ACADEMY OF ACCOUNTING AND FINANCIAL STUDIES JOURNAL

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LETTER FROM THE EDITORS

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Dr. Janet Dye, University of Alaska Southeast, is the Accountancy Editor and Dr. Denise Woodbury, Weber State University, is the Finance Editor. Their joint mission has been to make the *AAFSJ* better known and more widely read.

As has been the case with the previous issues of the *AAFSJ*, the articles contained in this volume have been double blind refereed. The acceptance rate for manuscripts in this issue, 25%, conforms to our editorial policies.

The Editors work to foster a supportive, mentoring effort on the part of the referees which will result in encouraging and supporting writers. They will continue to 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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MANUSCRIPTS

A NEW LOOK AT FINANCIAL STATEMENT ARTICULATION:
FINANCIAL ACCOUNTING AT THE CROSSROADS

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ABSTRACT

Much has been written recently about the quality of earnings reported by publicly held companies. Traditionally, earnings announcements are considered principal stock price drivers. Currently, earnings per share (EPS) and price-earnings (PE) ratios are the primary benchmarks in investor decisions. The rise and fall of Enron, WorldCom, Adelphia, and Global Crossing, among others, is a wake-up call for the accounting profession to take actions that promote integrity in the earnings reporting process. In each of the previously mentioned companies, earnings reports were manipulated or window-dressed to present better than actual pictures of company earnings.

In this article, the researchers review the literature in search of a definition of quality earnings. Next, they develop a model of financial statement articulation that should help differentiate quality earnings from ordinary bottom-line earnings. The proposed model is applied to companies that have suffered recent financial disasters. Results of the study indicate that the financial statement articulation model proposed by the authors is beneficial in distinguishing quality earnings from ordinary bottom-line earnings. This study should provide impetus for the accounting profession to improve the earnings reporting process.

INTRODUCTION

Earnings manipulation is not a new phenomenon. In the McKesson-Robbins case in the 1930s, inventories and accounts receivable were dramatically overstated to produce inflated earnings and net worth. Confirmation of receivables and observation of physical inventory counts by independent auditors were established as generally accepted auditing procedures as a result of this financial defalcation. A recent issue of *Issues in Accounting Education* (November, 2002) devoted the entire publication to quality earnings questions.

Historically, corporate earnings have driven stock price projections for investor purposes. For example, earnings per share, price-earnings ratios, and return on investment measurements each use some segment of earnings, as shown on income statements, as part of the calculation. However, inordinate use of earnings as a primary driver of investment potential decisions recently generated skepticism (Morgenson, 1999). Some prominent companies such as Cisco, Tyco International, Dollar General, and Global Crossing, Ltd. indicate intentions to restate earnings. Others like K-Mart, WorldCom, and Adelphia are in financial distress and are currently in various reorganization processes. These announcements have shaken the public's confidence in the validity and quality of earnings reported on contemporary income statements. The demise of Enron (Krantz, 2002) provides additional fuel for the fire. Enron reported a 250% revenue increase and a 10% net income increase in 2000. Yet its stock prices plummeted during the latter part of 2001.

QUALITY EARNINGS AND CASHFLOWS

Quality earnings exist when earnings reported result in true economic increases in value of the companies reporting the earnings. The accounting profession has received much pressure to differentiate quality earnings from traditionally reported earnings (Brown, 1999; Branner, 2001). Amernic and Robb (2003) suggest that "Quality of earnings measures how much the profits companies publicly report diverge from their true operating earnings."

Kamp (2002) notes three elements that encompass aspects of quality earnings. Earnings should be accompanied by an equal amount of cash flow; earnings should clearly reveal ongoing costs and revenues; and earnings should clearly reveal the performance of the company's core business. Currently, the income statement identifies ongoing costs and revenues and reveals performance of the company's core business appropriately. However, relating earnings to cash flow appears to be inadequate. The writers address this aspect of quality earnings in their research. Information from the cash flow statement through proper financial statement articulation can help distinguish quality earnings from ordinary bottom-line earnings.

FINANCIAL STATEMENT ARTICULATION

In most beginning accounting texts, financial statement articulation is illustrated but not sufficiently defined. Consequently, many accounting graduates are fully aware of the procedure without knowledge of what it means. Articulation of financial statements is a process whereby data from one financial statement flows through to another financial statement. Therefore, if data are misstated on the first financial statement, an equal misstatement is made on the second financial statement. Traditionally, financial statement articulation traces current net income from the income statement to the retained earnings statement and the retained earnings section of the balance sheet as illustrated in Figure 1.

Figure 1: Traditional Financial Statement Articulation

Beginning	+Net Income or	Ending
Retained Earnings	-Net Loss From	Retained Earnings
From Balance Sheet ⟶	Income Statement ➤ -Dividends ➤	From Balance Sheet
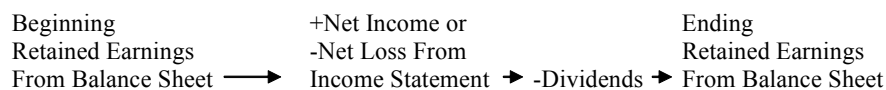
BRINGING THE CASH FLOW STATEMENT INTO THE PROCESS

The Financial Accounting Standards Board (FASB) issued Statement of Financial Accounting Standards Number (SFAS) 95 in 1987. This standard requires the inclusion of the cash flow statement in the financial reporting package. Some writers (Tergesen, 2001) applaud the integration and articulation of cash flow statement data into financial analysis in quest for more definitive measurements of quality earnings. However, until recently, very little has been done by academia to include cash flow statement information in financial statement articulation.

Bahnson (1996) discovered that changes in current assets and current liabilities in balance sheets did not coincide with changes as reported in cash flow statements in a large number of publicly held companies included in his study. There is a genuine need for the accounting profession and accounting educators to address a financial statement articulation model that includes the cash flow statement. This model should make use of data in a good mix from balance sheets, income statements, and cash flow statements to identify true increases and decreases in company value. Contemporary financial analysts realize that manipulation of company earnings has consequences on cash flow and subsequent debt structure and, accordingly, future fixed payment burdens. Companies that generate the window dressed earnings reports, in turn, experience resulting declines in value. Figure 2 illustrates the writers' proposed model that includes the cash flow statement in the articulation process.

Figure 2
Financial Statement Articulation That Includes the Cash Flow Statement

Beginning	Income	Cash Flow	Ending
Balance Sheet	Statement	Statement	Balance Sheet
Cash and		Cash Flow From	Cash and
Equivalents ⟶		Operating Activities ➤	Equivalents
……….			……….
Retained	+Net Income or		Retained
Earnings ⟶	-Net Loss ⟶	-Dividends ⟶	Earnings
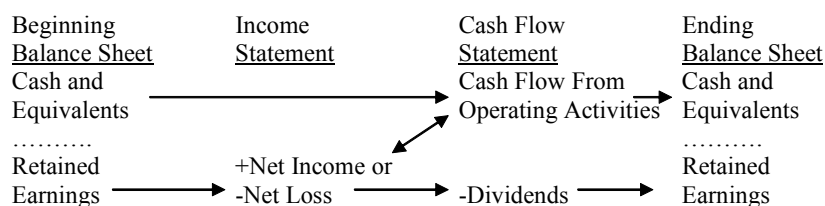
THE STUDY

The writers researched companies that experienced dramatic changes in stock prices during the years, 2001-2002. Certain ratios and other analyses that included cash flow statement data were performed on the companies for their most recently available financial information for a five-year period. One company (eBay) that experienced a 67% increase in stock price during the period and was included in the analysis because its stock price moved counter to the bear market during this period. Enron, WorldCom and Lucent were selected for inclusion in the study because their stock prices declined dramatically during 2001-2002. The research should provide the impetus for a change in the way accountants use financial statements to project investment potential of companies.

Many methods of cash flow analyses and measurements have appeared since the early 1990s. The writers used the following three ratios, or variations of these ratios, as useful tools to determine if earnings reported by the companies on their income statements were quality earnings.

♦   Cash flow from operating activities to net income (Operations Index)
♦   Total debt to cash flow from operating activities (Debt Payback)
♦   Cash invested in capital expenditures to cash flow from operating activities

The ability of businesses to generate efficient cash flows from operating activities is an important sign of quality earnings. Giacomino and Mielke (1993) proposed operations index (cash flow from operating activities to net income) as a measurement of cash generation efficiency of businesses. Since this article was published, operations indices have appeared in many accounting texts in one form or another. Recent media releases indicate that top management has the power to manipulate earnings in order to increase personal gains and to improve top management performance evaluations. However, it is difficult, if not impossible, to manipulate cash flow streams. For companies generating quality earnings, the ratio should be at least one (1) and over the long-term, it should be consistently above one. It is equally important that the ratio reflects consistency. Extreme variability indicates problems in cash management and possible earnings manipulation.

A second measurement is identified as a debt payback ratio (Mills & Yamamura, 1998). This ratio compares total liabilities on a given balance sheet date to cash flow from operating activities from the cash flow statement. It represents the number of years required to pay all debt with the current year's stream of cash flow from operating activities. An increasing trend in the debt payback ratio indicates a company is assuming debt at a faster rate than can be paid back. This ratio is a good measure of increased risk associated with a company. Many public companies, especially high-tech companies like Lucent, experienced financial distress during 1999-2001. A primary reason for such distress was increased fixed debt obligations that quickly outgrew abilities to

generate cash flow from operating activities. In efforts to obtain the most funds from original equity capital issues, these companies inflated earnings to boost stock prices.

The final ratio used in this study is cash invested in capital and intangible assets to cash flow from operating activities. This ratio recognizes the importance of investment in new and modern property, plant, and equipment to businesses in growth modes. However, it is just as important that such expenditures do not generate cash crunches for the companies. High-tech companies experienced this quandary in the latter part of 2000. The analysis can also disclose management attempts to capitalize expenditures, which are, in fact, expenses of operation and should be charged against current earnings.

DISCUSSION

The previously mentioned ratios are not intended to be exclusive of other quality earnings measurements. Rather, the writers propose the use of these specific ratios as methods of using financial information in a way that should help analysts make better decisions regarding the quality of reported earnings. In this study, the researchers emphasized quality earnings measurements that incorporate operating cash flows of companies investigated. Other models that rely mainly on income statement analysis are also helpful. By including cash flow statement information in the analysis, true increases and decreases in company value due to quality earnings should be more evident.

The researchers used data from financial statements of the four companies as reported by Microsoft's moneycentral.com for their most recently available five years of operations. The three aforementioned ratios were applied to the data. The procedure should validate the idea that companies with quality earnings add value for its investors, since stock price movements are good indicators of increases and decreases in company value. Stock price changes from February 2001 to November 2002 of each company were observed and compared with the financial statement measurements.

EBay, Inc.

EBay's operations index was .89, 2.6, 6.16, 2.07, and 2.79, averaging well above the benchmark of one. This shows that the company generated cash efficiently over the five-year period. EBay's debt coverage (payback) ratio also reflects continuous improvement at 2.0, 1.29, 1.67, 1.68, and .99 respectively during the five years. Amazingly, the company generated enough cash flow from operating activities in its most recent year to pay all of its liabilities in less than one year. The company also avoided using more than its cash flow from operating activities for capital expenditures in three of the five years examined with ratios of .88, 1.41, 1.29, .49, and .67. The

ratios for eBay indicate an absence of extreme variability from year to year, perhaps one of the most important factors in determining if earnings are manipulated.
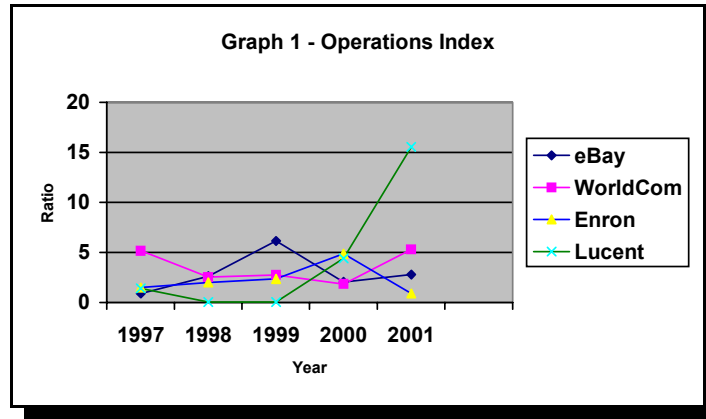
WorldCom

News releases indicate that WorldCom capitalized $5.6 billion that should have been expensed in 2001. Debt coverage ratios increased unfavorably in three of the five years. Extreme variability in the operations index indicates possible earnings manipulation. Also, WorldCom used more than its operating cash flows for capital expenditures in four of the five years examined. Perhaps the most significant warning signal for WorldCom is the severe variation in ratio trends from year-to-year.
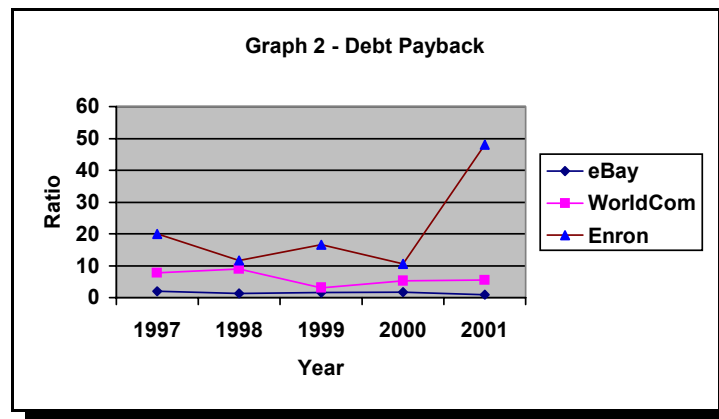
Enron

As the first of the major corporations to collapse in the 21st century, Enron has the dubious distinction to be the most talked about and the most written about of the failed organizations. Information is not available for year 2001. The 10Q Forms filed with the Securities and Exchange Commission for the quarter ending September 30, 2001, were used to calculate year five ratios. Like WorldCom, Enron's ratios indicate variability from year-to-year. Such variability is indicative of earnings manipulation. Cash invested in capital expenditures exceeded cash flow from operating activities in four of the five years. This seems to be a common characteristic of financially distressed corporations. Debt payback ratios are erratic over the five-year time frame varying from a high of 90.8 in 1997 to a low of 10.61 in 2000.
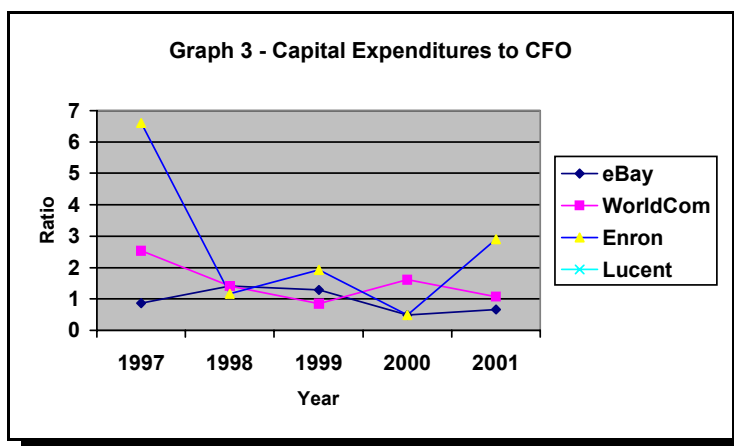
Lucent

It was difficult to compare Lucent's ratios with the other companies because the company experienced negative cash flows from operating activities in three of the five years examined. Lucent had positive cash flow from operating activities only in the first and third years of the series. In the years that Lucent had positive cash flows from operating activities, debt payback ratios were 15.51 and 565. A decline in stock price from $60.00 to $1.60 is indicative of the problems Lucent experienced during 2000-2002.

