, and the use of the vesting date might eliminate the measurement difficulties that were inherent in the exposure draft position" (Bureau of National Affairs 1994). In Section III we offer an alternative vesting date model that seems to minimize some of the problems inherent in the grant date approach.

Measurement Methods

The final issue in accounting for stock based compensation involves measuring the fair value of employee stock options (ESO), which determines the amount of compensation expense. This is, perhaps, the most controversial issue surrounding the stock compensation debate, and as a result the most difficult to resolve. The fair value of an ESO is driven by two elements: the intrinsic value of the option and its time value (Robbins 1988, p. 567). The intrinsic value is the difference between the exercise price of the option and the market price

of the underlying stock on any given date. This value will be positive when the price of the underlying stock increases above the exercise price. When the stock price is below the exercise price, however, the intrinsic value of the option is zero. Thus, the option holder can benefit from upward price movements, but will not experience direct losses from downward price movements. (If the stock price falls below the exercise price, the option holder will simply choose not to exercise the option.) The time value of a stock option reflects the one-sided risk-reward characteristics of an option. The option-holder benefits from the stock appreciation without having to purchase the underlying stock. The time value decreases as the measurement date approaches and will be zero on the measurement date.

The difficulties in measuring the fair value of stock based compensation lies in identifying a clear, objective method for determining the fair value of the option's intrinsic value and time value elements. The FASB concluded in the ED that option pricing models provide the best measure of an ESO's fair value. They preferred these models because they consider the volatility value of the option; whereas, other approaches such as discounted cash flow techniques do not.

The FASB's primary argument for using option pricing models to value ESO's was that the resulting fair values and compensation cost would provide more useful and *relevant* financial information (FASB 1993). However, the overwhelming message from the public hearings and comment letters was that there was a need for a more reliable measurement of compensation cost than that suggested in the Exposure Draft (Coopers & Lybrand 1993, p. 23). Accounting information is *reliable* to the extent that it is verifiable, representationally faithful, and reasonably free of error and bias (FASB 1980). Most discussants agreed that the ED provided better neutrality than APB 25 (see Coopers & Lybrand 1993). However, these discussions also identified three critical limitations of option-pricing models that lead to serious concerns about the *verifiability* and *representational faithfulness* of the resulting fair value estimates.

First, option-pricing models generate only a mathematically derived "theoretical" value, which is based on a series of assumptions which may or may not be valid in the context of employee stock options. For example, Huddart (1994) illustrates how the assumption that all ESO's recipients are risk neutral may be inappropriate and discusses the impact this error has on option valuation. Because of the broad-ranging nature of these assumptions, the characteristics of ESO's, and the fact that no market exists for this type of stock option, there is no way to determine if the theoretical value approximates the fair market value of the option. The existence of vesting privileges, early exercise provisions, and trading restrictions further complicates the scenario. Such distortions in the foundations underlying these models leads to the perception that the resulting information is not representationally faithful.

Second, all option-pricing models have limitations. Many of the factors that influence fair value are based on expectations of the future that cannot be fully or accurately captured in a model. Even complex valuation models greatly simplify reality. For example, the models suggested in the exposure draft do not incorporate expectations of supply and demand, possible government actions, and changes in the economy, all of which may affect fair value. In addition, option-pricing models are usually designed to price short-term traded options, not

long-term options subject to forfeiture and transferability restrictions. Again, these factors generate concerns about the representative faithfulness and reliability of option pricing model estimates.

Finally, values derived from option-pricing models are subjective estimates that are not necessarily comparable across entities or consistent across time. While many of the input variables are somewhat objective, three of the variables (expected volatility, expected dividend yield, and expected term of the option) require highly subjective estimates. Even though these inputs are discretionary, small shifts in these variables can dramatically alter an option's value. For example, the FASB ED illustrates how, using the Black-Scholes option-pricing model, an option with a 6 year term, 30% expected volatility, and 1.5% expected dividend yield has an estimated fair value of $18.10. The sensitivity of this value to changes in the three subjective variables is illustrated in Figure 1, where all three of the subjective variables are adjusted up or down by 50 percent. As the table indicates, adjusting the variables by 50 percent produces a greater than 50% change in the option value, ranging from a low of $7.87 to a high of $29.23.

FIGURE 1
VARIATION IN BLACK-SCHOLES OPTION PRICING MODEL RESULTS

Scenario	Stock Price	Risk-free Interest Rate	Expected Term	Expected Volatility	Expected Dividend Yield†	Fair Value of the Option	Compensation Expense for 1,000 Options
Decrease by 50%	$50	6.5%	3 yr.	15%	2.25%	$7.87	$7,870
Base Case	$50	6.5%	6 yr.	30%	1.5%	$18.10	$18,100
Increase by 50%	$50	6.5%	9 yr.	45%	.75%	$29.23	$29,230

† **The expected dividend yield is increased by 50% in the first row and decreased by 50% in the last row in order to show the potential range of variation in option value under the Black-Scholes model.**

This illustration highlights how the estimated option values and related expense levels under the ED can vary significantly, depending on the assumptions used in the option pricing models. Although all assumptions affect option value, assumptions about stock price volatility and expected exercise term have the most significant impact on option value (Coopers & Lybrand 1993, p. 65). The non-verifiability and highly sensitive nature of these subjective inputs has generated considerable concern about the reliability of the resulting option values (see e.g. Huddart 1994). These measurement problems lead to questions about whether the perceived need for a new standard is justified and whether the benefits to be derived justify the costs. Most of the concern is not driven by the cost of changing accounting practices and ongoing compliance, but the cost and inefficiency imposed in the marketplace by highly

subjective and volatile expense measurements that lack comparability across companies. *Relevant* financial accounting information means that the information has either predictive or feedback value capable of making a difference in a decision (FASB 1980). The large potential variation in fair value estimates without a corresponding change in underlying economic circumstances greatly diminishes the usefulness of this information for predictive or feedback purposes. Thus, both the relevance and the reliability of the resulting compensation expense is questionable.

The FAS 123 approach provides an improvement in the neutrality of the accounting for employee stock options, but the option valuation methods suggested in the statement appear to be impractical and highly unreliable. This indicates the need for an approach that is both relevant and reliable. The proposal suggested in the next section satisfies both of these characteristics, while avoiding the limitations associated with other measurement techniques.

AN ALTERNATIVE PROPOSAL

The ultimate cost to the company of issuing employee stock options is the difference between the underlying market price of the stock and the option price when the option can first be exercised. This compensation is earned evenly over the entire compensation period, and therefore should be accrued and expensed over this period. The actual amount of compensation cost a company has incurred, however, is not known until after the compensation period has passed. Consequently, it is difficult to determine the amount of compensation expense to be recognized during each compensation period because it is impossible to know what total compensation cost will be until the measurement date.

A reliable measure of total compensation cost for the plan at any interim period is the present value of the difference between the current market price of the stock and the option price multiplied by the number of options granted. This total estimated compensation cost should then be allocated over the service period, with an expense (or a decrease in expense if the market price falls) recorded in each period. At the end of each interim period, total compensation expense reported to date should equal the percentage of the total service period that has elapsed multiplied by the present value of the estimated compensation cost.

This Vested Present Value (VPV) approach is a variation of the method applied for stock appreciation rights outlined in FASB Interpretation No. 28 "Accounting for Stock Appreciation Rights and Other Variable Stock Awards" (1978). The primary difference between this method and that identified in Interpretation No. 28 is that the VPV approach discounts the estimated compensation during the service period. Because this approach measures compensation cost over the service period and focuses on present value methods rather than option pricing models, it resolves concerns about the reliability of option pricing models and allocating compensation cost to the appropriate periods.

To illustrate the VPV method, consider a company which grants options to purchase 1000 shares of common stock at an option price of $20 on January 1, 1995 when the market price is also $20. The options vest on December 31, 1998 and are compensation for 1995, 1996, 1997, and 1998. The options can be exercised any time between January 1, 1999 and January

1, 2005. The market price of the stock on December 31, 1995; 1996; and 1997 is $26, $25, and $28, respectively. On the vesting date, December 31, 1998, the market price is $30.

Under current accounting requirements (APB 25), no compensation expense would be recorded at any time regardless of changes in the market price of the stock during the option period because the market price did not exceed the option price on the grant date. However, under the Vested Present Value approach, the company will have incurred a $10,000 cost on the vesting date (1,000 options times the difference between the market price and the option price on the vesting date) since the market price has risen to $30 by the vesting date. Figure 2 illustrates the amount of compensation expense to be recorded under the VPV approach, assuming that all of the options vest on December 31, 1998.

FIGURE 2
ANNUAL COMPENSATION EXPENSE

Date	Market Price	Exercise Price	Compensation Recognizable	Present Value[1]	% Accrued[2]	Cumulative Comp. Accrued To Date	Annual Comp. Expense
1/1/95	$20	$20	$0	.683	0%	$0	$0
12/31/95	$26	$20	$6,000	.751	25%	$1,127	$1,127
12/31/96	$25	$20	$5,000	.826	50%	$2,065	$938
12/31/97	$28	$20	$8,000	.909	75%	$5,454	$3,389
12/31/98	$30	$20	$10,000	1.000	100%	$10,000	$4,546

[1] **Assuming an interest rate of 10% compounded annually.**

[2] **The % accrued is based upon the 4-year service period**

On January 1 1995, the grant date, there is no compensation cost because the market price does not exceed the option price. On December 31 1995, the market price on the vesting date is estimated using the current market price ($26). (Alternatively, the future market price could be estimated using an empirical model based on the firm's earnings history, dividend distributions, and discount rate. Because of the subjectivity of the inputs required for empirical modelling, however, we use current market price to approximate market price at the vesting date.) The estimated total compensation cost would be $6,000, the difference between the market and exercise price. The earliest that this cost could be incurred by the company, however, is three years in the future. Thus, conceptually the company should take the present value of this expected cost using the company's cost of capital (assumed to be 10% in this example). Multiplying this amount by the percentage of the service life completed provides the cumulative compensation that should be accrued to date. Since 1995 is the first year, the entire amount is recorded as compensation expense.

On December 31, 1996 the cumulative compensation is $2,065, the difference between the market price of $25 and the exercise price multiplied by the percentage of the service period elapsed (50%). Since $1,127 was recognized in 1995, the compensation expense for 1996

would be $938. Because compensation expense is measured by the difference between market prices of the stock from period to period, multiplied by the number of options and present value, compensation expense can increase or decrease from one period to the next. This possible volatility may bother some companies, but it would simply be reflecting the volatility of the stock prices. In addition, the net shift in stock price will be dampened because the stock option expense reduces income which is counter to the change in stock price. The total compensation cost allocated over the four years was $10,000, which was the company's actual cost on the vesting date ($30 -$20)(1,000 options).

FIGURE 3
Variation in Annual Compensation Expense under the Vpv Method

Date	Market Price	Comp Recognizable	5% Discount Rate		10% Discount Rate		15% Discount Rate	
			Cumm. Comp. Acc'd To Date	Annual Comp. Exp	Cumm. Comp. Acc'd To Date	Annual Comp. Exp	Cumm. Comp. Acc'd To Date	Annual Comp. Exp
1/1/95	$20	$0	$0	$0	$0	$0	$0	$0
12/31/95	$26	$6,000	$1,296	$1,296	$1,127	$1,127	$987	$987
12/31/96	$25	$5,000	$2267.5	$972	$2,065	$938	$1,890	$903
12/31/97	$28	$8,000	$5712	$3,444	$5,454	$3,389	$5,220	$3,330
12/31/98	$30	$10,000	$10,000	$4,288	$10,000	$4,546	$10,000	$4,780

Figure 3 illustrates the effect that changing the discount rate assumption up and down by 50% has on the outcome of the VPV method. Note that this 50% change in the lone subjective input of the VPV method changes annual compensation expense by less than 5%. This is compared to a greater than 50% change in the fair value of options when the assumptions of the Black-Scholes model are flexed by 50%.

As an alternative to the example in Figure 2, Figure 4 illustrates the scenario where market price rises to $30 during the vesting period and then drops to $20 on the vesting date. When the option price is equal to or greater than the market price on the vesting date, then the company has not incurred any cost and the Vested Present Value approach will not show any *net* compensation expense (any expense recorded in one year would have been credited in a later year). If the market price does not get above the option price until after the vesting date, the company will not show any compensation expense for the employee stock options during any period. If at a later date the market price exceeds the option price and the options are exercised, compensation expense will still not be recorded because the service period has been completed and the total cost to the company is the cost on the vesting date.

While the "true" annual compensation expense should be zero for each of the four years, it is impossible to know this during the years prior to vesting. Under the VPV method

the $4,130 ($1,127 & $3,003) of compensation expense recorded in 1995 and 1996 is offset by the reductions in compensation expense of $721 and $3,409 in 1997 and 1998. Thus, the total compensation expense recorded over the four years is zero, which reflects the company's actual net compensation cost for the four year period. The fact that the VPV method recognizes net cumulative compensation of zero with annual expense based on current stock price, yields a more robust expense number than could be generated by option pricing models.

FIGURE 4
Annual Compensation Expense

Date	Market Price	Exercise Price	Compensation Recognizable	Present Value[1]	% Accrued[2]	Cumulative Comp. Accrued To Date	Annual Comp. Expense
1/1/95	$20	$20	$0	.683	0%	$0	$0
12/31/95	$26	$20	$6,000	.751	25%	$1,127	$1,127
12/31/96	$30	$20	$10,000	.826	50%	$4,130	$3,003
12/31/97	$25	$20	$5,000	.909	75%	$3,409	($721)
12/31/98	$20	$20	$0	1.000	100%	$0	($3,409)

[1] **Assuming an interest rate of 10% compounded annually.**

[2] **The % accrued is based upon the 4-year service period**

SUMMARY

The employee stock option debate is a classic example of the difficulty the FASB faces in issuing an accounting standard. The entire controversy is troubling because the debate has not focused on "proper accounting," but rather on the economic consequences of the accounting issue. If standards are written to achieve social, economic, or public policy goals, then the credibility of financial reporting is in danger. The damaging effect that injecting social engineering into the standard setting process can have on the quality and credibility of this process has already been illustrated by the controversies associated with accounting for pensions, post-employment benefits, and business combinations.

Accounting standards should be neutral in that the resulting financial information reports economic activity as faithfully as possible without trying to influence behaviors. In this case, the standard should neither encourage nor discourage the use of options or other equity securities to compensate employees. Rather, they should neutrally report employers' compensation decisions. The bias in the requirements of APB 25 in favor of fixed plans at the expense of variable plans has resulted in a much greater use of fixed plans than would result if the requirements were neutral (Coopers & Lybrand 1993, p. 13). Since APB 25 uses the intrinsic value on the grant date for fixed plans, most fixed plans result in no expense being recognized. However, since variable plans use the date when both the number of shares and

the exercise price are known, many of the variable plans will result in the recognition of an expense (FASB 1993, ¶ 55). Unfortunately, this may result in the employer's designing their compensation plans to "get around" the accounting standard rather than establishing plans that provide the best incentives (FASB 1993, ¶ 39).

The FASB attempted to remedy this problem with the proposal suggested in the Exposure Draft. The proposal would have significantly increased the amount of compensation expense many corporations recognize. Although this provides the desired neutrality, the option valuation methods suggested in the Exposure Draft are impractical and highly unreliable. The extremely negative reaction that the FASB experienced in response to the proposal probably caused the Board to compromise and issue Statement 123 which allows the APB 25 approach with additional disclosures. However, disclosure does not seem to be an adequate substitute for recognition of transactions such as these that should be treated as an expense. The FASB can be criticized for its measurement techniques, but not for attempting to require the measurement of compensation.

The Vested Present Value approach focuses on measuring both fixed and variable options on the vesting date because it is the date the employee's obligation condition has been satisfied, and the company is obligated to issue shares at the option price from the grant date. The actual compensation cost would be marked to market at the end of each period until the vesting date when the actual cost would be known. The compensation expense allocated to the service period would be the company's actual compensation cost. Options that fail to vest during a period would be part of the adjustment when the annual compensation expense is accrued. Consequently, the measurement amount will be both reliable and neutral.

This proposal seems to satisfy most of the conceptual issues that opponents to the ED have raised. Those opponents who want no expense to be shown or those who feel accounting standards should not necessarily be neutral will probably oppose this alternative. They would prefer the current accounting where the expense can be circumvented. However, if the options were given to independent consultants, or in exchange for materials, the options would be assigned a value and recorded as an expense based upon the services or materials received. Despite the difficulties in measuring the compensation expense, failure to recognize an expense does not seem to be appropriate. This paper provides a reliable and theoretically sound alternative which might provide an acceptable solution to the stock compensation issue.

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PRAGMATIC APPLICATIONS OF STOCHASTIC OSCILLATORS FOR INDIVIDUAL STOCK SELECTIONS: SOME EMPIRICAL EVIDENCE

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ABSTRACT

The recent uncertainties in world markets simply compound the difficulty of common stock selection already faced by investors. U.S. markets are certainly not exceptions. Aggressive investors seeking above average returns encounter the problems of recognizing under and overvaluation on a recurring basis. A failure to time points of entry and departure in the investment decision simply results in reduced returns and/or losses.

With volatility in stocks, bonds, precious metals, commodities, currencies, and mutual funds, investors seemingly prefer to take their chances in common stocks. However, Wall Street prognosticators repeatedly express the concern that a deep correction or major price slide in the form of a bear market is imminent and investors should exert caution. With the gurus skeptical, a logical conclusion stemming from these pronouncements suggests a premium be placed on correctly anticipating advances and declines from price levels that are too low or too high, respectively.

Timing certainly seems to be emerging as a central thrust of most investment approaches. Therefore the search continues for a predictive tool with behavior patterns which consistently display accuracy in detecting price moves at or before their point of origin rather than after the fact. Ex-ante recognition of forthcoming price movements certainly transcends ex-post decisions in the case of final investment performance. Ideally, a conceptually sound indicator can assist in identifying price moves before they are originated. A "leading indicator" which would locate "bottoms" for purchases and "tops" for liquidations and/or short sales seems to be an optimal solution.

STOCHASTIC OSCILLATORS

According to *Webster's New World Dictionary*, stochastic is " . . . designating a process having an infinite progression of jointly distributed random variables." In effect, the stochastic oscillators compare a security's closing price to its price range over a predetermined time frame. This time period is somewhat arbitrarily selected, depending on the user and his (her) investment objectives and investment horizon (Achelis, 1995). The principal use of stochastic applications lies in its attempts to indicate overbought and oversold conditions in different markets (Teixera, 1994). The feature premise of stochastics (Lane, 1984) lies in the

view that during periods of price declines, prices tend to close near the bottom of the spreads (i.e., the difference between the high and low prices for the day, week, month, etc.). In periods of advances, price closes tend to accumulate near the tops of the spread (i.e., near the security's high price for the period).

Stochastic oscillators contain two lines which are prominently displayed in graphs throughout the study. An important line utilized in the graphics is called the %K. A second line is known as %D and is a moving average of %K. Therefore, the %D line with its smoothing effect from the moving average is less sensitive, less erratic, and in general not as volatile as the %K line. Changes in direction may be signaled when movements in the %K lines change directions and intersect or "cross over" the %D line. A fast stochastic and a slow stochastic are often used. The primary difference is that the fast stochastic has no smoothing process. The absolute value of one %K calculation is used, creating a value of 1. The slow stochastic generally contains a brief three-week smoothing factor (or perhaps three-day for short-term traders) created by averaging the highest-high and lowest low for the 3 weeks (days) before the division process. Creation of the vertical bar charts and the indicator plots are made possible by Super Charts, the award-winning software package from Omega Research.

Lane's stochastic may be calculated as follows:

K = CP - LP/ HP -LP X 100 for n periods

where

K is Lane's stochastic.

CP is the security's latest or current closing price.

LP is the low price for the test period.

HP is the highest price for the test period,

n represents any number determined to be the calculation period.

To calculate, assume the calculation of a 10-day %K value (Colby & Meyers, 1988). If the latest closing price were 33, the highest price was 37, and the lowest price was 27, a range of 10 points exists. The %K value may be calculated in the following manner.

%K = 33 - 27/ 37 - 27 X 100 = .60 X 100, or 60%.

The 60% value for %K illustrates that the latest closing price was 60% relative to the trading range of the security during the last 10-day period. If this calculation remains as is without a moving average, there is no smoothing effect or period and it would serve the study in the use of the fast stochastic. The moving average of %K is based on the number of days or weeks included in the calculation period, with this value plotted as the %D line. This study incorporates a 14-week moving average period for %D to eliminate excessive sensitivity, which often creates false, misleading signals. Remember, the %K line is faster, quicker, or more volatile and reacts faster because %D is a moving average of %K. Although test periods may be varied to reflect different levels of sensitivity, this study seeks to be different from conventional technicians by using a longer-term viewpoint with less emphasis on short-term trading orientations. The intent is to reduce interpretation errors and produce better long-term results. The range of possible values for the stochastic oscillator lies between 0% and 100%, with 20% generally considered oversold and 80% overbought.

PURPOSE OF THE STUDY

This study examines stochastic models in an attempt to locate individual common stocks which are either undervalued or overvalued. By finding mispriced assets, investment returns may be increased while reducing risks by minimizing the downside vulnerability (or upside risk in the case of short sales). If stocks can be located at junctures or key turning points, above average returns are achieved.

The study includes analyses of actual stock charts. An anecdotal approach is utilized and decision rules are formulated by means of in-depth evaluation of real-world graphic presentations.

Whereas many short-term traders traditionally use daily stochastic applications for short-term decisions, the emphasis herein focuses on weekly periods. A 14-week period is constructed for the length of the valuation period to establish lead-lag relationships and hopefully obtain successful buy and sell signals of longer duration.

It is the feeling of the authors that too much emphasis is often placed on day-to-day or week-to-week trading, which leads to high commissions and reduced profits. Many traders using daily-based indicators often receive false and misleading signals, which leads to more in-and-out activity, lower returns, and higher costs. Hopefully, the use of a longer test period will provide a greater degree of certainty from buy and sell signals. Not only should the signals be reliable, but they may result in the prediction of more lasting or permanent moves.

To reiterate, methodology is designed to be consistent with the scope and intent of this study --a longer-term indicator with higher predictive powers and enhanced performance returns. It is felt that this approach serves to maximize profits and reduce commission costs, objectives which are incongruent with daily trading strategies and philosophies. By stretching our investment horizon and expanding our investment objectives to a longer-term framework, this approach may also allow investors to remain invested in short-lived retracements of the primary trends. An examination of stochastic oscillators will hopefully show appropriate signals on both full-fledged upmoves and downmoves as well as the corrective processes which disrupt overall or major trends.

ANALYSIS OF THE FINDINGS

Numerous stocks were evaluated in the research. In view of space constraints, four typical stocks and their chart patterns were included for illustration purposes. The research confirms that, generally speaking, stochastic indicator readings of 20 or less signal an oversold stock while readings of 80 or better imply overbought levels. However, buy and sell signals require more amplification and are treated in the analysis. (Figures will appear at the end of the paper).