CONCLUSIONS

There is a need in today's capital markets to establish methods that correctly associate the value of publicly held companies with information on reported financial statements. In this article,

the writers suggest articulation of financial statements in a way that uses data from each of the three major financial statements to determine quality of earnings reported in income statements. Financial data were used from the four companies as the basis for validation of the writer's suggested financial measurements.

Research obtained in this study indicates that companies that show greatest improvement in stock prices, hence greatest improvement in company value, exhibit the following characteristics.

1.	Consistent operations indices greater than one
2.	Declining debt payback ratios
3.	Sufficient cash flow from operating activities to fund capital expenditures

An increase in variability or deterioration in one of the previously mentioned financial measurements should signal the need for a closer look by analysts at other company financial data. The ability to incorporate the aforementioned ratios and analyses into traditional financial statement analysis will make each interested party more capable of making informed decisions concerning company potential and financial viability.

Finally, accounting educators can help with the problem addressed in this article by curriculum design, especially in Intermediate Accounting. They should teach financial statement articulation in a manner that includes data from the cash flow statement. Sessions on cash flow statements should be taught in conjunction with the chapters on balance sheets and income statements so students can gain an appropriate appreciation of the meaningfulness of the method of financial statement articulation.

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GOING CONCERN OPINIONS USEFUL IN CONVEYING INFORMATION REGARDING THE COMPUTER INDUSTRY AND FIRMS

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ABSTRACT

This study provides evidence that going concern opinions contain useful information about the computer industry as well as about the specific computer firms announcing going concern opinions in the financial media. Three out of the five computer industries with firms that received a going concern opinion, 60 percent, that appeared in the financial media from 1989 through 1996 are associated with significant stock price reactions by rivals of the announcing firms. This is slightly higher than the 50 percent rate noted for all industries (computer and non-computer industries) included in the study.

INTRODUCTION

The information content of audit opinions has been scrutinized in the past. The main focus of the discussions has been whether audit opinions contain useful information for financial statement users. In 1988, Statement on Auditing Standard (SAS) No. 34, *The Auditor's Considerations When a Question Arises About an Entity's Continued Existence* was superseded by SAS No. 59, *The Auditor's Consideration of an Entities Ability to Continue as a Going Concern* (AICPA, 1988). SAS No. 59 eliminated the "subject to" audit opinion qualification and in its place required unqualified audit opinions to include a separate explanatory paragraph in going concern situations. The purpose of the audit opinion change was rooted in decade-old discussions surrounding the information content of auditors' opinions and their usefulness to financial statement users. The idea was that the "subject to" wording was an ineffective and possibly misunderstood means of conveying the significance of the auditor's going concern assessment. The addition of a separate explanatory paragraph, it was thought, would enhance the information usefulness of the auditor's report in conveying the existence of going concern issues.

This study examines the effects going concern opinion announcements under SAS No. 59 have on selected industry rivals of the audited firms. The study examined firms in many industries; however, this paper reports the results related to firms in the computer industry. Of interest was

whether firms in the computer industry and the computer industry as a whole respond differently compared with firms in other industries, or other industries.

BACKGROUND

The information content of audit opinions has been examined in various studies to determine whether audit qualifications contain new information useful to investors. For instance, in a study performed by Dopuch et al. (1986), firms receiving "subject to" qualified audit opinions were shown to suffer significant negative stock price reactions after the release of the information about the audit's outcome through a media announcement to the public. Such an announcement is presumed to convey new information, bringing about stock price adjustments as traders react. In contrast, related studies (Chow & Rice, 1982; Dodd, et al, 1984) show little evidence of a significant abnormal return at the filing date of the 10-K or annual report when the statements include a qualified audit opinion. This difference suggests that market participants are better able to monitor media announcements, resulting in a more efficient information dissemination process. Blay and Geiger (2001) indicate that a naive measure of market expectations provides information to the market that is incremental to previously developed measures when using market reaction as an indication of changed expectations.

Jones (1996) indicates that going concern opinions contain new information about announcing firms that is subsequently incorporated into the announcing firm's equity valuation. going concern opinions are issued when auditors doubt a firm's ability to remain solvent over the next operating period and formally issue a "subject to" qualified opinion. When a going concern opinion is issued, new negative information about the audited firm is released to the investing public, usually resulting in a downward stock price reaction. The aim of this research is to determine whether going concern opinions contain useful information applicable to rivals of the announcing firm. An audit opinion announcement followed by a significant stock price reaction by the industry as well as the announcing firm provides evidence that audit opinions contain useful information for users of financial statements.

Information transfer studies deal specifically with the resulting stock price adjustments within and among industries when an announcing firm incurs a stock price adjustment. The reaction of rivals of the announcing firm may be in the same direction or opposite of the reaction of the market. If stock prices of industry rivals adjust in the same direction as the stock price of the firm announcing unfavorable news, then the reaction is a contagion effect: the information released is interpreted by market participants to reveal new, industry-wide economic conditions. If the equity values of industry rivals adjust in a direction opposite to that of the announcing firm, then the reaction is a competitive effect: the unfavorable event is specific to the announcing firm, thus creating a new competitive position for the rivals of the announcing firm. Essentially, the competitive effect is a transfer of wealth from the troubled firm to its competitors.

DATA AND METHODOLOGY

Determining the announcement or signaling effects of going concern opinions upon announcing and non-announcing firms is the main focus of this study. Therefore, only those companies that had going concern opinions receiving attention in the financial press are of concern. Additionally, this study did not include firms receiving an auditor disclaimer of opinion in lieu of going concern opinion nor did it include firms that received a disclaimer of opinion due to the going concern issue. The following steps were followed in constructing the sample of those firms that received going concern opinions: Press announcement as reported by *Lexis Nexis* in the *Business Wire* and *Wall Street Journal Index* were used to identify NASDAQ, AMEX or NYSE listed firms that received a going concern opinion AND were identified in major financial press. Firms for which confounding events were found during the event window were not included in the sample (a confounding event is one that would materially distort the impact of the audit opinion announcement). The sampling time frame was audits of financial statements for periods on or after January 1, 1989 (the effective date of SAS No. 59) through December 31, 1996. Additionally, only firms identified in CRSP daily return data set were included in the sample. The CRSP-assigned four-digit SIC codes were used to identify the industry rivals of the announcing firms included in the sample. Only those firms that had data available on the CRSP data set around the announcement date were included in the sample of non-announcing firms. The regression coefficients of each announcing and non-announcing firm to be used in computing expected returns were computed using daily returns over the interval from 299 trading days to 50 trading days before the announcement date. For this reason, the samples of announcing and non-announcing firms were further reduced to include only those firms with the available returns for the abnormal return-generating model estimation time period on the CRSP data source.

The final sample consists of 36 cases of announcing firms. The sample size of the industry rivals of each announcing firm varies by industry. On one end of the scale, some industries contain over 100 rivals, while, on the other end, one industry contained no rivals with data available for the time period necessary to compute the abnormal returns. The industries are listed in Table 1 along with the number of announcing firms in each SIC category and the number of industry rivals for which CRSP data were available. Overall, the sample includes 2,084 rivals representing 27 different four-digit SIC-defined industries. This paper analyzes the results of firms with SIC codes 3570, 3571, 3670, 3679, and 7370, which we define as firms operating in the computer industry. These five industries contained seven announcing firms with 541 industry rivals.

The abnormal returns for each firm are calculated as the difference between the stock's actual returns and its expected return as estimated by the single index model. Using the single index model in the abnormal return-generating process is standard in event studies dealing with announcement effects. The estimation procedure for the market model (single index model) is shown below in Equation #1.

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \qquad\qquad (1)$$

where:

AR_{it} =   the abnormal or excess return on stock i for day t,

R_{it} =   the return on stock i for day t,

R_{mt} =   the return on the CRSP equally-weighted market portfolio for day t, and

α_i, β_i =   the OLS estimates of the market model parameters.

Table 1: Sample of All Firms Receiving Going Concern Opinions		
SIC: Industry:	Number of Announcing Firms:	Number of Rival Firms:
1311 Oil & Gas Extraction	2	238
2830 Drugs & Pharmaceutical	4	572
2835 Diagnostic Substances	1	6
3523 Farm Machinery & Equipment	1	8
3570 Computer and Office Equipment	2	246
3571 Electronic Computers	1	9
3670 Electronic Components & Accessories	1	106
3679 Electronic Components, nec (not elsewhere classified)	2	62
3811 Search & Navigation Equipment	2	8
3840 Surgical, Medical & Dental Instruments	1	78
3841 Surgical, Medical Instruments, Apparatus	1	13
3845 Electromedical Apparatus	1	5
4911 Electric Services	1	71
4950 Sanitary Services	1	25
5040 Professional & Commercial Equipment-whsl	1	30
5810 Eating & Drinking Places	1	16
5812 Eating Places	2	86
6162 Mortgage Bankers & Correspondents	1	15
6550 Land Subdividers & Developers	1	5
6552 Subdividers & Developers, nec	1	20
6799 Investors, nec	2	224
7360 Personnel Supply Services	1	0
7370 Computer Programming, Data Process	1	118
7380 Miscellaneous Business Services	1	18
8080 Home Health Care Services	1	18
8090 Miscellaneous Home & Allied Services, nec	1	17
8730 Research, Development & Testing Services	1	34
Totals: 27 Four-Digit-SIC-Defined Industries	36 firms	2,084 firms

The abnormal return for each firm, announcing and non-announcing, is computed using Equation #1 over the event window. The event window is limited to one day before and one day after the announcement date, all inclusive (-1,1). However, the abnormal returns of each day, 10 days before and 10 days after the announcement date, are reported and tested for significance to determine the existence of leakage or slow dissemination of information. The OLS regression coefficients are estimated based on the stock and market return behavior over a period of one year (or 250 trading days). This period ends 50 trading days prior to the announcement date in order to remove bias to the regression coefficients due to the possible changes in return variability brought about by leakage. Since one year is equivalent to 250 trading days, the estimates are computed over the interval beginning 299 trading days before the announcement date up to 50 trading days before the announcement date (-299, -50).

Once the abnormal returns are calculated, these returns must be statistically tested to determine whether they are significantly different from zero. In order to correct for problems of heteroskedasticity, the test statistics used in this study are based on standardized abnormal returns, computed as shown in the following equation.

$$SAR_{it} = AR_{it}/S_{ie} \tag{2}$$

where:

SAR_{it} = the standardized abnormal return of security i on day t,
AR_{it} = the abnormal return computed in Equation #1 for security i on day t, and
S_{ie} = the standard error of security i over the estimation period.

The SARs computed in Equation #2 are used to determine whether the security returns of the announcing firms and the respective industries represented by each announcing firm are significant. The test of abnormal returns is based on the average standardized abnormal returns that are computed in Equation #3 below.

$$ASAR_t = \tfrac{1}{N} \sum_{i=1}^{N} SAR_{it} \tag{3}$$

where:

$ASAR_t$ = the average standardized abnormal return on day t,
N = the number of firms announcing or non-announcing, and
SAR_{it} = the standardized abnormal returns computed for firm i on day t in Equation #2 above.

The industry standardized average abnormal returns (computed for the rivals of the announcing firm) and the standardized average abnormal returns for the announcing firms determine whether the difference between those returns is significantly different from zero. The testing procedure requires the computation of a t-score, which is computed as shown in Equation #4 below.

$$t = \sqrt{N}(ASAR_t) \tag{4}$$

The returns are tested at an alpha level of 0.10. However, returns significant at alpha levels of 0.05 or 0.01 are specified. The abnormal returns for the announcing firms are expected to be negative and significant and are tested with a one-tailed t-test. The industry average abnormal returns may be positive or negative depending on whether a contagion or competitive effect exists (or dominates) among the industry rivals of the announcing firm and are tested with a two-tailed t-test.

RESULTS AND IMPLICATIONS

For the 36 announcing forms from all industries, the average cumulative abnormal returns for the event window, which is denoted as (-1,1), are negative and significant (-13.77%) with a t-value of -21.299 (see Table 2.) The average abnormal returns for the announcement date of -25.20% is also significant, with a t-value of -26.923. Interestingly enough, the average abnormal returns for the first few days after the announcement date are large and positive. This may imply an initial overreaction on the part of investors to the unfavorable audit opinion announcement, followed by a subsequent adjustment back to the true equilibrium value of the securities.

Significant negative average abnormal returns to the sample of all firms announcing going concern opinions in the major financial press also occur on the third and ninth day before the official announcement date, as well as the sixth and eighth day after the announcement date. The returns before the announcement date may be evidence of an information leakage. This may infer that negative information exists about the firm other than the auditors going concern opinion is present and(or) possibly that information about the type of auditors opinion that was to be released has in some way become available to individuals outside of the audit engagement team and audit firm. For example, although auditor's have a responsibility to keep confidential certain client information, such as opinion type, it is possible that information related to the auditor's client may become available either through ethical breech or perhaps some unforeseen and unintentional actions on the part of the client or audit firm personnel. The significant negative returns on the days following the market readjustment may be the result of subsequent stories released in the financial press, or even a further readjustment.

This study also examines the possibility significant abnormal returns to the rival firms of those companies announcing going concern opinions in the major financial press. If the industry rivals of an announcing firm have significant negative returns, then a contagion effect has occurred as a result of the announcement. Conversely, if the average industry-wide equity adjustment is significant and positive, then a competitive effect dominates that industry. For this study we focus on the rivals of the five announcing firms in the computer industry.

The test results are presented for computer industry firms in Table 3. Of these five industries, three report a significant abnormal stock price reaction over the event window. Two industries (SICs 3670 and 3679) show significant negative equity adjustments, suggesting the existence of a contagion effect, while the other industry (SIC 3570) encountered a significant positive equity adjustment, implying a dominating competitive effect. Of the three industries giving evidence of the existence of competitive or contagion effects resulting from the going concern opinion announcements, two proved statistically significant at a level of .01.