Figure 1 contains a chart of Micron Technology, a stock which serves the study appropriately because of its well-defined moves in either direction. Notice the %K line crosses the %D line in November, 1994 on both the "fast stochastic" and the "slow stochastic"

indicators. Further, the %K line rallied from about the 15% level, suggesting a deeply oversold issue. The %D line reached the 20% level before turning upward. The initial signal to buy comes from the crossover of the %K line above the %D line. However, confirmation results from an upturn in the %D line prior to the advance recorded by the stock. When the %D and %K lines turn up prior to the stock's advance, the indicators *converge* on a falling stock price. Research results also confirmed that the more depressed the indicator reading, the more significant both the crossover signal and the %D line upturn become. Readings from 0% to 10% or 15% suggest extreme oversold conditions and advise of powerful advancement potential in the future.

Micron more than doubled in value as the price increased from below 10 to a level in excess of 20 in January, 1995. Both the crossover and the upturn in the %D line gave about two months warning prior to the origination of Micron's price advance. Sell signals were received from both fast and slow stochastic oscillators in March, 1995 when %K turned down and crossover the %D line. Several things should be noted at this point. First, the slow stochastic seems to be more reliable with its signals because of its reduced sensitivity. Secondly, when the %D line turns down from above 80%, this indicates a declining momentum and should serve as a warning to investors. A series of successively lower %D tops confirms deterioration in the momentum.

Note that downtrend lines are drawn in some illustrations to denote a signal to liquidate positions and/or sell short the stock. Although the %K sends the same signal, the %D line seems to be more meaningful because of its permanence and reduced volatility. If the %D line *diverges* or turns down while the common stock either continues its advance or "flattens out" in a sideways fashion, a strong hint of a downside reversal is received. The %K line sends a similar message but seems to lack the signal strength of the %D line because of its faster or quicker action on the graphs. And finally, upturns in both lines and particularly in the %D from the 0% to 15% level indicate a reversal in momentum. As the stock's momentum builds, the implication is that informed investors are accumulating the stock in anticipation of a strong upside price move. However, it should be mentioned that some stocks reach oversold levels with readings below 30% and overbought status at indicator values of 70%. Further, many analysts subscribe to the 30% and 70% norms rather than the 20% and 80% parameters.

Both stochastic oscillators furnished buy signals from the crossover of the %K above the %D line as well as an upturn in the %D line in September and October, 1994. A strong price advance ensued within a month as Micron enjoy roughly a five-fold increase in value with the bullish trend concluding near the 100 level. Sell signals followed in August and September of 1995, less than one month prior to the stock plummeting from 100 to the mid-20s. A beautiful, converging buy signal developed on the slow stochastic from the 0% to 10% level in January, 1996 with a spring rally emerging several months later as the stock advanced ultimately from the mid-20s to $40 per share. All signals produced in the Micron analysis provided good lead times for investors. In addition, price moves demonstrated a strong duration or degree of permanence.

Figure 2 illustrates a graph of LSI Logic. The initial stochastic buy signals came from "double bottom" chart formations with both sets of readings at or below 20%. Interestingly enough, the %K line often reaches lower absolute levels than does the %D line because of its highly sensitive tendencies. Investors should be reminded that buy signals from %D directional changes often begin from the 30% and 70% levels. Because of the smoothing effect from the moving average, the %D line often fails to achieve the extreme levels displayed by the %K line. A point of interest in Figure 2 focuses on sell signals which turned downward from the 90% level but then reversed directions again after a brief decline. The indicators yielded sell signals which predicted "correctional moves" or retracements as opposed to major junctures or bear-market turning points. Although the declines were relatively minor, they were detected by the oscillators. Investors should recognize that corrections rather than major moves generally occur during powerful, sustained trends in either direction. In this case, LSI Logic experienced an unusually strong advance.

Although a series of crossovers by the %K line could have been misleading at the September, 1995 top, a series of declining or lower tops in the %D line began in April, 1995 from the 90% level. A five-month warning of technical weakness in the stock came from the slow stochastic while a longer signal developed in the fast stochastic. Although the slow stochastic remains the more reliable of the two indicators, one must recognize that fast stochastic often presages moves in its slower counterpart. In effect, the fast stochastic frequently previews future developments in the slow stochastic. Leading stochastic sell indications helped investors sell long positions and/or establish short positions as LSI incurred a slide of "free fall" proportions by declining from 62 to 22. Strong double bottom buy signals from both oscillators in the form of %K crossovers and converging %D lines at the outset of 1996 predicted roughly a 60% advance from below 25 .

Figure 3 illustrates Pfizer, Inc., which displays a virtually uninterrupted price advance from 26. The stock's move eventually culminated in the $80 area. Both oscillators indicated %K crossovers and %D upturns in April, 1994, about a month before the large upmove. Interestingly enough, most of the buy and sell signals give ample warning but do not seem to generate meaningless or false signals. Neither are the signals received so far in advance that they lead to interpretational errors and inaccurate decision making by investors. Note that the buy signals hinted of a powerful advance as both lines emerged from below the 10% indicator level on the fast and slow stochastic oscillators. As in the case with LSI Logic, most sell signals yielded corrections due to the persistence of a powerful uptrend in Pfizer.

Figure 4 contains an illustration of International Cabletel, a stock characterized by a more gradual uptrend and more significant retracement or correction activity. The stock's first downtrend concludes in February, 1994. Meanwhile, upturns in %K and %D lines from below 10% to the 15% area, respectively, warned of a deeply oversold stock. It should be mentioned that chart illustrations emphasize the %K line at extreme readings more than they emphasize the more permanent %D line. However, the logic may be found in the fact that at extreme readings, quick changes in %K generally give earlier warning signals and preface forthcoming activity in the slower-responding %D line. Although the %D line is perhaps more critical for interpretation, the %K line, like the fast stochastic, often tells of things to come.

International Cabletel formed a double bottom with the advance developing in April, 1994. Notice the value of the %K intersection and crossover in July, 1995 as it furnished an earlier warning signal and clearly showed a declining momentum. Strong buy signals evolved in January, 1995 with %K values less than 10% and %D readings marginally higher.

The use of trendlines for both stock price and indicator movements reveal the importance of directional moves. Charles Dow discovered that bull markets were characterized by higher tops and higher bottoms, while bear markets showed lower tops and lower bottoms. Not only does International Cabletel's stock price follow the trendlines closely, but indicator interpretations seem to benefit as well. An uptrend line is drawn from the origin of the indicator buy signals in early 1994 as it connects higher bottoms and higher tops. The March, 1995 decline proved to be a correctional pause and was confirmed by the trendline action. Of interest is the parallel nature of the trendlines in both stock prices and indicators.

Strong sell signals unfolded in both stochastic indicators and hinted of a top which followed shortly. Both the %K crossover and the diverging %D line suggested technical weakness in the stock and warned of an approaching shift to the downside. Similarly, strong buy signals from readings below 10% (%K) and 20% (%D) on the slow stochastic and 10% and 15% respectively on the faster version predicted the advance from 22 to 34 in the spring of 1996.

SUMMARY OF FINDINGS

Stochastic oscillators as defined herein proved to be a strong, accurate predictor of future stock price moves and directional changes. The fast stochastic seemed to be of more value than some scholars argue in the literature. Although the slow stochastic yields more reliable, permanent moves from the signals, the fast stochastic proves its value by giving an early preview of the action which lies ahead. The indicators demonstrated good leading abilities as a technical tool with advance warnings from less than one month up to five months or more. Regardless, investors are furnished enough time to make decisions and alter investment strategies.

In addition to the value of the fast stochastic, another meaningful conclusion seems to be the strong leading indicator potential of the %K line and its early intersection or crossover signals with the %D line from depressed or lofty levels. Although Dr. Lane apparently devoted more attention to the %D line, the %K crossover (intersection) of the %D line proved invaluable at extreme readings. In fact, investors should acknowledge the crossover signals at inordinately high or low levels because this is usually the first sign of a change in momentum in either direction.

The positive results appear closely correlated with the longer smoothing effect from the 14-week %D line. False, misleading moves for the most part are eliminated. Further, trendlines are often helpful in indicating lower tops for %K and especially for %D lines and higher bottoms for each. The study suggests that a series of lower tops in the %D line at overvalued levels should help investors with their self discipline and recognize the loss of momentum. Similar benefits may be reaped at bottoms.

As a general rule, downturns in any line from above 70%, 80%, or 90% warn of weakness. Conversely, upturns in either or both lines from below 10%, 20%, or 30% signal the first indication of a potential momentum reversal. Heed these turns diligently. Also remember that multiple bottoms or tops that form on the indicator graphs often lead to powerful moves in much the same way as do extreme readings. More than one signal often results at multiple indicator tops or bottoms (i.e., double or triple tops, etc.). If one acknowledges the first signal, be patient and remain steadfast with convictions because the opportunity to get in early on a potentially powerful formation lies at hand.

Although the potential exists for more in the way of research efforts, results from this study proved especially gratifying. Additional work along these lines could refine these efforts and prove to be a potential breakthrough in technical analysis, individual stock selection, and overall portfolio management.

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AN ALTERNATIVE VERTICAL APPROACH TO ANALYZING OVERHEAD VARIANCES

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ABSTRACT

This article presents an alternative model for analyzing overhead variances based on a vertical approach. As illustrated, this model uses a highly structured approach to calculating overhead variances which makes the calculations easier for students to remember. In addition, this approach enables students to more clearly determine the favorable or unfavorable nature of the variances as well as identifying the relationships between the two-way, three-way, and four-way analyses.

INTRODUCTION

Variance analysis has traditionally been among the more difficult topics for cost and managerial students to comprehend. Various methods have been suggested for presenting this material in a manner that will simplify calculations and facilitate an understanding of the resulting variances. Among these methods the most commonly used are the formula approach and the horizontal diagram approach, both of which are illustrated in many textbooks. Alternative approaches include a "common sense" approach (Chow, 1988), a graphic approach (Martin & Laughlin, 1988), and a vertical approach (Smith, 1991). While the techniques may vary, all of the methods attempt to simplify the calculations of the variances and promote an understanding and appreciation of the meaning of the resultant numbers.

The purpose of this article is to present an alternative model which builds on Smith's (1991) vertical model for analyzing overhead variances. First, the four basic components of our vertical model which comprise combinations of actual and standard costs of production are explained. Next, our vertical format for calculating manufacturing overhead variances using the four components is presented. Finally, an example is included to illustrate the applicability of our model for analyzing overhead variances.

Our vertical model for analyzing overhead presented in this paper should enhance students' understanding and learning in calculating two-way, three-way and four-way overhead variances. For comparison purposes, a review of other approaches is provided in the next section.

OTHER APPROACHES TO OVERHEAD VARIANCE ANALYSIS

Several approaches have been suggested to enhance the classroom presentation of variance analysis and enable students to more readily comprehend the concepts and calculations covered. Chow (1988) advocated a "common sense" approach which presented a written explanation of the variances. This approach, to be used to reinforce the traditional approaches, was designed to enhance the student's understanding of the underlying reasoning behind the variances. Referred to as a non-formula approach, the article consists of a series of formulas, using words instead of numbers.

A graphic approach to variance analysis was developed by Martin and Laughlin (1988). Using a series of overhead transparencies which present a logical progression of the development of the variances, students are provided a visual graphic illustration of the components of the variances. This method is also intended to supplement the traditional formula and diagram approaches.

An alternative format for presenting variance calculations, referred to as the "Vertical Method," was developed by Smith (1991). In this model fixed and variable overhead computations are integrated into a single formula, which, according to Smith, facilitates the preparation of journal entries as well as the calculation of the variances. Two features of this study are relevant to our article. First, by referring to educational psychology literature on learning organizers and learning transfer, he provided theoretical support for his vertical model to assist in organizing learning (pg. 81). Second, a classroom experiment, which tested the effectiveness of the traditional horizontal versus his vertical instructional approach indicated students in the vertical section scored significantly higher on variance exam questions than did the students in the horizontal sections even after controlling for grade point average factors. These results support the development of models which enhance students' understanding and comprehension of difficult academic topics. While the basic initial feature of our model is similar to Smith's vertical model, we extend the framework to provide a structural means of organizing, calculating and identifying the nature of the variance.