Table 2: Average Abnormal Returns to All Firms Receiving Media Coverage of Their "Going Concern" Unqualified Audit Opinions from 1989-1996 (Event Window in Bold)			
Day Relative to Announcement Date	Average Abnormal Return (%)	T-value	Number of Observations
- 10	-0.8125	-0.786	36
- 9	-0.8834	-1.411*	36
- 8	1.9759	1.401	36
- 7	-0.1457	-0.556	36
- 6	2.0345	1.255	36
- 5	1.2788	1.057	36
- 4	0.7938	-0.459	36
- 3	-1.4479	-1.733**	36
- 2	-1.5901	0.132	34
- 1	2.1206	-1.081	31
0	-25.1997	-26.923***	36
+ 1	9.3106	6.704	36
(-1,1)	**-13.7685**	**-21.299*** **	**36**
+ 2	1.6121	3.372	36
+ 3	5.9782	2.906	36
+ 4	1.4502	3.916	36
+ 5	3.1891	1.638	36
+ 6	-2.3287	-3.558***	36
+ 7	0.4613	1.304	36
+ 8	-0.7698	-2.211**	36
+ 9	0.8859	1.621	36
10	1.1902	0.798	36
*** Significant at the 1% level under a one-tailed test ** Significant at the 5% level under a one-tailed test. * Significant at the 10% level under a one-tailed test.			

Table 3: Average Abnormal Returns to Rivals of Computer Industry Firms Receiving Media Coverage of Their "Going Concern" Unqualified Audit Opinions over the Event Window of (-1,1)			
SIC:	Industry:	Average Abnormal Returns (%):	Number of Rival Firms:
3570	Computer and Office Equipment	1.32***	246
3571	Electronic Computers	-0.41	9
3670	Electronic Components & Accessories	-2.28***	106
3679	Electronic Components, nec (not elsewhere classified)	-2.23*	62
7370	Computer Programming, Data Process	-0.09	118
*** Significant at the 1% level under a two-tailed test. ** Significant at the 5% level under a two-tailed test. * Significant at the 10% level under a two-tailed test.			

It is interesting to compare the average abnormal returns for the firms within the computer industry with the average abnormal return for all firms, -13.77%. Computer and Office Equipment, SIC 3570 had a rival firm average abnormal return of 1.32% (see Table 3). The competitive effect is essentially a transfer of profitability from one or more firms in the industry to others. Thus, it may be inferred that the negative aspects of the going concern issue are firm-specific and not related to the industry as a whole. Electronic Components & Accessories, SIC 3670, had a rival firm average abnormal return of -2.28% while Electronic Components, nec, SIC3679, had a rival firm average abnormal return of -2.23 %. This indicates a market interpretation of the going concern opinion of information that affects the industry as a whole. For example, such a response could be indicative of perceptions of industry-wide issues such as inflationary pressures and(or) supply constraints for resource inputs such as component materials and(or) labor. Thus, it may be inferred that the announcement of the going concern opinions communicate some industry-wide problem that was not detected or perceived to be a problem by the market prior to the announcement.

Also of interest is the apparent dominating competitive effect for Computer and Office Equipment, SIC 3570, with a rival firm average abnormal return of 1.32% compared with the contagion effects noted for Electronic Components & Accessories, SIC 3670, rival firm average abnormal return of -2.28% and Electronic Components, nec, SIC3679, rival firm average abnormal return of -2.23. This could possibly be explained partially by consideration of the firms, firm products and services, and characteristics of the different industries and the differences in the industry competitive posture. For example, SIC 3570 and 3571 industries include establishments primarily engaged in manufacturing electronic computers, including firms primarily engaged in manufacturing machinery or equipment which incorporate computers or a central processing unit for the purpose of performing functions such as measuring, displaying, or controlling process

variables are classified based on the manufactured end product. Major products include digital, analog, and hybrid, mainframe computers, microcomputers, minicomputers, personal computers, computer storage devices, computer terminals, computer peripheral equipment, including printers, plotters, and graphic displays.

SIC codes 3670 and 3679 include establishments primarily engaged in manufacturing modems and other communications interface equipment, point-of-sale devices and certain word processing equipment and establishments primarily engaged in manufacturing semiconductors and related solid- state devices. Important products of these industries are semiconductor diodes and stacks, integrated microcircuits (semiconductor networks), transistors. Finally, SIC code 7370 includes firms offering computer programming services and data processing such as including computer software design and analysis; modifications of custom software; and training in the use of custom software, computer time-sharing, data entry service, and leasing of computer time. It may be speculated that firms in the Computer and Office Equipment category are of a competitive posture such that the loss of one competitor enhances the competitive position of the remaining firms. The above scenario may be the converse with respect to SIC industries 3670 and 3679.. Firms in these categories may operate in industries which potentially are subject to greater industry-wide pressures compared with firms in the SIC 3570 category. Thus, the perceived weakness of a member firm may result in a negative perception about the prospects for the industry.

CONCLUSIONS

Consistent with prior research, this study provides evidence that suggests that going concern opinion announcements contain useful information for the users of financial statements. Additionally, it appears that leakages of information related to the going concern opinion prior to the going concern opinion occur.

Evidence was provided that computer and computer-related industries may experience more abnormal returns compared with the measures of all industries and may be dominated by the contagion effect. Three out of the five computer industries with firms that received a going concern opinion, 60 percent, are associated with significant stock price reactions by rivals of the announcing firms. This is slightly higher than the 50 percent rate noted for all firms (computer and non-computer industries) included in the study. Additionally, two of the three abnormal returns are negative, indicating a contagion effect. However, due to the small sample of announcing firms in this industry these results should be interpreted with caution. Further research is needed to shed additional light on information transfers of audit opinions in this industry.

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THE RELATIONSHIP BETWEEN CORPORATE GOVERNANCE AND MANAGEMENT FRAUD: AN EMPIRICAL ANALYSIS

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ABSTRACT

Management fraud is an important issue, as determined by significant governing bodies and major accounting firms. There are significant implications for the profession and the capital markets stemming from instances of management fraud. This study determined instances of management fraud using SEC Accounting & Auditing Enforcement Releases (AAER's) and advances our understanding of how corporate governance factors might impact instances of management fraud. Overall, results of the analysis point to the importance of corporate governance playing a role in limiting instances of management fraud, especially auditor identity and tenure.

INTRODUCTION

The purpose of the study is to determine the relationship between corporate governance and the incidence of management fraud. There is evidence that cases of MF are ever increasing and that millions of dollars are being lost to such crimes. Management Fraud has wide ranging ramifications with all stakeholders being affected in varying ways.

Regulatory organizations have commented on the responsibility of the auditor to detect management fraud. There is agreement among interested parties that audit firms need to play an active role in the detection and reporting of management fraud. Consequently, the responsibility of the audit firm to detect and report management fraud has increased through the issuance of SAS No. 53 (AICPA, 1988).

Despite an increase in responsibility, access to inside information, and applying audit procedures, audit firms have not been successful in detecting and reporting management fraud. The reasons for this lack of success are several. First, the auditing standards, while increasing the role of the auditor in detecting management fraud, state that if the audit has been performed according to generally accepted auditing standards the auditor has done his job (SAS 53, AICPA, 1988). Second, management fraud represents a situation where management intentionally misstates financial statements. As acknowledged by numerous individuals, since auditing involves testing a sample, management may have a well-concealed fraud such that the auditor is misled (Hanson,

1977; Kapnick, 1977; Arens & Loebbecke, 1988; AICPA, 1988; Campbell & Parker, 1992; Bintliff, 1993). Third, considerable amount of litigation against the auditor, large settlements by auditors, and negative press exists against the auditor, stemming from management fraud (Palmrose, 1987; Palmrose, 1991), as well as evidence pointing to the inability of the audit firm to detect management fraud (Park, 1989; Welch et al., 1995). Fourth, representatives of the auditing profession have pointed out that they are neither trained nor are necessarily able to detect violations of law that govern corporate conduct (Cressey, 1987).

This increase in responsibility but consequent inability of the audit firm to detect management fraud has had repercussions. Authoritative bodies have determined that a gap exists between the expectations of the users of financial statements and the performance of the auditing profession. They further determine that one way to reduce the gap would be for the audit firms to improve their ability to detect and report management fraud.

As early as 1977, Hanson called for increased research, development, and application of techniques to aid the auditor in detecting management fraud. Limited research has been conducted on the detection and reporting of management fraud. Additionally, the research suffers from multiple weaknesses including design and sample issues, and a lack of theory used to motivate variables.

CONCEPTUAL FOUNDATION

Agency theory is based on the view that firms are legal fictions that serve as a nexus for a set of contractual relationships among self interested individuals whereby ownership and control are separate (Alchian & Demsetz, 1972; Jensen & Meckling, 1976; Fama, 1980). Such separation arises when one or more principal(s) engage an agent to perform some services that require the agent to make decisions on behalf of the principal(s) (Spence & Zeckhauser, 1971).

The conflict between principals and agents manifests itself in the different ways in which the two groups view risk (Macey, 1991). The principals or stockholders are assumed to be risk-neutral (Jensen & Meckling, 1976), given that they can own a diversified portfolio of securities, thereby reducing the risk associated with any individual stock holding. By contrast, the agents or managers are assumed to be averse to risk and labor (Jensen & Meckling, 1976), since they hold undiversified investments in the firm for which they work, in the form of their human capital. Further, conflict could arise if both parties are utility maximizers, leading the agent to behavior not always in the best interests of shareholders (Jensen & Meckling, 1976; Fama & Jensen, 1983; Schotter & Weigelt, 1992).

But, managers face high personal costs if they are caught committing fraud (Macey, 1991). If self-interested behavior is detected, it will eventually be reflected in the reputation of the manager. This would affect the wage rate as determined by the market for managerial labor (Fama, 1980). The market for managerial labor represents an external corporate governance mechanism (Williamson, 1984). Further, the divergence of interest between the parties and deviant behavior by the agent may

be reduced if the principal incurs costs to monitor the actions of the agent (Jensen & Meckling, 1976). The above discussion leads to the inference that the incidence of management fraud will be rare (Macey, 1991).

However management fraud does occur. Management fraud represents one instance of the agency problem where managers act self interestedly in an attempt to expropriate stockholder wealth (Beasley, 1994). Agency problems can arise in a number of ways and lead to criminal conduct by the manager. Agency theory provides insights into when management fraud is likely to occur. The effectiveness of the monitoring system could impact the perpetration of fraudulent acts. While contracts between the parties are aimed at limiting the divergence of interests between the principal and agent, divergence will exist given that contracts are not costlessly written (Eisenhardt, 1989; Beasley, 1994). Since shareholders are risk neutral, given a diversified portfolio, there is a disincentive for them to incur resources to monitor the actions of the agent beyond the point at which the marginal utility derived from a dollar's expenditure equals the marginal utility of their ownership percentage (Jensen & Meckling, 1976). Thus, imperfect monitoring exists (Jensen & Meckling, 1976). The relationship between monitoring quality and incidence of management fraud is the focus of this study.

LITERATURE REVIEW

There are three streams of research dealing with the issue of management fraud. The first involves the use of a checklist of variables to help auditors identify them on an audit. These checklists consist of red flags. Price Waterhouse (1985;31) defines red flags as, "potential symptoms existing within the company's business environment that would indicate a higher risk of an intentional misstatement of the financial statements." The second involves the development of expert systems to serve as decision aids to help auditors detect management fraud. The third involves development and testing of statistical models to help the auditor predict the existence of management fraud.

The stream of research involving checklists includes Sorenson, Grove and Selto (1983), and Albrecht and Romney (1986), Pincus (1989), and Hackenbrack (1993). Overall, the stream of research associated with checklists has the following weaknesses. The benefits of checklists terminate after helping the auditor identify red flags (Eining, Jones & Loebbecke, 1995). No assistance is provided to weigh and combine red flags into an overall assessment model. Finally, checklists might lead to cases where decision strategies are worse than would be made by an unaided auditor (Kahneman & Tversky, 1972).

Another instrument developed to aid the auditor in assessing management fraud is an expert system. Eining, Jones, and Loebbecke (1995), developed an expert system based on red flags. Using a constructive dialogue, the authors determined that the ability to discriminate between fraud situations improved as did the consistency of subsequent decisions regarding the audit action.

This stream of research suffers from limitations. There is a limitation associated with conducting an experiment in a laboratory setting. The study used auditors from one Big-Six firm, and the experiment called for using the system once to make a determination of fraud. These factors impact the generalizability of the results.

Two kinds of statistical models dealing with management fraud have received attention. The first involves the use of internal information (red flags), while the second involves the use of publicly available information to determine the characteristics of fraud and no-fraud firms. The present study seeks to contribute to this stream of research.

Two studies have attempted to identify significant red flags and combine them in a statistical model. Loebbecke, Eining, and Willingham (1989) developed an audit planning fraud risk assessment model. They developed a list of 36 fraud indicators divided into three categories: conditions, motive, and attitude. Bell, Szykowny, and Willingham (1993) developed a fraud prediction model to validate whether the red flag characteristics of fraud firms differed from no-fraud firms. The model correctly assigned 86% of the sample fraud cases as high risk and 81% of the non-fraud cases as low risk.

The subsequent testing of these models in experimental settings has not been successful. This lack of success is evidenced by studies that have failed to show any difference in the predictive ability between auditors using the red flags and those not using the red flags (Boatsman, Moeckel & Pei, 1994; Cassidy & Gill, 1994). Weaknesses of definition and respondents associated with the studies could have led to the indifferent results.

First, red flags were not defined to ensure consistency. Second, an inappropriate group of respondents was approached to help build the models. Since red flags related to the period and process of the audit, the audit manager, rather than the audit partner, may have been a more appropriate respondent. Third, there was a lack of theory development when defining the variables of interest. Wallace (1983) and Pincus (1989) called for researchers to develop factors based on theory so that they are well motivated.

Two studies have attempted to use publicly available information to determine the different characteristics between fraud and no-fraud firms. Beasley (1994) determined the relationship between corporate governance and the existence of management fraud. Latham (1994) studied the incentive and monitoring effects of managers behaving in a fraudulent manner, in court cases relating to management.

DEVELOPMENT OF VARIABLES

The dependent variable is a dummy variable that indicates whether management fraud was present in an organization or not. The cases of management fraud were determined from the SEC Accounting and Auditing Enforcement Releases (AAERs). Specifically, the characteristics that differed between fraud and no-fraud firms were determined.

Consistent with prior research (Palmrose, 1988; Stice, 1991; Latham, 1994; Lys & Watts, 1994), a control sample (of matched-pair firms) was identified with firms similar in size, time period, and industry but in which management fraud was not present (detected). Therefore, the identification of a firm where management fraud was present, (hereafter "F" firms), was represented by a "2", while a firm where management fraud was not present, (hereafter "NF" firms), was represented by a "1".