Similar to the alternative approaches discussed, we do not advocate rote memorization of formulas and computations. Like these other approaches, our model provides a pedagogical means by which students can organize and structure the data for analyzing overhead variances. Our model can then be used to develop an underlying understanding and appreciation of variances and standard costing.

THE MODEL

The model presented herein is based on a framework for organizing four combinations of actual and standard factory overhead costs. The components of the four data points in this framework are presented in Exhibit 1. The first data point is the total actual overhead costs incurred during the period. To compute the second data point both components use the standard overhead rates with variable overhead budgeted based on actual inputs and fixed overhead budgeted based on the denominator input. As with the flexible budget of the second

data point, both components of the third data point are based on standard rates. However, variable costs are based on standard allowable inputs for actual output, while fixed overhead is again budgeted at the denominator level. The fourth data point, applied overhead, is determined by multiplying the standard allowable inputs for actual production times the standard rate for both variable and fixed overhead costs. Consistent with the horizontal analysis this framework for organizing the overhead data flows from the actual to the flexible budget to the standard applied overhead costs of production.

After organizing the overhead data into the four components, our vertical model utilizes the four data points to calculate the overhead variances in a systematic fashion. The model as shown in Exhibit 2 evolves from the two-way to three-way to four-way variance analysis.

SPECIAL FEATURES OF THE MODEL

There are three basic features of our vertical model for analyzing and computing overhead variances which represent an improvement over other similar models which are as follows:

(1)	**The variances are easily calculated from the four data points using a highly structured approach.**
(2)	**The nature of the variances, whether unfavorable or favorable, can be easily determined.**
(3)	**The relationships between the two-way, three-way, and four-way analysis are clearly identified.**

Each of these features are illustrated in the following discussion based on the model framework as depicted in Exhibits 1 and 2.

In a two-way analysis the overhead variance is divided into two components, the flexible budget and volume variances. The flexible budget variance is defined as the difference between actual costs and budgeted costs for standard allowable inputs. In our model this variance is computed by subtracting data points #1 and #3. Accordingly, this variance is a combination of both spending and efficiency which will be broken down in the three-way analysis. The volume variance, related only to fixed overhead, is measured as the difference between the denominator volume input and standard input allowed times the standard rate for fixed overhead. In our model this variance is calculated by subtracting data points #3 and #4. Two factors should be noted concerning the volume variance. First, although data points #3 and #4 include a variable overhead component, it is the same for both points. Accordingly, the difference (volume variance) is caused solely by the fixed overhead component. Secondly, the volume variance (#3 - #4) is presented as the last variance calculated in all three systems. It is important to note that data point #2, the flexible budget for actual inputs, is not used in the two-way analysis of variance.

When calculating the three-way variance analysis the flexible budget variance is split between the spending variance and the efficiency variance. The two-way flexible budget variance, calculated as #1 minus #3, now incorporates data point #2. Accordingly, the variance is separated into the spending variance, #1 minus #2 and the efficiency variance, #2 minus #3.

As will be demonstrated in the four-way analysis, the spending variance comprises two differences, one for variable overhead and one for fixed overhead. However, the spending variance in the three-way analysis is the difference between total actual overhead and the total flexible budget based on actual inputs. To complete the flexible budget variance from the two-way analysis, the next step is simply to subtract data points #2 and #3 to obtain a measure of efficiency. The volume variance in the three-way analysis is the same as in the two-way analysis.

In the four-way variance analysis, the spending variance is simply broken down into its variable and fixed components. The spending variance of the three-way system is now separated into a variable overhead spending variance and a fixed overhead spending variance. Consistent with the three-way analysis, the spending variances are calculated by subtracting data points #1 and #2. The efficiency variance and volume variance are calculated the same as before.

Our model provides an easy method for determining whether the variances are unfavorable or favorable. From Exhibit 2 it can be seen that the data point on the left in the variance computation represents unfavorable while the data point on the right represents favorable. Accordingly, whichever value is greater (i.e., the left side or right side) determines whether the variance is unfavorable or favorable. This method for determining the nature of the variance is consistent throughout the three different breakdowns of variance analysis.

ILLUSTRATIVE EXAMPLE

A hypothetical case will illustrate the methodology of our model.

Based on a standard volume of output of 4,000 units per month, the standard overhead cost of the product manufactured by High Tech Company consists of:				
	Variable Overhead (6 machine hours @ $8 per hour)			**$ 48 per unit**
	Fixed Overhead (6 machine hours @ $15 per hour)			**$ 90 per unit**
During the current period of total of 4,400 units were produced with the following costs:				
	Variable Overhead			**$245,000**
	Fixed Overhead			**$373,000**
	Actual Machine Hours were:			**28,400 hours**
Using the standard costs per unit and the actual costs incurred in producing the output for the period, we can develop the four data points of our framework.				
1)	**Actual Overhead:**	**Variable**	**$ 245,000**	
		Fixed	**$ 373,000**	**$ 618,000**
2)	**Flexible Budget Based on Actual Inputs**			
	Variable 28,400 hrs x 8 =		**$ 227,200**	
	Fixed:Denominator Inputs x Std Rate (4,000 x 6 hrs) x 15 =		**$ 360,000**	**$ 587,200**
3)	**Flexible Budget Based on Standard Inputs Allowed:**			
	Variable (4,400 x 6 hrs) x 8 =		**$ 211,200**	

	Fixed 24,000 hrs x 15 =		**$ 360,000**	**$ 571,200**
4)	**Applied Overhead:**			
	Variable 26,400 hrs x 8 =		**$ 211,200**	
	Fixed 26,400 hrs x 15 =		**$ 396,000**	**$ 607,200**

Having combined the variable and fixed overhead data into the four factors, we will now utilize these combinations in the model to develop the respective variances. Starting with a two-way analysis, we find:

Overhead Analysis:		**U - F**	
Two-Way Analysis:	**Flexible Budget Variance**	**#1 - #3**	
		$618,000 - 571,200 = $46,800 U	
	Volume Variance	**#3 - #4**	
		$571,200 - 607,200 = $36,000 F	
Three-Way Analysis:	**Spending Variance**	**#1 - #2**	
		$618,000 - 587,200 = $30,800 U	
	Efficiency Variance	**#2 - #3**	
		$587,200 - 571,200 = $16,000 U	
	Volume Variance	**#3 - #4**	
		$571,200 - 607,200 = #36,000 F	
Four-Way Analysis:	**Variable Overhead:**		
	Spending Variance	**#1 - #2**	
		$245,000 - 227,200 = $17,800 U	
	Efficiency Variance	**#2 - #3**	
		$227,200 - 211,200 = $16,000 U	
	Fixed Overhead:		
	Spending Variance	**#1 - #2**	
		$373,000 - 360,000 = $13,000 U	
	Volume Variance	**#3 - #4**	
		$360,000 - 396,000 = $36,000 F	

This example illustrates the logical schematic approach of our system. Students can easily remember the numerical sequence of the model. Using the numbers of the data points, the two-way analysis sequence is 1-3, 3-4, noting that "2" is omitted from the two-way analysis. All data point numbers are included in the three-way analysis, using the system 1-2, 2-3, 3-4. Splitting he overhead into variable and fixed components, the four-way analysis system is 1-2, 2-3 for variable overhead and 1-2, 3-4 for fixed overhead. It should be noted that the volume variance, 3-4, is included in all systems, while the flexible budget variance of 1-3 is divided into component parts 1-2, 2-3 in the three- and four-way analysis.

Further, this example illustrates how our model allows students to easily determine the nature of the variances. If the first number of the sequence is larger than the second, the variance is unfavorable. This is logical since the cost related to the data points are organized from actual to applied numbers. Since the data points are ordered to measure actual, flexible

budget based on actual inputs, flexible budget based on standard inputs allowed, and finally applied overhead costs, if the first number of the difference exceeds the second number the difference should be unfavorable. Likewise, if the first number which represents the actual or allowable costs is less than the second number representing another allowable or applied overhead cost, the variance should be favorable.

SUMMARY AND CONCLUSIONS

Overhead variance analysis is a difficult topic for students to understand. The various formulas and calculations for the individual variances are hard to comprehend and remember. Our model presented in this article provides a framework to organize the overhead cost components and a structured approach to calculate the variances. The favorable or unfavorable nature of the variance is easily determined in this system. Using this model as a learning organizer, an understanding of the components of the data as well as the computations of the variances is facilitated.

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Exhibit 1
Framework for Analyzing Variable and Fixed Factory Overhead Variances

1. **Actual Overhead**
   - **Variable:** Actual Inputs X Actual Rate
   - **Fixed:** Actual Inputs X Actual Rate
2. **Flexible Budget Based on Actual Inputs**
   - **Variable:** Actual Inputs X Standard Rate
   - **Fixed:** Budgeted Overhead: Denominator Inputs X Standard Rate
3. **Flexible Budget Based on Standard Inputs Allowed**
   - **Variable:** Standard Inputs X Standard Rate
   - **Fixed:** Budgeted Overhead: Denominator Inputs X Standard Rate
4. **Applied Overhead**
   - **Variable:** Standard Inputs X Standard Rate
   - **Fixed:** Standard Inputs X Standard Rate

Exhibit 2
Model for Vertical Variance Analysis

Two-Way Analysis	**U**	**-**	**F**
Flexible Budget Variance:	**1**	**-**	**3**
Volume Variance:	**3**	**-**	**4**
Three-Way Analysis			
Spending Variance:	**1**	**-**	**2**
Efficiency Variance:	**2**	**-**	**3**
Volume Variance:	**3**	**-**	**4**
Four-Way Analysis			
Variable Overhead:			
Spending:	**1**	**-**	**2**
Efficiency:	**2**	**-**	**3**
Fixed Overhead:			
Spending:	**1**	**-**	**2**
Volume:	**3**	**-**	**4**

Spending: (Actual Rate - Standard Rate) X Actual Inputs
Variable Overhead Efficiency: (Actual Inputs - Standard Inputs) X Standard Rate
Fixed Overheard Volume: (Denominator Inputs - Standard Inputs) X Standard Rate

EXECUTIVE COMPENSATION PLANS: EMPIRICAL ANALYSIS OF THE TAX EXPLANATION OF COMPENSATION PLAN CHOICE

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ABSTRACT

Over the last twenty-five years, many different types of executive compensation techniques have become popular. Both incentive and tax factors have been cited as reasons why different forms of executive compensation are used. The purpose of this study was to determine how taxes affect firms' decisions on the trade-off between current and deferred executive compensation. The need for such inquiry was identified by Raviv (1985) in his review of research on executive compensation. A growing body of empirical research has examined the incentive effects of different forms of executive compensation (Smith and Watts 1982; Eaton and Rosen 1983; Lewellen, Loderer, and Martin 1987). However, few studies have investigated the role of taxes in executive compensation plan choice.

INTRODUCTION

Researchers such as Miller and Scholes (1982), Smith and Watts (1982), and Scholes and Wolfson (1986) have assessed analytically the impact of taxes on different forms of compensation. The role that taxes play in compensation plan choice, however, has not been investigated empirically. In order for accountants to accurately measure and report the impact of firms' transactions, it is desirable that they have as much information as possible regarding the factors that influence the transactions. Lewellen et al. (1987) concluded that an understanding of firms' investment and financing decisions may require knowledge of their executive compensation plans. By investigating the relative importance of incentive and tax considerations in the design of executive pay packages, our understanding of why various compensation techniques are employed should be increased.

The study described in the following pages tests for an unexpected increase in the current compensation of chief executive officers (CEOs) pursuant to the 1986 Tax Reform Act (TRA '86). A methodology developed by McGahran (1988) is used to test for unexpected increases in current compensation. A regression model is constructed to predict the change in CEOs' current compensation for the years 1986, 1987, and 1988. Actual changes in current compensation for each year then are compared with expected changes (from the prediction model) to identify unexpected changes in the CEOs' current compensation. The objective is to test for changes in current compensation that are not explained by macroeconomic and firm-specific factors included in the model. Detection of significant unexpected increases in

current compensation is consistent with a tax explanation for the change. Failure to detect significant unexpected increases is consistent with the view that the tax considerations do not have a great enough impact to overcome the incentive factors that favor deferred compensation.

The study also has tax policy implications. To the extent that TRA '86 increased the tax benefits of current compensation methods relative to deferred compensation methods, it can be argued that TRA '86 had undesirable tax policy consequences. This is especially significant in light of successive tax acts since 1982 eroding the ability to defer compensation - although this may have been mitigated to a degree by the $1 million dollar limitation on deductibility of current compensation.

The remainder of the study is organized as follows. Section 2 reviews the previous literature and develops a theoretical base from which hypotheses are derived. Section 3 describes the research methods. Section 4 analyzes the test results. Section 5 contains the study's conclusions and limitations.

TAX EXPLANATION OF COMPENSATION PLAN CHOICE

The tax explanation posits that the tax effects of different executive compensation techniques explain or influence their use. Researchers have developed various analytical models that explain why a particular compensation technique is preferable to another, given the tax laws at the time. They do not always agree, however, as to when, how, and to what extent taxes play a role in compensation plan choice.

In applying the tools of financial economics to various compensation techniques, Miller and Scholes (1982) attempted "...to distinguish schemes that seem intended mainly to share tax benefits from those, of greater interest to economists, that appear designed as incentives to make the real pie bigger (p. 179)." They reasoned that tax-disadvantaged schemes must have compensating non-tax benefits such as incentive or incentive-signaling benefits to justify their use. Based on the results of their analysis, however, they drew the general conclusion that, under the tax rules in effect at that time, deferred compensation techniques were tax-preferred to current compensation techniques in most situations. They even speculated that labor economists would be disappointed in their not having found more deferred compensation arrangements for which tax-savings motives could be ruled out.

Hite and Long (1982) developed a tax hypothesis that posits that the relationship between the corporate tax rate, the individual ordinary tax rate, and the capital gains tax rate determines whether a firm chooses a qualified or non-qualified executive stock option plan. Their study documented a shift from qualified compensation plans to non-qualified compensation plans after the Tax Reform Act of 1969. Their findings, along with those of Long (1986) and Poston (1960), supported their tax hypothesis. These studies, however, did not control for other factors that may have been responsible for the shift.

McGahran (1988) posited that a decrease in the desirability of perquisites (due to the combined effect of SEC disclosure requirements and taxation by IRS) would result in a shift out of perquisite compensation into monetary compensation for CEOs. She found that an

increase in CEOs' current compensation occurred as a result of the disclosure requirement and tax policies. The support of these findings for the tax explanation is limited by the fact that the shift was found to be caused by the combined effect of taxation and SEC disclosure; therefore, it is not apparent which (or if both) of the factors was responsible. In contrast to those that support the tax explanation as a primary factor in executive compensation plan choice, Raviv (1985), and Smith and Watts (1982), argued that taxes do not explain the variation in, or choice of, executive compensation techniques, but instead are only a secondary consideration. Specifically, Raviv speculated that taxes do not represent a theory of compensation plan choice but only serve to change the relative prices of various components of the compensation package. Smith and Watts agreed with Miller and Scholes' (1982) conclusion that deferred compensation techniques were tax-preferred to current compensation, but found that a combination of salary and pension was as efficient as incentive-based deferred compensation techniques in reducing taxes and did not increase the manager's exposure to risk as much as incentive plans. After citing several other examples in which compensation plan choice could not be explained by taxes, they concluded that:

> ***tax effects are at best a partial explanation for the nature, existence, and growing popularity of incentive plans and are not likely to be the primary explanation. Incentive effects would appear to be more important given their ability to explain the nature of, and cross-sectional variations in, the plans (p. 153).***

In summary, some researchers have argued that taxes are a significant factor in executive compensation plan choice while others have argued that other (incentive) factors are the primary determinants and that taxes are at most only of secondary importance. In the following subsections, analyses of the effects of TRA '86 on executive compensation plan choice are provided. In each subsection, a particular change in the tax law is analyzed and, from that, a specific tax hypothesis is developed. The analyses result in hypotheses that test for an unexpected increase in current compensation after TRA '86.

REVERSAL OF MAXIMUM TAX RATES

Miller and Scholes (1982) demonstrated analytically that when personal and corporate tax rates are equal, deferred compensation arrangements are tax-neutral. In effect, the firm offering deferred compensation is reducing the executive's current salary and investing the difference in a security. The interest on the security is taxed at the corporation's marginal tax rate just as it would be if it had been paid out as current compensation and invested in a security by the executive.

A tax advantage arises if the firm's tax rate is less than the executive's. [This does not necessarily hold true if the executive's tax rate is expected to decline in future years, if the firm's tax rate is expected to increase in future years, or if the firm can earn a greater after-tax return on investment than the executive. Other exceptions may exist for firms that are in a net operating loss position or are subject to the alternative minimum tax (Scholes and Wolfson

1986)]. Before TRA '86, the top corporate tax rate of 46% was less than the top individual tax rate of 50%, making deferred bonus arrangements tax-preferred to current compensation. TRA '86 reversed the relationship between the two tax rates, with the top corporate rate now being 34% and the top individual rate being 28% (phased-in during 1987). (TRA '86 also resulted in the assessment of a 5% surtax over certain ranges of taxable income for both corporations and individuals. Consequently, the top tax rates for corporations and individuals with taxable incomes in these ranges now were 39% and 33%, respectively). Based on the foregoing analysis, deferred bonus arrangements now were tax-disadvantaged. Hence, a tax explanation would predict an unexpected increase in current compensation after TRA '86 (i.e., a shift from deferred to current compensation not explained by the macroeconomic and firm-specific factors in McGahran's (1988) model).

REDUCTION IN INDIVIDUAL TAX RATES

As mentioned in the previous section, TRA '86 lowered the top ordinary tax rate from 50% to 28%. Several articles (*Employee Benefit Plan Review*, 1988; Greenlaw, 1988; Levine, 1988) suggest that this large reduction in the tax rate would reduce executives' demands or desires for deferred compensation. This argument assumes executives have input into the process and that they have a greater utility for current compensation (because they have the use of the cash currently and do not bear the added risk exposure of deferred compensation). Also, to the extent executives might anticipate higher tax rates in the future, they would be less likely to defer income to those years. A tax explanation then would predict an unexpected increase in current compensation after TRA '86.

REDUCTION IN TAX RATE PROGRESSIVITY

TRA '86 also reduced the progressivity of the tax rates. While eleven different individual tax brackets existed before the 1986 Tax Reform Act, after the transition, only two brackets existed, 15% and 28% (except for the 5% surtax mentioned previously). Eaton and Rosen (1983) anticipated that executives expecting to be in lower tax brackets upon retirement would find deferred compensation of any form attractive. With only two rates in existence, most executives could expect to be in the same bracket (28%) during retirement as before retirement. If rates were increased, they could be in a higher bracket during retirement. Based on the decrease in progressivity of the rates, a tax explanation would predict an unexpected increase in current compensation after TRA '86.

LOSS OF CAPITAL GAINS TAX RATE

TRA '86 phased out preferential treatment for capital gains transactions. Before TRA '86, the principal tax advantage of qualified stock options (also referred to as restricted or incentive stock options) over non-qualified stock options was that qualified stock options were eligible for capital gains treatment.

Before 1987, the capital gains deduction resulted in a maximum effective tax rate of 20% on capital gains for individuals. Nineteen eighty-seven was a transition year in which capital gains were taxed at no more than 28%. After 1987, the effective tax rate on capital gains was the same as the ordinary tax rate; therefore, capital gains no longer received favorable tax treatment. As explained in the following paragraphs, this loss of preferential treatment for capital gains, along with the reversal in tax rates discussed previously, supports a tax explanation that would expect a shift away from qualified executive stock option plans after TRA '86.

For non-qualified stock options, executives are taxed at the date the options are exercised (on the excess of the market price at the exercise date over the exercise price). The corporation then receives a corporate tax deduction for this amount at the exercise date. For qualified stock options (ISOs), executives are not taxed upon exercise but only at the point they sell the shares (on the excess of the sales price over the exercise price). The corporation, however, receives no corporate tax deduction.

As mentioned previously, Hite and Long (1982) developed a tax hypothesis explaining the form of executive stock option plan chosen, qualified versus non-qualified. They hypothesized that the relationship between the corporate tax rate, the individual ordinary tax rate, and the capital gains tax rate, determines whether a firm chooses a qualified or non-qualified executive stock option plan. During various periods of time since the inception of the federal income tax system, the tax laws have allowed the use of capital gain tax rates for qualified stock option plans (Long, 1986). These stock option plans are qualified or restricted in the sense that certain requirements and limitations must be met (such as how long the stocks must be held before exercise and sale) in order for them to receive capital gains treatment. All other stock option plans are considered to be non-qualified, and are taxed at ordinary tax rates upon exercise. While qualified option plans have enjoyed the capital gain tax rates, the tradeoff has been the inability of the corporation to take the corporate tax deduction it otherwise would be entitled to.

Miller (1977) quantified the relationship between the three tax rates in order to determine which alternative offered the lowest joint tax liability at a point in time. The following formula can be used to determine the alternative that gives the executive the most after-personal tax dollar for a given after-corporate tax dollar. The break-even point is:

$$\frac{[1-Tg]\,[1-Tc]}{[1-Tp]},$$

where Tg is the effective capital gains tax rate for the executive, Tc is the effective corporate tax rate, and Tp is the ordinary individual marginal tax rate for the executive. A ratio greater than 1.0 indicates that qualified option plans will achieve a lower joint tax liability, while a ratio less than 1.0 indicates that non-qualified option plans will achieve a lower joint tax liability.

Hite and Long (1982) attempted to test the tax hypothesis by analyzing the forms of stock option plans in use before and after the Tax Reform Act of 1969, which reduced the

maximum individual ordinary tax rate from 70% to 50%. Because the changes in rates dropped the break-even ratio below 1.0, Hite and Long predicted a shift from qualified plans to non-qualified plans. They reviewed the compensation plans of the Fortune 100 firms for 1968, finding 86 with qualified option plans. Between 1969 and 1975, 81 of these 86 firms (94%) switched to non-qualified plans; this large shift supported their tax hypothesis. Long (1986) and Poston (1960) also documented shifts in the form of option plans around other instances in which the tax rates or tax laws changed.

After TRA '86 eliminated the capital gains deduction, incentive stock options (ISOs) were taxed at the ordinary tax rate, making them no longer tax-advantaged compared to other forms of deferred compensation. Using the post-TRA' 86 tax rates, the break-even ratio was 0.66, indicating that non-qualified plans now had a lower joint tax liability). The tax explanation then would expect a shift away from incentive stock options to other forms of compensation. Because other forms of deferred compensation also were affected negatively by TRA '86, as described in the previous two subsections, a tax explanation would predict an unexpected increase in current compensation. This expectation, however, is not consistent with an agency-based incentive explanation, which posits that deferred compensation methods are superior to current compensation in terms of solving certain agency problems.

An agency relationship exists whenever one party (a principal) delegates to another party (an agent) a service to be performed for compensation (Merchant and Simon 1986). In the corporate setting, managers act as agents for the shareholders, the principals. Agency theory research suggests that potential conflicts of interests between managers seeking to maximize their own utility, and outside owners wishing only to maximize firm value, result in the use of executive compensation plans as a means to motivate and control managerial behavior (Miller and Scholes 1982). These compensation plans contain incentives designed to align the interests of shareholders and managers.