Monitoring variables are discussed next, as is their differing impact on fraud and no-fraud firms. The theoretical support for these variables is developed from the discussion relating to agency theory.

External Auditor

The quality of monitoring has been linked to the presence of management fraud previously. Hence, the identity of the audit firm is a factor whose impact on the existence of management fraud will be determined.

The quality of the Big-Six firms as a group has been considered to be superior to that of the Non Big-Six group, for various reasons (see Goldman & Barlev, 1974; DeAngelo, 1981; Mutchler & Williams, 1990). Further, a dichotomous variable to classify external auditing firms between the Big-Six (Big-Eight) and the Non Big-Six (Non Big-Eight) (Stice, 1991; Latham, 1994), has been used in prior research to capture the quality differential between the two groups.

Prior research has had mixed results. Huss and Jacobs (1992), investigated audit processes and structure within the group of Big-Six firms. They found evidence of significant differences in the operations of the firms, possibly pointing to quality differentials among them. Further, Palmrose (1988), found differing litigation rates among the group of Big-Six firms, again pointing to apparent differences in quality within the group. But Teoh and Wong (1993) found evidence that the earnings response coefficients of Big-Eight clients were statistically higher than those of Non Big-Eight clients.

Hence, for the current study, audit firm identity was measured as a dummy variable and coded "1" if the audit firm was a member of the Big-Six (Big-Eight) group, and "2" otherwise. It is predicted that the better the quality of the audit firm, (member of the Big-Six (Big-Eight) group), the lesser the possibility of management fraud being present, since the greater the impact of monitoring. The variable was operationalized (variable name AUD), using data obtained from the proxy statement of the entity for the year in which fraud is alleged to have occurred. The following hypothesis was tested:

H1:	The quality of the audit firm will be better in entities where management fraud is not present and worse where management fraud is present.

Number of Years Audited

Since the dichotomous partition of firms into two groups has had mixed results regarding the quality differential between audit firms, another measure of the quality of monitoring is included and its impact on the existence of management fraud is determined. The measure employed to evaluate the quality of monitoring provided by an audit firm is number of years an audit firm has been auditing an entity.

It is posited that as the number of years an audit firm is employed by an entity increases the quality of their audit increases. This is so because in the early years of an engagement the audit firm is forming opinions regarding the internal control structure of the entity and thus the manager(s) may have an incentive to engage in fraudulent activities.

In the current study, the number of years an audit firm has been engaged by an entity to perform an external audit was used to determine its impact on management fraud. It is predicted that the greater the number of years an entity has been audited, the smaller the chance of management fraud being present. The variable was operationalized (variable name YRSAUD), using data obtained from COMPUSTAT ending with the year in which fraud is alleged to have occurred. The following hypothesis was tested:

H2: The number of years an audit firm has audited an entity is inversely related to the existence of management fraud.

Audit Committee

Audit committees often have the responsibility for the oversight of financial reporting, serve as a monitoring mechanism and can play an important role in detecting and preventing management fraud (National Commission on Fraudulent Financial Reporting, 1987; AICPA, SAS No. 53, 1988). The quality of information flows between the principal and agent would be improved since committees form a direct line of communication between the board of directors and the auditor, thus reducing the information asymmetry between management and the board (Pincus, Rusbarsky & Wong, 1989).

Further, the audit committee improves the capacity of the board to act as a management control by providing them with detailed knowledge and better understanding of financial statements (Beasley, 1994). Finally, an audit committee may be perceived as indicating higher quality monitoring (Pincus et al., 1989), and may often be the first non-management personnel to identify an irregularity (Sommer, 1991).

But, the mere presence of an audit committee does not make it an effective tool (Sommer, 1991). Inadequate audit committees have been suggested as being one reason contributing to the existence of management fraud (Beasley, 1994). The AICPA's Public Oversight Board (1993; p. 50)

states, "in too many instances the audit committees do not perform their duties adequately and in many cases do not understand their responsibilities."

Prior research has used the audit committee as a variable to measure monitoring (Dechow, Sloan & Sweeney, 1994; Beasley, 1994). While the first study used the existence of a committee to signify monitoring, the second study defined and used an "active" audit committee to signify monitoring. Since the effectiveness of a committee would be eliminated if the committee is not allowed to meet, in this study an "active" committee would be defined as one which meets at least once in the year [similar to Beasley 1994]. The following hypothesis was tested:

| H3: | No audit committee or an inactive committee will characterize an entity where fraud is present. |

Outsiders on the Board of Directors

The Board of Directors represents an internal monitoring variable. Agency theory suggests that stockholders engage a board of directors to minimize agency problems arising from the separation of decision control and risk-bearing (Beasley, 1994). This delegation of governance to the board makes it the common apex of control within large and small corporations (Fama & Jensen, 1983).

The board of directors is composed of individuals who are managers of the firm as well as certain outsiders (non-employees). Managers of the organization are included on the board because it must use information from the internal monitoring system (Fama & Jensen, 1983). The presence of managers improves the amount and quality of information from the internal monitoring system.

Since inside board of director members are generally more influential than outside members, the board will not be an effective monitoring device unless it limits the number of inside members (Fama & Jensen, 1983). Inside managers employ informational advantages due to their full-time status and insider knowledge (Beasley, 1994). Hence, the board can easily become an instrument of management, sacrificing the interests of stockholders (Williamson,1984), which may lead to collusion and transfer of stockholder wealth (Fama, 1980).

The viability of the board is enhanced by the inclusion of outside members who are disciplined for their services by the market, through a pricing of their performance as referees (Fama, 1980). The purpose of an outside member on the board is to act as an arbiter in disagreements among internal managers and carry out tasks involving agency problems between managers and residual claimants (Fama & Jensen, 1983).

Empirical evidence exists that points to the improved monitoring role performed by outside members on the board of directors. Their increased effectiveness ranges from cases involving corporate takeovers (Brickley & James, 1987), management buyouts (Lee, Rosenstein, Rangan & Davidson, 1992), greenmail payments (Kosnik, 1990), to firms with golden parachutes (Singh & Harianto, 1989). Further, the findings of Rosensteina and Wyatt (1990), suggest that stockholders

prefer outside board members. This is evidenced by a positive abnormal return when management chosen outside directors are added to the board of directors.

The discussion above points to the importance of the board of directors being a significant internal monitoring mechanism. Further, the importance of having outside members on the board is discussed through the support from prior literature. The variable has been used in prior research (Dechow et al., 1994; Beasley, 1994). Hence, having a high proportion of outside members on the board of directors should lead to effective monitoring and lead to fewer cases of management fraud. The variable was operationalized (variable name OUTDIR), using data obtained from the proxy statement of the entity in the year in which management fraud is alleged. The following hypothesis was tested:

H4:	The proportion of outside directors on the board of directors will be higher for firms in which management fraud is detected as compared to no-fraud firms.

Average Tenure of the CEO

The ability of outside directors to effectively monitor management may be impacted by management's ability to exert power to override such monitoring (Beasley, 1994). It is widely believed that the chief executive officer (CEO) sets the tone for the behavior of the board since s/he has the strongest voice in determining who will serve on the board (Mace, 1986; Vanil, 1987).

Further, the CEO's tenure on the board of directors may be an indication of the power of the individual. Hermalin and Weisbach (1988) point out that an established CEO has relatively more power than a new CEO. Hence, as the tenure of the CEO increases, his/her power increases which could decrease the monitoring provided by the board thus leading to management fraud.

CEO tenure is a variable that has been used in prior research (Beasley, 1994). The variable was operationalized (variable name CEOTEN), using data obtained from the proxy statement of the entity in the year in which management fraud is alleged. The following hypothesis was tested:

H5:	The tenure of the CEO is greater in an entity where management fraud is present as compared to no-fraud firms.

CEO also Board Chair

Another measure of the power of the CEO is that the CEO is also the chairman of the board of directors. The chairman of the board is responsible for running board meetings, and overseeing the hiring, firing, evaluating, and compensation of the CEO (Beasley, 1994). Jensen (1993) states that the CEO cannot perform this function apart from his/her personal interests.

When an individual dominates the board, its monitoring value may be diminished since the possibilities for checking and balancing powers of the CEO are eliminated (Chaganti, Mahajan & Sharma, 1985). Hence, for a board to be effective, the positions of the chairman and CEO should be separated (Jensen, 1993).

Based on the discussion above, it is posited that there is a greater chance of management fraud in an entity where the CEO is also the chairman of the board. The variable was operationalized (variable name CEOCHAIR), as a dummy variable with a value of "1" if the CEO was also chairman of the board, and a value of "2" if the CEO was not the chairman of the board. The data was obtained from the proxy statements of the client firm in the year in which fraud is alleged. The following hypothesis was tested:

> H6:   CEO is also chairman of the board in an entity where management fraud is present as compared to an entity where fraud is not present.

Insider Stock Ownership

Jensen and Meckling (1976) state that the agency problem related with managers making decisions to benefit themselves as opposed to shareholders can be reduced by increasing the stock ownership of the inside managers who serve on the board of directors. This is true since as the ownership percentage increases, the managers pay a larger share of the agency costs and thus are considered less likely to waste corporate wealth.

There is evidence that ownership in an entity can serve as a substitute for controls over management's actions (Beasley 1994). Further, Weisbach (1988) finds that the fraction of outside directors is negatively correlated with shareholding of top management, thus suggesting that they are substitute measures of control.

It is predicted that the greater the stock ownership of insider top management the smaller the incentive to indulge in management fraud and hence the smaller the possibility of fraud. The variable was operationalized (variable name INSTK), using data obtained from the proxy statement of the entity for the year in which fraud is alleged. The following hypothesis was tested:

> H7:   The percentage of insider stock ownership is inversely related to the existence of management fraud.

SAMPLE SELECTION - FRAUD FIRMS

Cases where the SEC files a formal complaint alleging fraudulent financial reporting forms the sample of firms where management fraud is present. More specifically, if the SEC accuses top management of violating Rule 10(b)-5 of the 1934 Securities Exchange Act (the SEC 1934 Act), it

is defined as a firm where fraud exists. Rule 10(b)-5 requires evidence of an intent to deceive, manipulate, or defraud (Commerce Clearing House SEC Accountant's Handbook, 1993). The SEC enforcement actions are published in the SEC Docket through the SEC Accounting and Auditing Enforcement Releases (AAERs), since April 1982.

For this study, AAERs for the period April 1982 to December 1993 were reviewed and the sample of firms where management fraud occurred was determined. The AAERs after 1993 were not reviewed to allow three subsequent years to verify that the related matched no-fraud firms had not experienced management fraud (the process of matching no-fraud firms with each fraud firm is described later). This procedure is similar to that used in prior research dealing with the issue of management fraud (Beasley, 1994).

Based on a review of the SEC AAER's and information available on Compustat a total of 76 firms formed the sample of firms where fraud was present. Next, the sample was matched with firms where fraud was not present (detected). Hence, a total of 152 firms make-up the sample of firms for this study.

The methodology used in this research involves matching each firm in which management fraud is detected with a firm where management fraud is not present (has not been detected). Matching is undertaken to ensure that each violating firm is paired with a non-violating firm that is as similar as possible except for the explanatory variables identified previously. The matching took place as follows.

Non-violating firms were selected from COMPUSTAT and were matched based on time period, industry membership (proxied by the four digit SIC code), and firm size (proxied by total assets). This is similar to prior research (Stice, 1991; Lys & Watts, 1994; Latham, 1994). When several firms satisfied the above mentioned criteria, the firm with the assets closest to those of the violating firm in the year of interest was selected. The SEC Accounting and Auditing Enforcement Releases and the Wall Street Journal Index were searched to ensure that no cases alleging fraudulent financial reporting had been filed against the firms in the control sample.

LOGIT REGRESSION

The research design of this study involves univariate analysis, and logistic regression. Logistic regression analysis was employed over ordinary least squares regression for the following reasons.

One, ordinary least squares regression is not suitable when the dependent variable is dichotomous. Two, logistic regression model is well suited when dummy independent variables are present. Three, the logistic regression model is more robust when the assumptions of the model are not met. The assumptions include normality of the dependent and the independent variables, equal variance of the dependent variables, and uncorrelated or independent errors (Hair, Anderson, Tatham & Black, 1992, p. 31).

The sample in this study represents a choice-based sample. Since violating firms were matched with non-violating firms, the sample is such that in 50% of the cases fraud has not occurred, while in the other 50% fraud has occurred.

Given that the actual percentage of firms experiencing management fraud, within all publicly traded firms, is less than 50%, logit regression analysis is appropriate for disproportionate sampling from two populations (Maddala, 1991). Further, given the disproportionate percentages, ordinary maximum likelihood procedures would yield inconsistent and asymptotically biased estimates (Palepu, 1986). In the case of logistic regression, coefficients of the explanatory terms are not affected by the unequal sampling rates and only the constant term is affected (Maddala, 1991; Beasley, 1994).

Palepu (1986), recommends correcting the bias in the constant term if the logit analysis is being used to obtain parameter estimates to develop a predictive model. Since the purpose of the current study is to determine characteristics of fraud and no-fraud firms, and not to develop a predictive model, the bias in the constant term will have no effect on the analysis and logistic regression is appropriate.

The logistic regression model will be as follows:

$$F_i \, Firm = b_0 + b_1 AUD_i + b_2 YRSAUD_i + b_3 AUDCOM_i + b_4 OUTDIR_i + b_5 CEOTEN_i + b_6 CEOCHAIR_i + b_7 INSTK_i + e_i$$

RESULTS

Table 1 displays the results of logit analysis. The overall model has a chi-square value of 33.017 with a significance level of .0000, thereby rejecting the null hypothesis that the coefficients are simultaneously equal to zero.

Table 1: Logit Regression			
	Chi Square	Significance	
Model Chi Square	33.017	.0000	
Variable Name	Estimated Coefficients	Standard Errors	Wald Statistics
AUD	.3265	.3931	.6900
YRSAUD	.1935	.0673	8.2651***
AUDCOM	.9331	.3928	5.6422**
OUTDIR	3.2018	1.1261	8.0845***
CEOTEN	.0295	.0276	1.1471
CEOCHAIR	.5406	.5158	1.0982
INSTK	-.0198	.0108	3.3885**
Constant	.0991	1.2080	.0067
*,[**],(***) Statistically significant at less than the .10,[.05],(.01) level.			

External Auditor: The first hypothesis states that the quality of the audit firm will be superior where management fraud is not present (detected). Table 1 indicates that this variable has the posited direction but is not statistically significant.

Years Audited: The second hypothesis posits that the number of years an audit firm has audited an entity is inversely related to the existence of management fraud. Table 1 indicates that the direction of the relationship is negative, or inverse, and is also statistically significant at less than .01 level of significance.

Audit Committee: Hypothesis three states that the presence of an active audit committee deters management fraud. This relationship is reflected in Table 1. The direction of the relationship is a result of the coding of the variable. Since "1" signified an active audit committee and "2" an inactive one, a positive relationship has been posited. Also, the variable is significant at less than the .05 level of significance. Thus, results indicate that an active audit committee will deter management fraud.

Outsiders on the Board of Directors: Hypothesis four states that the proportion of outside directors will be higher for firms in which management fraud is detected. Table 1 indicates that direction of the relationship is as hypothesized while the variable is significant at less than .01 level of significance. Thus, results indicate that as the number of outside directors increases the propensity of management fraud decreases.

Average tenure of the CEO: The next hypothesis contends that as the tenure of the CEO within an entity increases, the possibility of fraud increases. Table 1 indicates that while the variable has the predicted sign, the variable is not statistically significant.

CEO is also Board Chair: The next hypothesis states that the CEO being the Chairman of the Board impacts management fraud in that the power of the CEO increases and hence fraud may be more prevalent. Table 1 sets out the result as per the direction of the hypothesis and is statistically significant at the less than .10 level.

Insider Stock Ownership: This is the last hypothesis in the monitoring variables section. The hypothesis states that as the percentage of insider stock ownership increases, the propensity to commit management fraud decreases. Table 1 indicates that the direction of the relationship is as per the theory, but the variable is not statistically significant.

Table 2 details the results of univariate analysis. The table indicates that five of the seven variables are statistically significant at various levels. These are auditor type, number of years audited, audit committee, outside directors, and average tenure of the CEO.

The table indicates that the fraud, no-fraud firms have univariate differences consistent with many of the hypotheses. However, it is recognized that the logit multiple regression model offers advantages over the comparison of univariate descriptives since it controls for differences in the firms associated with fraud and the factors (Beasley, 1994).

Table 2: Univariate Analysis			
Variable	Variable Name	Difference In Means	T-statistic
Auditor type	AUD	-.1447	-1.85*
# years audited	YRSAUD	1.8421	3.54***
Audit Committee	AUDCOM	-.2763	-3.60***
# outside directors	OUTDIR	.1097	3.62***
Average tenure	CEOTEN	2.4617	3.64***
CEO & board chair	CEOCHAIR	-.0263	-.44
Insider stock	INSTK	-1.1065	-.36
*,[**],(***) Statistically significant at less than the .10,[.05],(.01) level.			

CONCLUSIONS

Overall results indicate that there is widespread support for monitoring variables, both directional and statistical. All seven variables have directional support, and four of the seven are statistically significant. The result of auditor identity and years audited points to a quality differential between the groups of audit firms and a greater propensity of management fraud to be committed in the early years of an auditor client relationship. Active audit committees are shown to deter management fraud, while the CEO variables did not show the impact as defined by theory.

The results of the analysis point to the importance of corporate governance playing a role on limiting management fraud, especially auditor identity and tenure. This could lead to narrowing the expectations gap as auditors improve their abilities to detect and deter management fraud.

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WHEN ARE PROFITABLE EARNINGS LOW ENOUGH TO TRIGGER A LIQUIDATION OPTION?

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ABSTRACT

Our primary objective is to determine the point at which earnings become low enough to trigger a liquidation (abandonment) option during the 1998 fiscal year. Second, we investigate whether the earnings level at which the liquidation option is triggered is intertemporally stable by investigating the valuation significance of earnings and book value during two pooled time periods. Third, we seek to determine whether the decreased valuation significance in earnings is associated with a simultaneous increase in the valuation significance of book value of equity for all three time periods examined. When dividing the data into deciles according to earnings before extraordinary items, book value increases in significance and incremental explanatory power, while earnings decrease in significance and exhibit virtually no explanatory power for lower earnings deciles. Also, there appears to be a shift in the valuation reliance from earnings to book value when the ratio of earnings before extraordinary items to book value falls below 0.10 for both exchanges and for all time periods. We interpret this as evidence that sufficiently low earnings increase the reliance on book value and decrease the reliance of earnings even though bankruptcy or liquidation is not imminent and even if cross-sectional data are examined.

INTRODUCTION

Purpose and contribution

The association between a firm's market value of equity and its earnings and book value has received much attention in recent literature. For instance, Collins, Pincus, and Xie (1999) find that book value of equity serves as a value-relevant proxy for expected future normal earnings for loss firms and as a proxy for abandonment option for loss firms most like to cease operations and liquidate. Burgstahler and Dichev (1997) show that market value is a convex function of earnings (book value) holding book value (earnings) constant, while Subramanyam and Wild (1996) find that the informativeness of earnings is decreasing in the probability of termination.

The studies most directly related to the present study are the ones by Hayn (1995), by Barth, Beaver, and Landsman (1998), and by Schnusenberg and Skantz (1998). Hayn offers the

abandonment hypothesis as an explanation for the weak association between negative earnings and market value of equity. Furthermore, Barth, Beaver, and Landsman use the abandonment hypothesis to explain the strong association between book value and market value for bankrupt firms. Schnusenberg and Skantz test the abandonment hypothesis for voluntarily liquidating firms and for unprofitable surviving firms.

The objective of this study is threefold. First, our primary objective is to determine the point at which earnings become low enough to trigger a liquidation (abandonment) option during the 1998 fiscal year. While previous research has successfully tested the abandonment option for bankrupt firms and for voluntarily liquidating firms and unprofitable surviving firms, Hayn (1995) argues that the liquidation option effect extends to profitable cases where earnings are low enough to make the put option attractive. Thus, the decreased valuation significance of earnings may be a function of the low earnings level in a given year as opposed to a function of the approaching liquidation of the firm. Schnusenberg and Skantz's (1998) and Collins, Pincus, and Xie's (1999) finding that the abandonment option hypothesis is equally true for nonliquidating distressed firms supports the argument that the relative valuation significance of earnings and book value could be a function of the current year's earnings. Consequently, the increasing relevance of book value (vis-à-vis earnings) could be triggered much earlier than the actual bankruptcy or liquidation and may even be independent of bankruptcy or liquidation. Obtaining a numerical estimate of the earnings level at which the liquidation option is triggered is important to standard setters and to researchers alike in order to accurately assess and utilize the relative importance of earnings and book value. This paper thus complements previous tests of the abandonment hypothesis and the value-relevance of negative earnings by determining numerically the amount of earnings (relative to book value) at which the liquidation option is triggered.

Our second objective is to investigate whether the earnings level at which the liquidation option is triggered is intertemporarily stable by investigating the valuation significance of earnings and book value during two pooled time periods from 1994 to 1998 and from 1989 to 1998. Our third and last objective is to determine whether the decreased valuation significance in earnings is associated with a simultaneous increase in the valuation significance of book value of equity for all three time periods examined. In fact, both Barth, Beaver, and Landsman (1998) and Schnusenberg and Skantz (1998) show the increasing (decreasing) reliance on book value (earnings) several years before actual liquidation of the firm.

In order to accomplish the objectives outlined in the previous paragraphs, the present study examines the relationship of market value of equity to earnings and book value for the deciles of all firms listed on the New York Stock Exchange (NYSE) and the Nasdaq for the 1998 fiscal year and for the 1994 to 1998 and the 1989 to 1998 time periods. The two stock exchanges were chosen to investigate the two perhaps most important segments comprising the stock market: "blue chip" stocks and "new economy" stocks.

Summary of findings

Our sample consists of all Compustat firms listed on the NYSE and the Nasdaq market with available data for the three respective time periods being analyzed. As a proxy for the decreasing valuation relevance of earnings, we form portfolios (deciles) based on the earnings before extraordinary items reported in the time period being analyzed. We find that earnings are less important and book value is more important in valuation as earnings before extraordinary items decreases for each time period investigated. Furthermore, and irrespective of the time period investigated, we find that the valuation relevance of earnings (book value) decreases (increases) when the ratio of earnings before extraordinary items to book value (EO/BV) falls below 0.10. These findings are consistent with an abandonment model where sufficiently low earnings reduce the reliance on current earnings and increase the reliance on book value whether purely cross-sectional or pooled cross-sectional time-series data are employed. Furthermore, the findings are consistent with Hayn's (1995) argument that a sufficiently weak earnings trigger a put option, thereby increasing the value relevance of book value.

The remainder of this paper is organized as follows. Section 2 reviews previous research on the abandonment hypotheses and develops hypotheses specific to our samples. Section 3 discusses data collection and sample characteristics. The methodology and results are presented in Section 4. Section 5 concludes.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Literature Review

The Financial Accounting Standards Board (FASB) places the primary focus of financial reporting on providing information about earnings and its components. Hence, an extensive body of accounting research has been devoted to the ability of earnings innovations to trigger abnormal stock returns and to the general relationship between earnings and both stock returns and market value since Ball and Brown's (1968) seminal study.

More recent accounting research, however, has placed increasing emphasis on the value relevance of book value relative to earnings. Specifically, recent empirical findings indicate that book value may be equally or even more important than earnings in firm valuation in certain instances. Collins, Pincus, and Xie (1999), for instance, find that including book value of equity in the valuation specification eliminates the negative price-earnings relation for loss firms, which suggests that book value may serve as a value-relevant proxy for future earnings. Furthermore, Collins, Maydew, and Weiss (1997) find that book values have increased and earnings have decreased in value-relevance over the last forty years, a finding the authors attribute to the increasing

frequency of negative earnings. Burgstahler and Dichev (1997) find that market value is a convex function of book value (earnings) holding earnings (book value) constant.

Subramanyam and Wild (1996) show that the informativeness of accounting earnings decreases as the probability of termination of an enterprise increases. This finding is complemented by Barth, Beaver, and Landsman (1998), who show that book value instead of earnings becomes the primary determinant of firm value as the firm approaches bankruptcy; Schnusenberg and Skantz (1998), who find that book value instead of earnings becomes the primary determinant of firm value for voluntarily liquidating firms and for unprofitable surviving firms; and Hayn (1995), who shows that positive earnings are more informative than negative earnings.

Internationally, Bao and Chow (1999) examine the relative value relevance of earnings and book value for B shares on the Chinese stock exchanges. The authors find that earnings and book value reported based on International Accounting Standards have greater information content than those based on domestic GAAPs. Furthermore, findings indicate that the explanatory power of earnings and book values for share prices increased over time.

The findings in the aforementioned studies are consistent with the abandonment option hypothesis; when abandonment of assets is likely, book value will capture the assets' value to the firm and earnings will provide little information over and above that already provided by book value. Thus, when a firm's exit value exceeds its value-in-use, its recognized net assets become the primary determinant of firm value and the firm's unrecognized net assets (e.g., growth-type options) become relatively less important. Conversely, when value-in-use exceeds exit value, unrecognized net assets such as goodwill and other intangibles will be the primary determinant of a firm's value. Thus, while the obvious focus in the accounting literature has been on firms approaching liquidation, we argue that a firm's exit value may exceed its value-in-use simply when earnings become low enough even when considering purely cross-sectional data.

In summary, recent empirical findings suggest that book value is the primary determinant of firm value when a firm is in financial distress and that earnings is the primary determinant of firm value when a firm is a healthy going concern. However, no study has yet attempted to investigate a numerical estimate of the earnings level at which earnings are low enough and at which a liquidation option is triggered. This paper contributes to the literature by providing a numerical estimate of earnings at which an abandonment option is triggered and at which the valuation significance of earnings decreases and the valuation significance of book value of equity increases.

Hypotheses

The sample of firms utilized in this study consists of those firms with available data for various time periods being investigated that are listed on the NYSE and the Nasdaq. Specifically, we investigate the 1998 fiscal year individually, a pooled sample for the 1994 to 1998 period, and a pooled sample for the 1989 to 1998 period. Each of these samples is independently subdivided into

deciles according to the sample firms' earnings before extraordinary items in the time period being analyzed.

Hayn (1995) suggests that poor earnings performance will trigger the market to rely less on earnings in valuation. Moreover, Collins, Pincus, and Xie (1999) find that book value of equity serves as a value-relevant proxy for expected future normal earnings for loss firms and as a proxy for abandonment option for loss firms most like to cease operations and liquidate. Together, these findings suggest that earnings are used as a signal of the probability of abandonment. Consequently, we hypothesize that as the level of earnings decreases, the valuation role of current earnings will decrease and the valuation role of book value will increase, in accordance with our first and third objectives. Thus, deciles with a lower level of earnings per share should exhibit a higher (lower) valuation significance of book value (earnings) than deciles with a higher level of earnings.

> H1:   As the level of earnings decreases, earnings will decrease in valuation significance and book value of equity will increase in valuation significance.

Our second objective is to determine whether the numerical estimate of the earnings level at which earnings become low enough to trigger a liquidation option is intertemporally stable. Although economic conditions may result in higher or lower reported average earnings levels over time, resulting in more or fewer bankruptcies, the earnings level at which liquidation is perceived to be more likely should be independent of the actual number of bankruptcies occurring in a given time period. Hence,

> H2:   The earnings level at which the liquidation option is triggered is independent of the time period investigated and independent of whether individual fiscal year or pooled data are utilized.

DATA

Sample selection

Since our primary objective is to obtain a numerical estimate of the earnings level at which earnings become low enough to trigger a liquidation option, we include all firms listed on the NYSE and the Nasdaq during the 1998 fiscal year in our analysis. The utilization of two different exchanges provides us with a large cross-section of both healthy and loss firms. We subsequently

analyze the valuation relevance of earnings and book value for these firms for the 1998 fiscal year and pooled for the 1994-1998 and the 1989-1998 fiscal years.

Characteristics of our final sample for each exchange and each time period is disclosed in Table 1, panel A. For example, a total of 2,204 firms are listed on the NYSE and have available data in 1998. In addition to unavailable data, 1 percent of the market value of equity distribution was truncated to eliminate outliers. Similarly, 9,243 and 15,951 data points are available on the NYSE in the 1994-1998 and the 1989-1998 time periods, respectively. Table 1 panel A also reports the averages, medians, and standard deviations for various financial statistics for each of the three time periods and for each of the two exchanges. Clearly, firms listed on the Nasdaq are much smaller than firms listed on the NYSE for each time period in terms of total assets and market value of equity. Furthermore, NYSE firms are more profitable than Nasdaq firms in terms of return on assets (ROA) for each time period. This observation is complemented by the fact that Nasdaq firms have a much higher percentage of firm-years in which earnings before extraordinary items are less than or equal to zero; for example, in 1998, Nasdaq 41.47 percent of Nasdaq firms were unprofitable, while only 13.34 percent of NYSE firms were unprofitable.