Hite and Long (1982) pointed out that to the extent that executive compensation plans defer payoffs and make them subject to forfeiture, they may provide "performance bonding" or even the "ex-post settling up" to which Fama (1980) referred. The use of incentive compensation plans ties compensation before the fact (ex ante) to some measure of performance, while in the case of ordinary salary negotiation, compensation is tied to performance after the fact (ex post) (Smith and Watts 1982). Numerous types of executive compensation techniques are found in practice, however, and it is not apparent how these techniques differ in their attempt to solve the agency problem.

HYPOTHESIS

The tax analysis in this section leads to the prediction that TRA '86 resulted in an increase in current compensation not explained by macroeconomic and firm-specific factors included in the prediction model. Formally, the research hypothesis is:

Ho:	**No unexpected increase in CEO current compensation occurred after the 1986 Tax Reform Act.**

Subject to the limitations discussed in section 5, rejection of the null hypothesis would be consistent with the view that tax considerations carried enough weight to overcome those incentive factors that favor deferred compensation, thereby resulting in an unexpected increase in current compensation.

RESEARCH DESIGN

Ideally, the impact of TRA '86 on CEO compensation would be assessed by examining the changes in both current and deferred compensation. However, this is not feasible because of the measurement problems encountered in attempting to value various forms of compensation (Antle and Smith 1985). Therefore, like McGahran (1988), the research described below develops a model for identifying unexpected increases in current compensation, which is defined as salary, bonus, and directors' fees.

Murphy (1985) found that the salary plus bonus component of executive compensation has a stronger statistical relationship with performance (as measured by stock price return and sales) than does total compensation. This results in a stronger prediction model. The focus on current compensation is consistent with Defeo et al. (1989), McGahran (1988), Healy et al. (1987), and Abdel-khalik (1985).

MODEL FORMULATION

This section formulates a prediction model, similar to that used by McGahran (1988). Unexpected changes in CEO current compensation are identified by comparing actual changes in deflated current compensation to changes in deflated current compensation predicted using a regression model. Several financial measures are used as independent variables to predict the change in CEO deflated current compensation. The model's predicted changes then are compared to the actual changes in each CEO's deflated current compensation in order to compute prediction errors. The prediction errors are used to evaluate unexpected changes in deflated current compensation for the years 1986, 1987, and 1988. Detection of any significant unexpected increase in current compensation during these years would support the tax explanation. Conversely, the failure to detect any significant unexpected increase in current compensation would not support the tax explanation.

The dependent variable in the model is the change in CEO deflated current compensation, consisting of salary, bonus, and director's fees. The CEO is considered to be a representative member of top management since studies by Mruk and Giardina (1972, 1976, 1979) indicate that compensation for the five top officers and directors as a group move together.

Two adjustments are made to current cash compensation. First, to control for the effect of changing prices, the current compensation of the CEO is deflated by the Consumers' Price Index. Second, the change in the natural log of deflated compensation is used as the dependent variable, i.e.,

$$1n(COMP_{i,t}) - 1n(COMP_{i,t-1}) = 1n(COMP_{i,t}/COMP_{i,t-1})$$

where i is the company and t is the year.

McGahran (1988) noted several benefits to using changes in the log of compensation (LCOMP) when estimating compensation. Using the log of compensation reduces problems due to differences in the size of the variables across firms. Also, omitted variables that influence the level of compensation in each time period, which are themselves unchanging over time, will drop from significance when first differences are used. To the extent that these omitted factors are constant through time, they will be captured in the intercept term. In addition, cross-sectional correlations for changes in the log of compensation and for changes in the log of performance measures are stronger than correlations which exist for the levels of compensation (Murphy 1985), and the higher correlations result in an improved prediction model. The log formulation is consistent with previous studies on compensation.

Parameter estimates are computed using the following regression model:

$$LCOMP_{i,t} = a_t + b_tLEARN_{i,t} + c_tLSALES_{i,t} + d_tLRC_{i,t} + f_tLESTD_{i,t} + e_{i,t},$$

where, i = 1, 2,...,132,

t = 1983, 1984,.....1988,

$LCOMP_{i,t}$ = change in natural log compensation (COMP) for company i in year t.

$LEARN_{i,t}$ = change in natural log net income (EARN) for company i in year t.

$LSALES_{i,t}$ = change in natural log sales (SALES) for company i in year t.

$LRC_{i,t}$ = change in natural log common stock price (dividend adjusted) or the continuously compounded rate of return on common stock for company i in year t.

$LESTD_{i,t}$ = change in the natural log of the standard deviation of net income (ESTD) for the company i in year t.

$e_{i,t}$ = the disturbance term for the regression of company i in year t.

The independent variables used to predict the change in the natural log of real current compensation are net income, sales, return on common equity, and the standard deviation of net income. These are the same variables used in McGahran's model, and with the exception of the standard deviation of net income, are based on prior empirical studies that examined the relationship between compensation and other variables. These studies include Masson (1971), Lewellen and Huntsman (1970), Mruk and Giardina (1972, 1976, 1979), Williamson (1963), Healy (1985), and Murphy (1985). Inclusion of these variables is intuitively appealing because many compensation contracts for CEOs include one or more of these variables.

The standard deviation of net income is included in the model as a surrogate for risk, capturing both firm-specific and economy-wide influences on the company. Although no

formal theory exists tying compensation to the standard deviation of net income of a company, McGahran reasoned that the manager of a company operating in a volatile environment would be paid more than one whose company operates in a stable environment. Thus, a positive association is expected between the risk surrogate and compensation. The standard deviation of net income is calculated using a ten-year moving average. For example, real net income for the years 1973 through 1982 inclusive is used to calculate the standard deviation of net income for the year 1982 for each company.

Because the model is predicting changes in the natural log of compensation (and to be consistent with previous studies), changes in the natural log of net income, sales, and the standard deviation of net income are used as independent variables. The rate of return to common equity used as an independent variable is the continuously compounded real rate of return. This corresponds to a percentage change in price (including dividends) and is consistent with the percentage change interpretation of the other variables. Positive changes in the independent variables are expected to be associated with positive changes in compensation. Thus, the signs of the regression coefficients are expected to be positive.

PREDICTION ERRORS

The above regression model is used to formulate prediction errors for the years 1986, 1987, and 1988. Three years are examined because it is unclear how quickly firms could have changed their compensation plans in response to TRA '86. It is possible, although unlikely, that the impact of TRA '86 could have been felt in 1986. Due to the time lag in implementing changes in compensation plans, it is more likely that the impact of TRA '86 would not have been felt until 1987 or 1988.

First, the estimated coefficients from the regressions are combined with each firm's actual performance variables in the year being predicted to determine the predicted change in the log of current compensation for that year. Coefficients using data from 1982 through 1985 are used to predict the change in the log of compensation for 1986. Coefficients using data from 1982 through 1986 are used to predict the change in the log of compensation for 1987. Thus, for each predictive regression, the coefficients are changing over time.

The actual changes in the log of current compensation are converted to actual percentage changes in current compensation for the years 1986, 1987, and 1988. Predicted changes in the log of current compensation also are converted to predicted percentage changes in current compensation for the years 1986, 1987, and 1988. The prediction errors then represent the difference between the actual percentage increase in real current compensation and the predicted percentage increase in real current compensation. For example, if the actual percentage increase in real current cash compensation for 1987 is 10.0% and the predicted percentage increase in real current cash compensation is 6.0%, then the prediction error would be 4.0%. A significant positive average prediction error found in a given year translates to an unexpected increase in current compensation. A one-tailed t-test is used to test for significance of the average prediction error; Ho: average prediction error $\leq$ 0; Ha: average prediction error > 0.

Subject to the limitations discussed in section 5, detection of a significant positive average prediction error in 1986, 1987, or 1988 would support the tax explanation of executive compensation plan choice. Failure to detect a significant positive average prediction error in 1986, 1987, or 1988 would suggest that the increase in current compensation for that year was no greater than expected. This result would not support the tax explanation of executive compensation plan choice but would suggest that other factors affect the choice between current and deferred compensation.

By analyzing unexpected changes (actual change minus predicted change) in current compensation, certain extraneous factors are controlled for. In applying the theory of marginal productivity to managerial compensation, it would be expected that a manager's marginal product would be more likely to increase (and therefore his compensation increase) in an expanding economy when output is increasing, or when the individual company's productivity is on the rise (increase in compensation may lag somewhat since salary and bonus compensation is based on the previous year's performance).

Macroeconomic factors are controlled for in the prediction model because the independent variables (change in sales, change in net income, change in return on common equity, standard deviation of net income) used to predict the dependent variable (change in real current compensation) are variables that capture macroeconomic changes. Variability in individual firm performance (caused by firm-specific factors) also is captured in the model because bonus formulas usually include these same variables.

SAMPLE SELECTION

The source of compensation data was the executive compensation surveys published annually by Forbes. This database includes the current compensation of CEOs for the approximately 800 firms that are on one of the Forbes 500 lists. The following selection criteria were used to develop the final sample:

- **the firm must be included in all of the Forbes surveys for the years 1982 through 1988,**
- **the firm did not experience a change in its CEO during this period, and**
- **COMPUSTAT financial data were available for the firm.**

The final sample included 132 firms. (Visual inspection of the five largest positive prediction errors and five largest negative prediction errors resulted in dropping Loews corporation from the sample. The compensation of Loew's CEO, Laurence Tisch, was significantly reduced in 1987 because he was reduced to part-time status upon being appointed CEO of CBS). Table 1 describes sample mortality.

Table 1: Sample Mortality

A.	**Number of firms included in all of the Forbes surveys 1982 through 1988**	**391**

B.	Number of firms in A which did not experience a change in CEO during 1982 through 1988	170
C.	Number of firms in B for which COMPUSAT financial data were available	133
D.	Final Sample after removal of Loews	132

The study does not include data from Forbes surveys before 1982 because they included payments made on long-term incentive plans in their definition of current compensation. The inclusion of data from years prior to 1982 adds noise and results in a weaker model. As another control measure, firms that experienced a change in their CEO were not included in the sample. (Thirty-one firms experienced a change in CEO during 1986 and 19 firms experienced a change in 1987). Many other factors than those in the model impact a new CEO's salary versus the previous CEO's salary (Deckop 1988).

EMPIRICAL RESULTS: REGRESSION

The Forbes compensation data and the COMPUSTAT financial data were used to estimate prediction models for the years 1986, 1987, and 1988. Table 2 reports the descriptive statistics for the variables in the model.

Table 2: Descriptive Statistics for Variables in the Regression Model

Prediction Year: 1986						
Variable	**N**	**Mean**	**Median**	**Std Dev**	**Minimum**	**Max**
Current Compensation	396	.092	.068	.261	-1.91	2.04
Net Income	396	.139	.091	.948	-4.49	5.07
Sales	396	.042	.040	.124	-0.78	0.47
Common Price	396	.235	.259	.229	-0.71	1.04
Std Dev of Net Income	396	.066	.036	.202	-0.68	1.25
Prediction Year: 1987						
Variable	**N**	**Mean**	**Median**	**Std Dev**	**Minimum**	**Max**
Current Compensation	598	.090	.073	.241	-1.91	2.04
Net Income	598	.104	.091	.944	-4.84	5.07
Sales	598	.044	.042	.143	-0.78	1.38
Common Price	598	.237	.251	.224	-0.71	1.59
Std Dev of Net Income	598	.084	.041	.224	-0.68	1.71
Prediction Year: 1988						
Variable	**N**	**Mean**	**Median**	**Std Dev**	**Minimum**	**Max**
Current Compensation	660	.090	.072	.229	-1.91	2.04
Net Income	660	.077	.091	1.046	-5.18	5.07
Sales	660	.046	.043	.137	-0.78	1.38
Common Price	660	.203	.213	.234	-0.71	1.59

Std Dev of Net Income	660	.088	.041	.223	-0.68	1.71

Statistics for the prediction year 1986 were computed using three years of data (1983-1985) for 132 firms. Statistics for the prediction year 1987 were computed using four years of data (1983-1986) for 132 firms. Statistics for the prediction year 1988 were computed using five years of data (1983-1987) for 132 firms.