Table 1: Selected financial statistics for firms by exchange and time period							
Panel A: Averages, medians, and standard deviations of selected financial variables by exchange and time period. Medians and standard deviations in parentheses.							
		Variables ($ in millions)[b]					
Exchange	Period[a]	N	TA	MVE	BVE	ROA	Percent EO≤0
New York Stock Exchange (NYSE)	1998	2,204	8,208 (1,256) (34,190)	5149 (780) (14,214)	1513 (424) (3,299)	4.88% (3.96%) (17.45%)	13.34%
	1994-1998	9,243	7,272 (1,024) (28,805)	3,551 (832) (8,197)	1,385 (384) (3,010)	5.58% (4,37%) (16.62%)	9.70%
	1989-1998	15,951	5,900 (874) (22,222)	2,918 (674) (6,619)	1,268 (328) (2,875)	5.59% (4.30%) (26.33%)	11.23%
Nasdaq	1998	5,206	416 (56) (2,183)	311 (46) (1,096)	106 (28) (464)	-11.36% (0.97%) (40.97%)	41.47%
	1994-1998	19,162	371 (51) (1,877)	244 (51) (757)	93 (25) (340)	-8.53% (1.15%) (37.44%)	38.29%
	1989-1998	28,953	321 (42) (1,660)	215 (41) (703)	87 (21) (340)	-7.75% (1.25%) (35.33%)	38.76%

Table 1: Selected financial statistics for firms by exchange and time period							
Panel B: Averages, medians, and standard deviations of selected financial variables by exchange and decile in 1998. Medians and standard deviations in parentheses.							
		Variables ($ in millions) [b]					
Exchange	Decile[c]	EO	TA	MVE	BVE	ROA	EO/BV	Percent EO≤0
New York Stock Exchange (NYSE)	1	1,415 (1,000) (1,705)	53,868 (22,241) (84,220)	32,494 (20,578) (30,103)	8,006 (5,929) (6,621)	6.02% (5.06%) (5.00%)	0.177	0.00%
	2	310 (295) (79)	9,541 (5,583) (12,499)	6,703 (5,172) (5,751)	2,271 (2,001) (1,521)	6.47% (5.05%) (5.74%)	0.137	0.00%
	3	143 (138) (26)	4,031 (2,598) (4,064)	3,270 (2,078) (6,116)	1,145 (930) (844)	6.38% (5.36%) (4.66%)	0.125	0.00%
	4	82 (80) (11)	2,349 (1,535) (3,277)	2,043 (1,121) (9,169)	714 (571) (629)	6.14% (5.14%) (4.15%)	0.115	0.00%
	5	51 (51) (6)	1,794 (1,119) (2,435)	1,041 (706) (1,508)	515 (388) (515)	6.29% (4.42%) (7.06%)	0.099	0.00%
	6	33 (33) (5)	1,473 (712) (5,383)	936 (528) (2,578)	507 (287) (1,825)	5.82% (4.53%) (5.28%)	0.065	0.00%
	7	20 (20) (3)	672 (452) (838)	490 (283) (694)	243 (168) (288)	7.81% (4.55%) (24.08%)	0.082	0.00%
	8	11 (11) (3)	424 (240) (695)	291 (154) (548)	153 (102) (277)	11.82% (4.29%) (42.84%)	0.072	0.00%
	9	1 (2) (4)	586 (259) (1,488)	526 (126) (2,388)	221 (89) (657)	1.01% (0.73%) (10.73%)	0.004	34.09%
	10	-333 (-74) (1,648)	7,425 (1,619) (4,063)	3,737 (632) (9,206)	1,367 (441) (2,660)	-9.02% (-4.62%) (13.29%)	-0.244	100.00%

Table 1 panel B displays the averages, medians, and standard deviations for the NYSE and the Nasdaq and selected financial variables in 1998 by decile. As explained below, firm-years are sorted into deciles by descending earnings before extraordinary items. Notice that the first eight deciles of the NYSE contain no negative earnings before extraordinary items, while only the first five deciles of the Nasdaq contain only positive earnings. This further shows that the firms listed on the Nasdaq in 1998 were less profitable than firms listed on the NYSE in 1998.

				Table 1 (continued): Selected financial statistics for firms by exchange and time period				
				Panel B (continued)				
Exchange	Decile[c]	EO	TA	MVE	BVE	ROA	EO/BV	Percent EO≤0
Nasdaq	1	79 (39) (134)	2,540 (642) (5,822)	1,572 (67) (2,331)	593 (271) (1,266)	8.99% (6.97%) (11.29%)	0.133	0.00%
	2	14 (13) (3)	485 (218) (612)	320 (182) (591)	117 (94) (119)	7.22% (5.83%) (6.32%)	0.120	0.00%
	3	6 (6) (1)	237 (113) (319)	133 (80) (233)	62 (50) (50)	7.81% (5.58%) (13.90%)	0.097	0.00%
	4	3 (3) (1)	134 (65) (154)	95 (50) (217)	39 (31) (37)	6.34% (4.47%) (7.82%)	0.077	0.00%
	5	1 (1) (0)	83 (34) (170)	112 (22) (824)	25 (15) (41)	5.75% (3.65%) (20.36%)	0.040	0.00%
	6	0 (0) (0)	38 (11) (101)	74 (7) (808)	14 (6) (34)	-0.24% (1.34%) (41.75%)	0.000	15.16%
	7	-1 (-1) (1)	36 (10) (112)	59 (8) (393)	16 (5) (46)	-17.70% (-8.39%) (26.91%)	-0.06	100.00%
	8	-3 (-3) (1)	40 (14) (88)	74 (13) (250)	19 (7) (36)	-40.85% (21.21%) (53.62%)	-0.158	100.00%
	9	-8 (-8) (2)	88 (27) (342)	121 (35) (404)	35 (15) (86)	-48.05% (-29.92%) (59.49%)	-0.229	100.00%
	10	-51 (-24) (93)	479 (93) (2,804)	547 (81) (1,565)	137 (40) (492)	-43.08% (-29.05%) (44.54%)	-0.372	100.00%

[a]   Time periods: The 1998 data is purely cross-sectional in nature, while the 1994 to 1998 and the 1989 to 1998 periods consist of pooled cross-sectional and time-series data.

[b]   Variables:

TA = total assets at year-end ($ millions).

MVE = market value of equity found as common shares outstanding at year end times price per share ($ millions).

BVE = book value of equity calculated as TA minus year-end total liabilities ($ millions).

EO = earnings before extraordinary items ($ millions).

ROA = return on assets found as EO/TA.

NI = net income at fiscal year end.

N = final sample size after eliminating missing data points and outliers.

[c]   Deciles: Deciles are formed by ranking firm-years in descending order by earnings before extraordinary items. Firm-years are then divided into ten roughly equal groups.

In Table 1 panel B, also note that the firms in the top two deciles and in the bottom decile of earnings are largest in terms of both total assets and market value of equity for both exchanges. In terms of ROA, firms concentrated in decile 8 (1) are the most profitable on the NYSE (Nasdaq). For each exchange, decile 10 contains the least profitable firms in terms of ROA. Also notice that the profitability of the firms in the lower deciles is much more variable (in terms of standard deviation of ROA) than the profitability of the firms in the higher deciles on each exchange. Consequently, it appears that the deciles presented in Table 1 panel B provide a reasonable proxy for the likelihood of abandonment for the NYSE and the Nasdaq.

METHODOLOGY AND REGRESSION RESULTS

Results for 1998

To investigate the valuation significance of earnings and book value over the three time periods analyzed here, we subdivide the firm-years listed on the two exchanges into deciles according to the levels of earnings before extraordinary items for each time period. The regression results for all deciles combined and for the individual deciles for the 1998 data are displayed in Table 2. The regression model in Table 2 uses levels data and expresses market value of equity as a function of earnings and book value of equity. The model is:

$$MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd} \qquad \text{Formula (1)}$$

where MVE_{itd} is market value of equity of firm i at the end of year t in decile d,
    eo_{itd} is income before extraordinary items for firm i, year t and decile d,
    bv_{itd} is book value of equity of firm i at the end of year t for decile d.

The model utilized here is identical to the model used by Schnusenberg and Skantz (1998).

In Table 2 panel A, we fit equation (1) for all deciles combined and each stock exchange for 1998. Not surprisingly, both earnings and book values are highly significant when all deciles are examined simultaneously. For NYSE (Nasdaq) firms in 1998, both earnings and book value are significant, with coefficients of 2.36 (1.00) and 3.09 (1.57), respectively. While both earnings and book values for the NYSE and Nasdaq possess valuation significance, book value appears to be the more highly significant variable for each exchange in 1998. The r-square for NYSE (Nasdaq) firms is a respectable 0.63 (0.40). Consequently, earnings before extraordinary items and book value explain a significant amount of variation in market value of equity.

The first two lines in Table 2 panel C lend further support to the notion that both earnings and book value possess explanatory power when all deciles are investigated in the aggregate; however, the incremental r-square value for book value is much greater than the incremental r-square value for earnings when investigating the entire sample. For example, while both earnings

and book values are significant for firms listed on the Nasdaq in 1998, book value has the larger incremental r-square of .35, versus an incremental r-square for earnings before extraordinary items of only .07.

Table 2				
Regression results for firms listed on NYSE and Nasdaq using 1998 fiscal year-ends and levels data [a]				
Panel A: All deciles -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{it} d + e_{itd}$				
	NYSE		Nasdaq	
1998	Coeff	t-stat	Coeff	t-stat
Intercept	56.62	0.28	148.64	12.28
eo_{itd}	2.36	9.92	-1.00	-4.01
bv_{itd}	3.09	49.40	1.57	49.23
N	2204		5206	
Adj. R^2	0.63		0.40	

In Table 2 panel B, we fit equation (1) separately for each of the ten deciles for the 1998 fiscal year; panel C reports corresponding incremental r-square values. For both exchanges, earnings is decreasing and book value is increasing in valuation significance as the level of earnings decreases. For example, comparing decile 1 to decile 10, the coefficient (t-statistic) on earnings decreases from 4.47 (4.25) for decile 1 to -0.16 (-0.81) for decile 10 for NYSE firms and from 5.22 (5.04) to -5.25 (-8.65) for Nasdaq firms. Conversely, the coefficient (t-statistic) on book value increases from 2.25 (8.33) to 3.03 (24.76) for the NYSE and from 0.76 (6.98) to 1.46 (12.78) for the Nasdaq. For firms listed on either exchange, the earnings coefficient becomes insignificant in decile 3, with the exception of decile 10 for Nasdaq firms.

Table 2 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE [a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 1 (highest) [b]				
eo_{it}	4.47	4.25	5.22	5.04
bvit	2.25	8.33	0.76	6.98
Adj. R^2	0.44		0.47	
Decile 2				
eo_{it}	18.30	3.79	14.64	2.10
bv_{it}	0.71	2.84	1.88	9.18
Adj. R^2	0.12		0.16	

Table 2 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE [a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 3				
eo_{it}	3.26	0.29	-0.51	-0.06
bv_{it}	5.28	15.35	1.79	9.22
Adj. R^2	0.53		0.14	
Decile 4				
eo_{it}	67.41	1.22	32.06	2.32
bv_{it}	0.71	0.72	1.50	5.95
Adj. R^2	0.00		0.08	
Decile 5				
eo_{it}	11.70	1.03	-155.21	-1.81
bv_{it}	2.05	14.52	4.14	4.74
Adj. R^2	0.50		0.04	
Decile 6				
eo_{it}	20.80	1.18	-225.54	-1.63
bv_{it}	1.26	28.54	6.11	6.15
Adj. R^2	0.79		0.07	
Decile 7				
eo_{it}	11.75	1.30	5.24	0.21
bv_{it}	1.89	18.73	5.37	18.22
Adj. R^2	0.62		0.39	
Decile 8				
eo_{it}	8.02	0.57	-6.51	-0.57
bv_{it}	0.66	5.18	3.37	12.70
Adj. R^2	0.11		0.24	
Decile 9				
eo_{it}	-5.16	-0.26	-5.58	-0.85
bv_{it}	3.08	23.32	2.52	14.32
Adj. R^2	0.72		0.29	
Decile 10				
eo_{it}	-0.16	-0.81	-5.25	-8.65
bv_{it}	3.03	24.76	1.46	12.78
Adj. R^2	0.79		0.39	

Table 2 (cont'd)		
Panel C: Incremental r-squares for decile regressions [c]		
	NYSE	Nasdaq
Entire Sample		
eo incremental	.02	.07
bv incremental	.41	.35
Decile 1		
eo incremental	.05	.03
bv incremental	.14	.05
Decile 2		
eo incremental	.06	.01
bv incremental	.03	.13
Decile 3		
eo incremental	.00	.00
bv incremental	.51	.14
Decile 4		
eo incremental	.00	.01
bv incremental	.00	.07
Decile 5		
eo incremental	.00	.00
bv incremental	.48	.04
Decile 6		
eo incremental	.00	.00
bv incremental	.79	.07
Decile 7		
eo incremental	.00	.00
bv incremental	.60	.39
Decile 8		
eo incremental	.00	.00
bv incremental	.11	.24
Decile 9		
eo incremental	.00	.00
bv incremental	.71	.28
Decile 10		
eo incremental	.00	.09
bv incremental	.59	.20

Table 2 (cont'd)

a   All variables are measured in levels form.
      MVE_{itd} is market value of equity for firm i at end of year t for decile d,
      eo_{it} is earnings before extraordinary items for year t and decile d, and
      bv_{it} is book value equity for firm i at end of year t for decile d.

b   Deciles are formed by dividing the data points for each time periods into ten groups according to their reported earnings before extraordinary items (eo) levels. Decile 1 represents the highest eo group and decile 10 represents the lowest eo group.
c   Incremental r-square values for bv (eo) are obtained by subtracting the r-square of a regression of market value of equity on eo (bv) from the r-square of the corresponding regressions in panels A and B.

The decreasing value-relevance of earnings and the increasing value-relevance of book value for NYSE firms is also strongly supported by incremental r-square results in panel C. While earnings possess some explanatory power in deciles 1 and 2, earnings have no incremental explanatory power for deciles 3 and higher. Conversely, book value exhibits a relatively low incremental r-square in deciles 1, 2, and 4, but a higher incremental r-square for the higher deciles, although the trend is not consistent.

Nasdaq firms exhibit a similar, but not identical trend in incremental r-square values. While the incremental explanatory power of book value increases almost consistently from decile 1 to decile 10, the incremental r-square value for earnings is highest for decile 10 firms, although the only remaining non-zero incremental r-squares for these firms are in deciles 1, 2, and 4, consistent with the abandonment hypothesis.

Although the high incremental r-square for earnings in decile 10 for Nasdaq firms in 1998 seems at first glance inconsistent with the abandonment option hypothesis, the coefficient on book value was a negative and significant -5.25 in decile 10. A possible explanation for this negative coefficient and high incremental explanatory power is that market participants do switch the valuation reliance from earnings to book value as earnings decrease, but only down to a certain earnings level. Below that level, market participants punish firms that continue to operate in the face of large earnings losses. In other words, investors may have preferred large loss firms to liquidate voluntarily as opposed to continuing to operate. Since 100 percent of the Nasdaq firms in decile 10 have negative earnings before extraordinary items, it appears that these firms are punished if they generate negative earnings, even if those earnings are higher than expected. This interpretation agrees with Collins, Pincus, and Xie's (1999) finding that book value of equity proxies for expected future normal earnings for loss firms.

The results in the previous paragraphs suggest a shift in valuation significance from earnings to book value in decile 3 in 1998. As shown in Table 1 panel B, earnings before extraordinary items in decile 3 are $143 ($6) million for NYSE (Nasdaq) firms, as opposed to $1,415 ($79) million in decile 1. More importantly, the ratio of earnings before extraordinary items to book value (EO/BV) is 0.125 (0.097) for NYSE (Nasdaq) firms in decile 3. Note that this ratio almost consistently decreases for both exchanges for higher level deciles. Thus, it appears that the cross-sectional

earnings level at which earnings (book value) decreases (increases) in valuation significance is at a ratio of earnings to book value of about 0.10. This issue is further explored in the paragraphs below.

To formally test whether earnings (book value) decreases (increases) in valuation significance, Table 3 panel A formally tests for a shift in the coefficients for earnings and book value between deciles through the following regression model:

$$MVE_{it} = a_0 + a_1eo_{it} + a_2bv_{it} + a_3P1eo_{it} + a_4 P1bv_{it} + e_{it} \qquad \text{Formula (2)}$$

where P1 is a proxy for the likelihood that a firm will exercise its put option. In panel A, P1 carries a value of zero (unity) as a proxy for a relatively low (high) likelihood of abandonment. Specifically, P1 is equal to zero for firms in deciles 2 and lower and equal to unity in deciles 3 and higher for each exchange. If P1 is a good proxy, the coefficients a_1 and a_2 will measure the relationship of market value to earnings and book value as if the firms are going concerns. We expect both coefficients to be positive and significant. Similarly, a_3 and a_4 will capture any shift in the market's reliance on earnings and book value, respectively, as the likelihood of abandonment increases. Under the abandonment hypothesis, we predict a_3 to be negative and significant, and a_4 to be positive and significant.

As shown in panel A, almost all predictions are supported. As the earnings level decreases, earnings become less and book value becomes more important in valuation. For example, for the Nasdaq, the coefficient a_4 is 0.76 (t = 8.55), implying that the coefficient on book value increases as the earnings level drops. Analogously, the coefficient a_3 is -12.15 (t = -20.37), implying that the valuation significance of earnings decreases as the earnings level decreases. Results are similar for the NYSE; however, the coefficient a_4 is insignificant for this exchange.

	Table 3			
	Regression results for three stock exchanges using levels data [a]			
Panel A: All years with slope dummy P1[b] for likelihood of abandonment				
	$MVE_{it} = b_0 + b_1eo_{it} + b_2bv_{it} + b_3P1eo_{it} + b_4P1bv_{it} + e_{it}$			
	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	346.67	1.67	111.24	9.41
Eo_{it}	5.30	13.89	7.19	15.27
Bv_{it}	2.64	32.45	0.76	14.76
$P1eo_{it}$	-5.92	-11.30	-12.15	-20.37
$P1bv_{it}$	-0.20	-1.16	0.76	8.55
N	2204		5206	
Adj. R^2	0.65		0.45	

Table 3
Regression results for three stock exchanges using levels data [a]

Panel B: All years with slope dummy P2[c] for likelihood of abandonment

$$MVE_{it} = b_0 + b_1 eo_{it} + b_2 bv_{it} + b_3 P2eo_{it} + b_4 P2bv_{it} + e_{it}$$

	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	57.19	0.29	98.04	8.44
Eo_{it}	4.08	9.80	14.99	16.76
Bv_{it}	3.11	29,86	-0.42	-3.14
$P2eo_{it}$	-4.51	-8.56	-20.29	-21.38
$P2bv_{it}$	-0.55	-4.26	1.94	13.96
N	2204		5206	
Adj. R^2	0.66		0.46	

[a]   Variables:
All variables are measure in levels form.
MVE_{it} is market value of equity for firm i at end of year t,
eo_{it} is earnings before extraordinary items for year t, and
bv_{it} is book value equity for firm i at end of year t.
[b]   Dummy variable P1:
We test for a shift in the coefficient on earnings and book value as earnings become low enough. P1 is a dummy variable that serves as a proxy for the increasing likelihood of abandonment. For the NYSE and Nasdaq, respectively, P1 is equal to zero for deciles 2 and 2 and lower and equal to unity for deciles 3 and 3 and higher.
[c]   Dummy variable P2:
We test for a shift in the coefficient on earnings and book value as earnings become low enough. P2 is a dummy variable that serves as a proxy for the increasing likelihood of abandonment. For both the NYSE and Nasdaq, P2 is equal to unity for eo/bv ratios less than or equal to 0.10 and zero otherwise. For the NYSE (Nasdaq), P2 is equal to zero for 1,296 (1,803) out of 2,205 (5,207) observations.

To further investigate whether the ratio of earnings before extraordinary items to book value influences the valuation significance of earnings and book value, Table 3 panel B formally tests for a shift for a shift in the coefficients for earnings and book value for differential values of this ratio through the following regression model:

$$MVE_{it} = a_0 + a_1 eo_{it} + a_2 bv_{it} + a_3 P2eo_{it} + a_4 P2bv_{it} + e_{it} \qquad \text{Formula (3)}$$

where P2 is a proxy for the likelihood that a firm will exercise its put option. In panel B, P2 carries a value of zero (unity) as a proxy for a relatively low (high) likelihood of abandonment. Specifically, P2 is equal to zero for firms with an EO/BV ratio of 0.10 or greater and equal to unity for firms with an EO/BV ratio of less than 0.10. Predictions regarding the coefficients in panel B are identical to the predictions in panel A.

The results in Table 3 panel B show that all predictions are supported. As the ratio of earnings to book value drops below 0.10, earnings (book value) become less (more) important in valuation. For example, for the NYSE, the coefficient a_4 is 0.55 (t = 4.26), implying that the coefficient on book value increases as the earnings level drops. Analogously, the coefficient a_3 is -4.51 (t = -8.56), implying that the valuation significance of earnings decreases as EO/BV ratio drops below 0.10. Results are similar for the Nasdaq.

Results for pooled time periods

Results for 1994 to 1998

Our second objective is to investigate whether the earnings level that is low enough to trigger a liquidation option is intertemporally stable. To accomplish this objective, we pool earnings data for the last five years and for the last ten years before dividing the data into deciles.

Regression results for all years combined and by decile are displayed in Tables 4 and 5 for the 1994 to 1998 and the 1989 to 1998 time periods, respectively. In Table 4 panel A, we fit equation (1) for all deciles and each stock exchange for the 1994 to 1998 time period. As in Table 2 panel A, both earnings and book value are highly significant in valuation when examining all deciles simultaneously. This is further confirmed by the incremental r-square values in the first two lines of panel C of Table 4. The results are virtually indistinguishable from those reported in panels A and C of Table 2.

Table 4				
Regression results for firms listed on the NYSE and Nasdaq using pooled data for the last five available fiscal years [a]				
Panel A: All deciles -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{it} d + e_{itd}$				
	NYSE [a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	440.48	8.58	81.06	23.96
eo_{itd}	3.50	35.54	0.95	12.74
bv_{itd}	1.80	92.76	1.70	144.36
N	9243		19162	
Adj. R^2	0.70		0.65	

In panel B of Table 4, we fit equation (1) separately for each of the ten deciles for the last available fiscal year; panel C reports corresponding incremental r-squares. The results are analogous to those displayed in panels B and C of Table 2; for both exchanges, earnings is decreasing and book value is increasing in valuation importance as the earnings level decreases cross-sectionally or over

time. For example, comparing decile 1 to decile 10, the coefficient (t-statistic) on book value increases from 1.00 (12.91) to 1.73 (27.84) for the NYSE and from 1.02 (21.65) to 1.59 (43.41) for the Nasdaq. The increasing value-relevance of book value is also supported by incremental r-square results. The incremental r-square for earnings for the two exchanges decreases over decile 1 to decile 10, while the incremental r-square of book value increases for all three exchanges from decile 1 to decile 10. For example, for the Nasdaq, the incremental book value r-square increases from 0.10 for decile 1 to 0.37 for decile 10. As in Table 2 panels B and C, the earnings coefficient is negative and significant and possesses incremental explanatory power in decile 10 for either exchange.

Table 4 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE[a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 1(highest)[b]				
eo_{it}	6.08	8.35	4.78	13.69
bv_{it}	1.00	12.91	1.02	21.65
Adj. R^2	0.51		0.62	
Decile 2				
eo_{it}	7.86	4.60	8.49	3.93
bv_{it}	1.78	31.28	2.06	23.95
Adj. R^2	0.55		0.26	
Decile 3				
eo_{it}	6.56	1.95	5.96	2.01
bv_{it}	1.15	15.90	2.09	26.17
Adj. R^2	0.23		0.28	
Decile 4				
eo_{it}	10.67	3.58	5.82	1.65
bv_{it}	1.34	20.44	1.74	33.16
Adj. R^2	0.34		0.37	
Decile 5				
eo_{it}	7.22	2.53	-18.91	-2.20
bv_{it}	1.51	28.34	2.74	31.68
Adj. R^2	0.48		0.34	
Decile 6				
eo_{it}	12.04	1.85	-6.84	-1.12
bv_{it}	1.31	41.12	1.78	33.20
Adj. R^2	0.65		0.36	

Table 4 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE[a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 7				
eo_{it}	8.34	2.12	-9.19	-2.73
bv_{it}	1.93	43.08	1.82	56.92
Adj. R^2	0.67		0.63	
Decile 8				
eo_{it}	-6.49	-0.94	-11.82	-3.92
bv_{it}	2.51	34.31	2.56	47.96
Adj. R^2	0.56		0.55	
Decile 9				
eo_{it}	2.82	0.37	-3.05	-1.39
bv_{it}	2.85	39.45	1.84	26.53
Adj. R^2	0.63		0.27	
Decile 10				
eo_{it}	-0.74	-4.29	-2.14	-14.34
bv_{it}	1.73	27.84	1.59	43.41
Adj. R^2	0.53		0.62	

Table 4 (cont'd)		
Panel C: Incremental r-squares for decile regressions[c]		
	NYSE	Nasdaq
Entire Sample		
eo incremental	.04	.01
bv incremental	.28	.39
Decile 1		
eo incremental	.14	.04
bv incremental	.09	.10
Decile 2		
eo incremental	.01	.00
bv incremental	.48	.22
Decile 3		
eo incremental	.00	.00
bv incremental	.21	.26

Table 4 (cont'd)		
Panel C: Incremental r-squares for decile regressions[c]		
Decile 4		
eo incremental	.01	.00
bv incremental	.30	.36
Decile 5		
eo incremental	.00	.00
bv incremental	.45	.34
Decile 6		
eo incremental	.00	.00
bv incremental	.65	.36
Decile 7		
eo incremental	.00	.00
bv incremental	.66	.63
Decile 8		
eo incremental	.00	.00
bv incremental	.56	.54
Decile 9		
eo incremental	.00	.00
bv incremental	.63	.27
Decile 10		
eo incremental		
bv incremental		4
[a] Variables: All variables are measured in levels form. MVE_{itd} is market value of equity for firm i at end of year t for decile d, eo_{it} is earnings before extraordinary items for year t and decile d, and bv_{it} is book value equity for firm i at end of year t for decile d. [b] Deciles: Deciles are formed by dividing the data points for each time periods into ten groups according to their reported earnings before extraordinary items (eo) levels. Decile 1 represents the highest eo group and decile 10 represents the lowest eo group. [c] Incremental r-squares: Incremental r-square values for bv (eo) are obtained by subtracting the r-squar4e of a regression of market value of equity on eo (bv) from the r-square of the corresponding regressions in panels A and B.		

Also note in panel B of Table 4 that the valuation reliance shifts from earnings to book value in decile 3 for the NYSE and in decile 4 for the Nasdaq, when earnings become insignificant and

without explanatory power in valuation importance. Although not displayed in tabular format, the mean EPS level of these deciles is $1.86 ($0.63) for the NYSE (Nasdaq). More importantly, the EO/BV ratio is 0.126 for decile 3 of the NYSE and 0.081 for decile 4 of the Nasdaq. Thus, as for the 1998 time period, a reasonable numerical estimate of the earnings level at which the abandonment put option is triggered is an EO/BV ratio of around 0.10.

Regression results for equations (2) and (3) for the 1994 to 1998 time period are displayed in panels A and C of Table 6, respectively. The predictions of the coefficients are identical to the predictions in Table 3. As shown in panels A and C, all predictions are supported for both NYSE and Nasdaq firms, using either P1 or P2 as the dummy variable proxying for the likelihood of abandonment. As the earnings level decreases, earnings become less and book value becomes more important in valuation. For example, for the Nasdaq, using the P2 dummy variable as a proxy for the likelihood of abandonment, the coefficient a_4 is 1.16 (t = 31.67), implying that the coefficient on book value increases as the earnings level drops. Analogously, the coefficient a_3 is -11.31 (t = -50.39), implying that the valuation significance of earnings decreases as the earnings level decreases. Results are virtually identical for the NYSE.

Results for 1989 to 1998

In the previous section, we saw that the EO/BV ratio at which the liquidation option is triggered is about 0.10 even if annual data are pooled. To further investigate whether this ratio remains stable, the 1989 to 1998 period is investigated next.

Regression results for all years combined and by decile for the 1989 to 1998 period are displayed in Table 5. As in Tables 2 and 4 panel A, both earnings and book value are highly significant in valuation when examining all deciles simultaneously. This is further confirmed by the incremental r-square values in the first two lines of panel C of Table 5. The results are virtually indistinguishable from those reported in panels A and C of Tables 2 and 4.