Table 3 reports the regression results. The adjusted R^2 statistics for the regressions in Table 3, which range from .19 to .26, are somewhat higher than those of previous studies using change in the log of compensation as a dependent variable due to the inclusion of more independent variables and limiting the sample to firms that did not experience a change in CEO. (Previous studies using variables in the change in the log form are Coughlan and Schmidt (1985), Murphy (1985), and McGahran (1988). Their R-squares range from .04 to .10 based on only one or two independent variables. The R-square for McGahran's [1988] study, which included the same independent variables as this study, was .21). The signs of the coefficients are positive as expected. The coefficients for net income and common stock price are significant at the .01 level (one-tailed) for all years. Chow tests of the stability of regression coefficients indicate that the regression coefficients are not stable over time.

The independent variables are correlated as expected. However, the analysis focuses on prediction errors rather than significance tests for individual coefficients. Collinearity does not affect the residuals of the regression.

Table 3

Estimated Coefficients from Regression of the Change in the Log of Deflated Current Compensation on the Change in the Log of Net Income, Sales, Common Stock Price, and Standard Deviation of Net Income (N=132)

	Year	Intercept	Net Income	Sales	Common Price	SD Net Income
Panel A:	1986	.030 (1.80)	.128 (10.15)*	.110 (1.14)	.160 (3.17)*	.019 (0.33)
		R^2 = .27; Adjusted R^2 = .26; F = 35.4; Probability = .0001				
Panel B:	1987	.034 (2.44)*	.113 (10.97)*	.015 (0.21)	.171 (4.08)*	.030 (0.70)
		R^2 = .24; Adjusted R^2 = .23; F = 40.4; Probability = .0001				
Panel C:	1988	.047 (4.17)*	.085 (10.35)*	.055 (0.89)	.147 (4.12)*	.050 (1.33)
		R^2 = .20; Adjusted R^2 = .19; F = 39.6; Probability = .0001				

Panel A, Panel B and Panel C are the regression results from the cross-sectional, time-series regression for 132 companies. All regression sample periods begin in 1983 and end with the year preceding the prediction year. The numbers in parentheses are the t-statistics for the coefficients.

* Statistically significant at the .01 level for a one-tailed t-test

PREDICTION ERROR RESULTS

The coefficients from the regression in Panel A, using data from 1982 through 1985, were used to predict the change in the log of compensation for 1986. Coefficients from Panel B, using data from 1982 through 1986, were used to predict the change in the log of compensation for 1987. Coefficients from Panel C, using data from 1982 through 1987, were

used to predict the change in the log of compensation for 1988. The estimated coefficients from these regressions were combined with each firm's actual performance variables in the year being predicted to determine the predicted change in the log of compensation for that year.

Using the antilog formula, the predicted changes in the log of current compensation were converted to predicted percentage changes in current compensation for the years 1986, 1987, and 1988. The actual changes in the log of current compensation (LCOMP) also were converted to actual percentage changes in current compensation for the years 1986, 1987, and 1988. Prediction errors then were computed by subtracting each firm's predicted percentage change in current compensation from their actual percentage change in current compensation. Table 4 provides the means and standard deviations of the prediction errors for the years 1986, 1987, and 1988.

The average prediction error for 1987 was .054, implying that the actual percentage increase in deflated current compensation was 5.4 percent greater than the percentage increase predicted by the model. This positive average prediction error is statistically significant using both a parametric t-test and nonparametric Wilcoxon sign-rank test at the .01 level (one-tail), suggesting that an unexpected increase in current compensation occurred in 1987. (Detection of a significant positive average prediction error for 1987 (the year after passage of TRA '86) is consistent with the timing of McGahran's findings. McGahran detected a significant positive average prediction error in 1978, the year after the SEC began issuing a series of releases requiring disclosure of executive perquisites). This is consistent with the tax explanation of compensation plan choice.

Neither of the average prediction errors for 1986 or 1988 are statistically significant. As mentioned previously, TRA '86 was not passed until August 27, 1986 and most of the provisions in the Act did not go into effect until 1987. It is not likely that TRA '86 would have impacted 1986 compensation because of the time lag in implementing changes to compensations plans. Also, the chance of anticipating the Act's provisions was not great as its provisions were hotly debated prior to passage (Gleckman, 1986).

The absence of a significant positive average prediction error for 1988 suggests that no unexpected increase in CEO current compensation occurred in 1988. This is not surprising since the prediction model used to forecast the change in current compensation for 1988 included data from 1987 (in which a significant unexpected increase in current compensation was detected). [In order to capture the impact of any structural change in 1987 on the 1988 forecast, an intercept shift dummy variable (that equals one in 1987 and zero in the years 1983 through 1986) was added to the model. Using this model, the average prediction error for 1988 was computed to be -0.03, which is not significant (p-value = .61). These results, like those in table 4, support the absence of a significant positive average prediction error for 1988].

Table 4: Average Prediction Errors for 1986, 1987, and 1988 (N=132)

				Parametric T test	Nonparametric Sign Rank Test
	Mean	Median	Std Dev	p value	p value

1986					
Avg Prediction Error	.014	-.007	.200	.207	.493
1987					
Avg Prediction Error	.054	.020	.220	.003	.006
1988					
Avg Prediction Error	.007	-.022	.283	.383	.930

The one tailed p values reflect the significance level of the average prediction errors.
H0: Average Prediction Error <= 0; Ha: Average Prediction Error > 0

SUB-GROUP ANALYSIS

In order to identify and control non-tax factors that are not included in the prediction model but that might have impacted current compensation, sub-group analysis was performed. An attempt was made to identify firms in the sample that were financially distressed or were the targets of takeover attempts. Arguably, non-tax factors (e.g., golden parachutes, pension planning) may have had a greater impact on the compensation decisions of these firms. A search of the Business Newsbank database was conducted for the years 1986 through 1988. Average prediction errors were computed for a sub-sample that included only those firms that:

* had not been mentioned as possible takeover targets during the period 1986 through 1988, and
* had not experienced a dividend cut (as a proxy for financial distress) during the period 1986 through 1988.

Of the 132 firms in the original sample, 95 firms met these criteria.

Tables 5 and 6 report the regression and prediction error results, respectively, for this subsample. The results indicate a positive average prediction error of 7.4 percent for 1987 which is significant at the .001 level. The removal from the sample of those firms considered financially distressed or possible takeover targets result in a larger (and more significant) positive prediction error. The average prediction errors for 1986 and 1988 were not significant (the same as for the full sample).

Chow tests were conducted to investigate the stability of the regression coefficients. Regression coefficients from the regression including data from the years 1983-1985 were compared with regression coefficients from the regression including only data from 1986 [Ho: $B_{(83\text{-}85)} = B_{(86)}$]. The results (F-statistic = 1.6, two-tailed p-value > .10) indicate that the coefficients from the two regressions are not significantly different. Because no structural change was detected in 1986, these findings support the inclusion of data from 1986 for forecasting the change in 1987 compensation.

Table 5
Estimated Coefficients from Regression of the Change in the Log of Deflated Current Compensation on

the Change in the Log of Net Income, Sales, Common Stock Price, and Standard Deviation of Net Income (N=95)
(Subsample includes only firms with no news of takeover activity and that did not experience a dividend cut.)

	Year	Intercept	Net Income	Sales	Common Price	SD Net Income
Panel A:	1986	.020 (0.96)	.145 (8.16)*	.209 (1.72)	.171 (2.88)*	-.033 (-0.49)
		R^2 = .27; Adjusted R^2 = .26; F = 26.1; Probability = .0001				
Panel B:	1987	.027 (1.55)	.135(8.82)*	.109 (1.18)	.153 (2.92)*	.0002 (0.004)
		R^2 = .24; Adjusted R^2 = .23; F = 29.1; Probability = .0001				
Panel C:	1988	.044 (3.12)*	.095 (7.98)*	.144 (1.74)	.126 (2.83)*	.035 (0.73)
		R^2 = .19; Adjusted R^2 = .18; F = 26.7; Probability = .0001				

Panel A, Panel B and Panel C are the regression results from the cross-sectional, time-series regression for 95 companies. All regression sample periods begin in 1983 and end with the year preceding the prediction year. The numbers in parentheses are the t-statistics for the coefficients.

* Statistically significant at the .01 level for a one-tailed t-test

Table 6: Average prediction Errors for 1986, 1987, 1988 (N=95)
(Subsample includes those firms with no news of takeover activity and that did not experience a dividend cut.)

	Mean	Median	Std Dev	Parametric T test p value	Nonparametric Sign Rank Test p value
1986					
Avg Prediction Error	.008	-0.010	.189	.339	.567
1987					
Avg Prediction Error	.074	.038	.234	.001	.001
1988					
Avg Prediction Error	.019	-.024	.324	.280	.844

The one tailed p values reflect the significance level of the average prediction errors.
H0: Average Prediction Error <= 0; Ha: Average Prediction Error > 0

Regression coefficients from the regression including data from the years 1983 through 1986 were compared with regression coefficients from the regression including only data from 1987 [Ho: $B_{(83\text{-}86)} = B_{(87)}$]. The results (F-statistic = 5.2, two-tailed p-value < .001) indicate that the coefficients from the two regressions are significantly different. These findings suggest that a structural change occurred in 1987, which is consistent with the significant positive average prediction error (7.4%) found for 1987. [In order to capture the impact of any structural change in 1987 on the 1988 forecast, an intercept shift dummy variable (that equals one in 1987 and zero in the years 1983 through 1986) was added to the model. Using this model, the average prediction error for 1988 was computed to be -0.01, which is not significant (one-tailed p-value = .82). These results, like those in table 6, support the absence of a significant positive average prediction error for 1988].

Separate analysis of industry groups might have reduced noise by controlling for non-tax factors that affect industries differently. This was not possible, however, due to inadequate degrees of freedom.

CONCLUSIONS

The results of this study offer evidence that an unexpected increase in current compensation occurred subsequent to TRA '86. These results suggest that taxes play a significant role in executive compensation plan choice and do not support the argument that taxes do not help explain the variation in, or choice of, executive compensation methods.

The results of the study also have tax policy implications. Previous research suggests that deferred compensation methods serve as a valuable tool in motivating and controlling executives' long-run performance, thereby enhancing shareholder wealth. The theoretical analysis and empirical results contained in this study suggest that TRA '86 increased the tax benefits of current compensation methods relative to deferred compensation methods. To the extent this occurred, it can be argued that TRA '86 had undesirable tax policy consequences. This is especially significant in light of the recent media attacks on CEO compensation (much of which is tied to the stock market) and the FASB's required disclosure of the impact on earnings of grants of executive stock options. Also, (Snarr 1994) notes that since TEFRA in 1982, successive tax acts have eroded the ability to defer compensation , especially for highly paid employees. This may have been mitigated to some degree by the $1 million limitation on deductibility of current compensation.

LIMITATIONS

While an attempt has been made to control for non-tax factors, the possibility exists that factors other than taxes or those in the model were responsible for the observed unexpected increase in current compensation in 1987. The use of a control sample might have controlled for these factors, strengthening the study's research design. However, because all firms were subject to the changes brought about by TRA '86, there was no obvious group of companies that could be used as a control sample.

More specifically, the possibility exists that the unexpected increase in 1987 current compensation could have been related to the stock market crash of October 29, 1987, which may have reduced investors' confidence in equity securities for a period of time. Assuming executives have some influence over the make-up of their compensation packages, this could have impacted compensation plan choice.

This possibility appears remote for two reasons. First, since the crash occurred with only two months left in 1987, it is unlikely that 1987 current compensation could have been influenced due to the time lag involved in implementing changes in compensation plans. Second, the investor wariness noted above may not have applied to executives specifically, when considering that insider purchasing of companies' stock was high after the crash.

Another important limitation of the study is rooted in the inability to measure deferred compensation (due to methodological constraints). While the study's results offer empirical evidence that an unexpected increase in current compensation occurred pursuant to TRA '86, it does not offer empirical evidence that the increase occurred as a result of a decrease in deferred compensation.

Ray (1988) noted the failure of researchers to concentrate on the determinants of executive compensation policies and schemes. Similarly, Raviv (1985), in his overview of research on executive compensation, included as a future research objective the need to explain the observed characteristics of executive compensation contracts in order to increase our understanding of why various compensation contracts are employed. Exploring the impact of taxes on current compensation, this study has attempted to take a step toward filling this void.

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BREAK-EVEN AND COST-VOLUME-REVENUE ANALYSIS FOR NONPROFIT ORGANIZATIONS

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ABSTRACT

By definition, the goal of a nonprofit entity is not to earn a profit. Its objective is to render as much suitable service possible with as little human and physical services. Ideally, the performance in a nonprofit organization is to break even. This means, by and large and on a short-term basis, revenues should equal costs. Over the long run, however, nonprofit entities cannot survive without reserve and sustain persistent deficits. This paper attempts to deal with many planning issues surrounding nonprofit organizations. Cost-volume-revenue (CVR) analysis, together with cost behavior information, helps non-profit managers perform many useful planning analyses. CVR analysis deals with how revenue and costs change with a change in the service level. More specifically, it looks at the effects on revenues of changes in such factors as variable costs, fixed costs, prices, service level, and mix of services offered. By studying the relationships of costs, service volume, and revenue, nonprofit management is better able to cope with many planning decisions.

QUESTIONS ANSWERED BY CVR ANALYSIS

CVR analysis tries to answer the following questions:

(a) What service level (or units of service) is required to break even?

(b) How would changes in price, variable costs, fixed costs, and service volume affect a surplus?

(c) How do changes in program levels and mix affect aggregate surplus/deficit?

(d) What alternative break-even strategies are available?

ANALYSIS OF REVENUES

Revenues for nonprofit entities include grants, contributions, and membership fees. For managerial purposes, each type of revenue is grouped into its fixed and variable parts. Fixed revenues are those that remain unchanged regardless of the level of service, such as gifts, grants, and contracts. For example, in colleges, donations, gifts, and grants have no relationship to enrollment. Variable revenues are the ones that vary in proportion to the volume of activity. Examples are cost reimbursements and membership fees. In colleges, tuition and fees are variable in relation to the number of students. Different nonprofit entities may

have different sources of revenue: variable revenue only, fixed revenue only, or a combination of both. In this chapter, we will cover different cases in treating break-even and CVR questions.

ANALYSIS OF COST BEHAVIOR

For managerial purposes (such as planning, control, and decision making), further classification of costs is desirable. One such classification is by behavior. Depending on how a cost will react or respond to changes in the level of activity, costs may be viewed as variable or fixed. This classification is made within a specified range of activity, called the relevant range. The relevant range is the volume zone within which the behavior of variable costs, fixed costs, and prices can be predicted with reasonable accuracy. Variable costs vary in total with changes in volume or level of activity. Examples of variable costs include supplies, printing and publications, telephone, and postage and shipping. Fixed costs do not change in total regardless of the volume or level of activity. Examples include salaries, accounting and consulting fees, and depreciation.

CVR ANALYSIS WITH VARIABLE REVENUE ONLY

For accurate CVR analysis, a distinction must be made between costs as being either variable or fixed. In order to compute the break-even point and perform various CVR analyses, note the following important concepts. The contribution margin (CM) is the excess of revenue(R) over the variable costs (VC) of the service. It is the amount of money available to cover fixed costs (FC) and to generate surplus. Symbolically, CM = R- VC. The unit CM is the excess of the unit price (P) over the unit variable cost (V). Symbolically, unit CM = P - V. The CM ratio is the contribution margin as a percentage of revenue.

EXAMPLE 1

To illustrate the various concepts of CM, assume that Los Altos Community Hospital has an average revenue of $250 per patient day. Variable costs are $50 per patient day. Total fixed costs per year are $650,000. Expected number of patient days is 4,000. The projected statement of revenue and expenditures follows:

	Total	Per Unit	Percentage
Revenue (4,000 days)	$1,000,000	$250	100%
Less: Variable costs	200,000	50	20
Contribution margin	$ 800,000	$200	80%
Less: Fixed costs	650,000		
Net income	$ 150,000		

BREAK-EVEN ANALYSIS

The break-even point represents the level of revenue that equals the total of the variable and fixed costs for a given volume of output service at a particular capacity use rate. Generally, the lower the break-even point, the higher the surplus and the less the operating risk, other things being equal. The break-even point also provides nonprofit managers with insights into surplus/deficit planning. To develop the formula for the break-even units of service, use the following variables:

S = Total revenue
P = Price or average revenue per unit
U = Units of service
VC = Total variable costs
V = Unit variable cost, and
FC = Total fixed costs

To break even means: Total revenue - total costs = 0; S - VC - FC = 0 or PU - VU - FC = 0 To solve, factor U out to get (P - V)U - FC = 0. Rearranging as (P - V)U = FC and divide by (P - V) to isolate U, we get U = FC/(P-V) or fixed costs divided by unit CM. If you want break-even point in dollars, use CM ratio instead of unit CM in the denominator.

EXAMPLE 2

Using the same data given in Example 1, where unit CM = $250 - $50 = $200 and CM ratio = 80%, we get: break-even point in units = $650,000/$200 = 3,250 patient days and break-even point in dollars = $650,000/0.8 = $812,500.

EXAMPLE 3

Tuition revenue (40 participants @$7,000)	**$280,000**
Less variable expenses (@$4,000)	**160,000**
Contribution margin	**$120,000**
Less fixed expenses	**150,000**
Operating deficit	**$(30,000)**

A nonprofit college offers a program in management for executives. The program has been experiencing financial difficulties. Operating data for the most recent year are shown below. The break-even point is $150,000/($7,000 - $4,000) = 50 participants.

EXAMPLE 4

In Example 3, the dean of the school is convinced that the class size can be increased to more economic levels without lowering the quality. He is prepared to spend $15,000 per year in additional promotional and other support expenses. If that is the case, the new break-even point is 55 participants ($165,000/($7,000 - $4,000).

SOME APPLICATIONS OF CVR ANALYSIS AND WHAT-IF ANALYSIS

The concepts of contribution margin and the contribution income statement have many applications in surplus/deficit planning and short-term decision making. Some applications are illustrated below using the same data as in Example 1.

EXAMPLE 5

Referring back to Example 4, another alternative under consideration is to hold the present program without any change in the regular campus facilities instead of in rented outside facilities that are better located. If adopted, this proposal will reduce fixed costs by $60,000. The variable costs will decrease by $100 per participant. Is the move to campus facilities advisable if it leads to a decline in the number of participants by 5? The answer is yes, since the move will turn into a surplus.

	Present		Proposed
S(40 x $7,000)	$280,000	(35 x $7,000)	$245,000
VC(40 x$4,000)	160,000	(35 x $3,900)	136,500
CM	$120,000		$108,500
FC	150,000		90,000
Surplus	$(30,000)		$ 18,500

CVR ANALYSIS WITH VARIABLE AND FIXED REVENUES

Many nonprofit organizations derive two types of revenue: fixed and variable. In this situation, the formulas developed previously need to be modified. The following example illustrates this.

EXAMPLE 6

ACM, Inc., a mental rehabilitation provider, has a $1,200,000 lump-sum annual budget appropriation to help rehabilitate mentally ill clients. The agency charges each client $600 a month for board and care. All of the appropriation must be spent. The variable costs for rehabilitation activity average $700 per patient per month. The agency's annual fixed costs are $800,000. The agency manager wishes to know how many clients can be served.

Let U = units of service = number of clients to be served.
We set up: Total revenue - Total expenses = 0
Lump sum appropriation + S - VC - FC = 0
Lump sum appropriation + PU - VU - FC = 0
$1,200,000 + $7,200 U - $8,400 U - $800,000 = 0
($7,200 - $8,400)U = $800,000 - $1,200,000
- $1,200 U = -$400,000
U = $400,000/$1,200
U = 333 clients

We will investigate the following "what-if" scenario:

EXAMPLE 7

In Example 6, the manager does not reduce the number of clients served despite a budget cut of 10%. All other things remain unchanged. How much more does he/she have to charge his/her clients for board and care? We let V = board and care charge per year and set up $1,080,000 + 333V - $8,400 (333) - $800,000 = 0. Solving for V yields $7,559. Thus, the monthly board and care charge must be increased to $630 (7,559/12 months).

PROGRAM MIX ANALYSIS

Previously, our main concern was to determine program-specific break-even volume. But as we are aware, most nonprofit companies are involved in multi-service, multi-program activities. Then one major concern is how to plan aggregate break-even volume, surplus, and deficits. Break-even and Cost-Volume-Revenue analysis requires additional computations and assumptions when an organization offers more than one program. In multi-program organizations, program mix is an important factor in calculating an overall break-even point. Different rates and different variable costs result in different unit CMs. As a result, break-even points and Cost-Volume-Revenue relationships vary with the relative proportions of the programs offered, called the *program mix*.

By defining the product as a package, the multi-program problem is converted into a single-program one. The first step is to determine the number of packages that need to be served to break even. The following example illustrates a multi-program, multi-service situation.

EXAMPLE 8

The Cypress Counseling Services is a nonprofit agency offering two programs: psychological counseling (PC) and alcohol addiction control (AAC). The agency charges individual clients an average of $10 per hour of counseling provided under the PO program. The local Chamber of Commerce reimburses the nonprofit organizations at the rate of $20 per hour of direct service provided under the AAC. The nonprofit organization believes that this billing variable rate is low enough to be affordable for most clients and also high enough to derive clients' commitment to the program objectives. Costs of administering the two programs are given below.

	PC	AAC
Variable costs	$4.6	$11.5
Direct fixed costs	$120,000	$180,000

There are other fixed costs that are common to the two programs, including general and administrative and fund raising, of $255,100 per year. The projected surplus for the coming
***The mix ratio is 5:4 (50,000 hours for PC and 40,000 hours for AAC).**
year, segmented by programs, follows:

	PC	AAC	Total
Revenue	$ 500,000	$ 800,000	$1,300,000
Program mix in hours	(50,000)	(40,000)	
Less: VC	(230,000)	(460,000)	(690,000)
Contribution margin	$ 270,000	$ 340,000	$ 610,000
Less: Direct FC	(120,000)	(180,000)	(300,000)
Program margin	$ 150,000	$ 160,000	$ 310,000
Less: Common FC			(255,100)
Surplus			$ 54,900

Program	P	V	Unit CM	Mix*	Package
CM					
PC	$10`	$4.6	$5.4	5	$27
AAC	20	11.5	8.5	4	34
Package total					$61

First, based on program-specific data on the rates, the variable costs, and the program mix, we can compute the package (aggregate) value as follows:

We know that the total fixed costs for the agency are $555,100. Thus, the package (aggregate) break-even point is $555,100/$61 = 9,100 packages. The company must

provide 45,500 hours of PC (5 x 9,100) and 36,400 hours of AAC (4 x 9,100) to avoid a deficit.

MANAGEMENT OPTIONS

Cost-Volume-Revenue analysis is useful as a frame of reference, as a vehicle for expressing overall managerial performance, and as a planning device via break-even techniques and "what-if" scenarios. In many practical situations, management will have to resort to a combination of approaches to reverse a deficit, including:

1. **Selected changes in volume of activity**
2. **Planned savings in fixed costs at all levels**
3. **Some savings in variable costs**
4. **Additional fund drives or grant seeking**
5. **Upward adjustments in pricing**
6. **Cost reimbursement contracts**