Table 5				
Regression results for firms listed on the NYSE and Nasdaq using pooled data for the last ten available fiscal years [a]				
Panel A: All deciles -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{it} d + e_{itd}$				
	NYSE[a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	487.84	15.42	74.08	29.11
eo_{itd}	3.84	55.33	1.18	19.61
bv_{itd}	1.44	117.15	1.54	167.51
N	15951		28953	
Adj. R^2	0.70		0.65	

Equation (1) is fitted separately for each of the ten deciles for the 1989 to 1998 time period in panel B of Table 5; corresponding incremental r-squares are reported in panel C of Table 5. The results are virtually identical to those displayed in panels B and C of Tables 2 and 4; for both exchanges, earnings is decreasing and book value is increasing in valuation importance as the earnings level decreases cross-sectionally or over time. For example, comparing decile 1 to decile 10, the coefficient (t-statistic) on earnings decreases from 6.10 (20.85) to -0.74 (-7.00) for the NYSE and from 4.43 (15.82) to -2.24 (-18.50) for the Nasdaq. The increasing value-relevance of book value is further supported by incremental r-square results. With the exception of decile 10 for both exchanges, the incremental r-square for earnings for the two exchanges decreases from decile 1 to decile 10, while the incremental r-square of book value increases for the two exchanges from decile 1 to decile 10. For example, for the NYSE, the incremental book value r-square increases from 0.08 for decile 1 to 0.38 for decile 10. As in panels B and C of Tables 2 and 4, the earnings coefficient is negative and significant and possesses incremental explanatory power in decile 10 for both exchanges.

Table 5 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE[a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 1 (highest)[b]				
eo_{it}	6.10	20.85	4.43	15.82
bv_{it}	0.78	15.86	0.95	24.44
Adj. R^2	0.48		0.61	
Decile 2				
eo_{it}	10.05	9.44	9.84	6.74
bv_{it}	1.00	25.83	1.53	27.00
Adj. R^2	0.36		0.24	
Decile 3				
eo_{it}	6.79	4.39	5.08	2.17
bv_{it}	1.06	20.75	2.05	37.80
Adj. R^2	0.24		0.34	
Decile 4				
eo_{it}	11.64	5.72	7.64	2.92
bv_{it}	1.21	32.84	1.77	44.70
Adj. R^2	0.43		0.41	

Table 5 (cont'd)				
Panel B: By decile -- $MVE_{itd} = b_0 + b_1 eo_{itd} + b_2 bv_{itd} + e_{itd}$				
	NYSE[a]		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Decile 5				
eo_{it}	3.16	1.29	-8.02	-1.21
bv_{it}	1.81	56.64	2.69	36.67
Adj. R^2	0.67		0.32	
Decile 6				
eo_{it}	15.49	3.76	0.35	0.06
bv_{it}	1.16	49.60	1.45	38.49
Adj. R^2	0.61		0.34	
Decile 7				
eo_{it}	-2.15	-0.59	-0.94	-0.36
bv_{it}	2.26	71.16	1.79	73.59
Adj. R^2	0.76		0.65	
Decile 8				
eo_{it}	5.05	1.28	-4.33	-2.02
bv_{it}	1.56	45.08	2.15	52.98
Adj. R^2	0.56		0.50	
Decile 9				
eo_{it}	7.08	1.30	1.89	0.84
bv_{it}	2.65	52.82	3.28	55.02
Adj. R^2	0.64		0.51	
Decile 10				
eo_{it}	-0.74	-7.00	-2.24	-18.50
bv_{it}	1.18	38.81	1.31	53.10
Adj. R^2	0.59		0.61	

As shown in panel B, the valuation reliance shifts from earnings to book value in decile 5 for the NYSE and in decile 3 for the Nasdaq, when earnings become insignificant and without explanatory power in valuation importance. The mean EPS level of these deciles is $1.33 ($0.74) for the NYSE (Nasdaq). More importantly, the EO/BV ratio is 0.105 for the NYSE decile 5 and 0.096 for the Nasdaq decile 3. Thus, as for the 1998 and the 1994 to 1998 time periods, a reasonable numerical estimate of the EO/BV ratio at which the liquidation option is triggered is 0.10.

Table 5 (cont'd)		
Panel C: Incremental r-squares for decile regressions[c]		
	NYSE	Nasdaq
Entire Sample		
eo incremental	.06	.01
bv incremental	.27	.35
Decile 1		
eo incremental	.14	.03
bv incremental	.08	.08
Decile 2		
eo incremental	.03	.01
bv incremental	.26	.19
Decile 3		
eo incremental	.01	.00
bv incremental	.20	.32
Decile 4		
eo incremental	.01	.00
bv incremental	.39	.40
Decile 5		
eo incremental	.00	.00
bv incremental	.66	.32
Decile 6		
eo incremental	.00	.00
bv incremental	.60	.34
Decile 7		
eo incremental	.00	.00
bv incremental	.75	.65
Decile 8		
eo incremental	.00	.00
bv incremental	.56	.49
Decile 9		
eo incremental	.00	.00
bv incremental	.64	.51
Decile 10		
eo incremental	.01	.00
bv incremental	.38	.38

a	MVE_{itd} is market value of equity for firm i at end of year t for decile d, eo_{it} is earnings before extraordinary items for year t and decile d, and bv_{it} is book value equity for firm i at end of year t for decile d.
b	Deciles are formed by dividing the data points for each time periods into ten groups according to their reported earnings before extraordinary items (eo) levels. Decile 1 represents the highest and decile 10 represents the lowest
c	Incremental r-square values for bv (eo) are obtained by subtracting the r-square of a regression of market value of equity on eo (bv) from the r-square of the corresponding regressions in panels A and B.

Panels B and D of Table 6 show the regression results for equations (2) and (3) for the 1989 to 1998 time period. As for the other two time periods, all predictions are supported for both NYSE and Nasdaq firms, using either P1 or P2 as the dummy variable proxying for the likelihood of abandonment. As the earnings level decreases, Earnings (book value) become less (more) important in valuation as the earnings level decreases. For instance, for the NYSE, using the P2 dummy variable as a proxy for the likelihood of abandonment, the coefficient a_4 is 0.19 (t = 6.93), implying that the coefficient on book value increases as the earnings level drops. Similarly, a_3 has a value of -6.53 (t = -41.32), implying that the valuation significance of earnings decreases as the earnings level decreases. Results for the Nasdaq are similar.

Table 6				
Regression results for three stock exchanges using levels data for two pooled time periods[a]				
Panel A: Slope dummy P1[b] for likelihood of abandonment for the last five fiscal years				
$MVE_{it} = b_0 + b_1 eo_{it} + b_2 bv_{it} + b_3 P1 eo_{it} + b_4 P1 bv_{it} + e_{it}$				
	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	578.76	11.33	70.53	21.30
Eo_{it}	6.46	48.94	5.85	44.85
Bv_{it}	1.36	57.83	1.10	61.67
$P1eo_{it}$	-7.28	-35.00	-7.69	-44.79
$P1bv_{it}$	0.23	4.58	0.55	17.09
N	9243		19162	
Adj. R^2	0.74		0.68	
Panel B: Slope dummy P1[b] for likelihood of abandonment for the last ten fiscal years				
$MVE_{it} = b_0 + b_1 eo_{it} + b_2 bv_{it} + b_3 P1 eo_{it} + b_4 P1 bv_{it} + e_{it}$				
	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat

Table 6 Regression results for three stock exchanges using levels data for two pooled time periods[a]				
Intercept	458.00	15.45	64.66	26.36
Eo_{it}	7.19	76.23	5.26	51.04
Bv_{it}	1.00	65.99	1.05	72.94
$P1eo_{it}$	-7.94	-50.98	-7.40	-51.98
$P1bv_{it}$	0.19	5.38	0.30	12.02
N	15951		28953	
Adj. R^2	0.74		0.68	

Panel C: Slope dummy P2[c] for likelihood of abandonment for the last five fiscal years

$$MVE_{it} = b_0 + b_1eo_{it} + b_2bv_{it} + b_3P2eo_{it} + b_4P2bv_{it} + e_{it}$$

	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	384.42	7.96	65.11	20.48
Eo_{it}	5.82	35.73	9.34	46.26
Bv_{it}	1.56	44.48	0.47	13.69
$P2eo_{it}$	-6.44	-29.09	-11.31	-50.37
$P2bv_{it}$	0.09	2.11	1.16	31.67
N	9243		19162	
Adj. R^2	0.74		0.69	

Panel D: Slope dummy P2[c] for likelihood of abandonment for the last ten fiscal years

$$MVE_{it} = b_0 + b_1eo_{it} + b_2bv_{it} + b_3P2eo_{it} + b_4P2bv_{it} + e_{it}$$

	NYSE		Nasdaq	
	Coeff	t-stat	Coeff	t-stat
Intercept	400.00	13.52	60.91	25.17
Eo_{it}	6.54	54.22	8.11	48.42
Bv_{it}	1.16	48.00	0.53	18.12
$P2eo_{it}$	-6.53	-41.32	-9.87	-53.03
$P2bv_{it}$	0.19	6.93	0.96	31.13
N	15951		28953	
Adj. R^2	0.74		0.68	

Academy of Accounting and Financial Studies Journal, Volume 7, Number 3, 2003

Table 6
Regression results for three stock exchanges using levels data for two pooled time periods[a]

[a]	All variables are measure in levels form.
	MVE_{it} is market value of equity for firm i at end of year t,
	eo_{it} is earnings before extraordinary items for year t, and
	bv_{it} is book value equity for firm i at end of year t.
	The two time periods are the last five years of available data and the last ten years of available data.
[b]	Dummy variable P1:
	We test for a shift in the coefficient on earnings and book value as earnings become low enough. P1 is a dummy variable that serves as a proxy for the increasing likelihood of abandonment. In Panel A, for the NYSE, Amex, and Nasdaq, respectively, P1 is equal to zero for deciles 2, 1, and 1 and lower and equal to unity for deciles 3, 2, and 2 and higher. In Panel B, for the NYSE, Amex, and Nasdaq, respectively, P1 is equal to zero for deciles 4, 1, and 2 and lower and equal to unity for deciles 5, 2, and 3 and higher.
[c]	Dummy variable P2:
	We test for a shift in the coefficient on earnings and book value as earnings become low enough. P2 is a dummy variable that serves as a proxy for the increasing likelihood of abandonment. For both the NYSE and Nasdaq, P2 is equal to unity for eo/bv ratios less than or equal to 0.10 and zero otherwise. From 1994 to 1998, for the NYSE (Nasdaq), P2 is equal to zero for 5,838 (6,958) out of 9,244 (19,163) observations. From 1989 to 1998, for the NYSE (Nasdaq), P2 is equal to zero for 9,762 (10,311) out of 15,952 (28,954) observations.

In summary, for the two stock exchanges and three time periods investigated here, results indicate that the market uses both earnings and book value valuation when earnings are relatively high. However, as earnings before extraordinary items become lower, book value becomes more significant and with greater incremental explanatory power, while earnings becomes less significant and with virtually no incremental explanatory power. Furthermore, we find that when the ratio of earnings before extraordinary items to book value (EO/BV) falls below 0.10, the reliance on earnings (book value) decreases (increases). These results are independent of whether purely cross-sectional or pooled cross-sectional time series data are examined.

Overall, our findings complement Barth, Beaver, and Landsman's (1998) finding that book value becomes increasingly important in firm valuation as firms become distressed (approach bankruptcy); Collins, Pincus, and Xie's (1999) finding that book value is an important determinant of firm value for loss firms; and, most importantly, Hayn's (1995) finding that sufficiently weak earnings performance can trigger a put option which reduces the reliance on earnings.

SUMMARY AND CONCLUSION

This study examines the relationship of market value of equity to earnings and book value utilizing a sample of companies listed on the NYSE and the Nasdaq. Particularly, we seek to determine the earnings level at which earnings become low enough for these two exchange to trigger a liquidation option and at which point the valuation significance of earnings (book value) decreases (increases).

For both exchanges and for three time periods, we find that both earnings and book value are used to value the firm investigating all data simultaneously. However, when dividing the data into deciles according to earnings before extraordinary items, book value increases in significance and incremental explanatory power, while earnings decrease in significance and exhibit virtually no explanatory power for lower earnings deciles. Furthermore, there appears to be a well-defined shift in the valuation reliance from earnings to book value when the ratio of earnings before extraordinary items to book value falls below 0.10 for both exchanges and for all three time periods. We interpret this as evidence that sufficiently low earnings increase the reliance on book value and decrease the reliance of earnings even though bankruptcy or liquidation is not imminent and even of purely cross-sectional data are examined.

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EARNINGS MANAGEMENT AND EQUITY HOLDINGS

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ABSTRACT

The findings of this study indicate that firms more frequently beat the market expectation of quarterly earnings when their CEOs' compensation is closely tied with a change in the value of equity holdings. Also, in recent years, a shift in the CEO compensation structure has taken place so that CEOs are rewarded through appreciation in the value of their equity holdings rather than through an emphasis of their cash pay, as was once a major incentive. Even though equity compensation is believed to encourage CEOs to work toward an increase in firm value from which both shareholders and CEOs themselves are financially benefited, the results of this paper indicate that a shift in equity compensation motivates CEOs to influence stock prices through earnings management. The results are robust even after the dispersion of earnings forecasts and firm size are controlled.

INTRODUCTION

This study investigates whether or not earnings management to beat the market expectation is motivated by CEOs who want to maximize their own wealth. Recent studies have reported that the number of firms that meet or barely beat the market expectation is substantially greater than the number of firms that slightly miss it. These findings are consistent with criticisms raised by SEC chairman, Arthur Levitt (1998) who stated that "one major US company, that failed to meet its so-called 'numbers' by one penny, lost more than six percent of its stock value in one day." Thus, managers are eager to beat the market expectation to avoid potential penalties in the capital market. Earnings management by CEOs who want to maximize their own wealth has been intensively documented in prior studies by focusing primarily on cash compensation, as the executive compensation committee implicitly or explicitly links cash compensation with a firm's financial performance (Healy, 1985; Gaver, Gaver & Austin, 1995; Holthausen, Larcker & Sloan, 1995; Balsam, 1998). In addition, cash compensation used to be a lion's share of annual total pay so that managers have been suspected of managing earnings as one of the components in the cash compensation formula. For example, Defeo, Huson & Sloan (1989) show cash compensation as around 70 and 80 percent of annual total pay, while Lambert & Larcker (1987) estimate it to be around 80 and 90 percent of annual total pay. The executive labor market, however, has drastically changed during the last decade. The relative portion of cash compensation has declined from 75 percent in 1982 to 52 percent of annual total pay in 1994 for CEOs of the largest US firms, while

the size of stock options has substantially increased during the same period (Hall & Liebman, 1998). Further, Core, Guay & Verrecchia (2000) report that stock return is a dominant component of CEOs' total compensation so that Abowd & Kaplan (1999, p. 150) concluded that "the vast majority of the link between shareholder and executive wealth comes from stock and stock option holdings." Accordingly, I speculate that CEOs might be more concerned about an increase in the value of their stock and options holdings rather than cash compensation.

This paper includes firms that beat or miss the consensus of analyst forecasts for quarterly earnings that are issued in the month prior to quarterly earnings announcements within a range of five cents per share and then investigates whether or not the compensation structure of CEOs (i.e., cash pay vs. a change in the value of their equity holdings) affects the probability of beating the market expectation. Total compensation of CEOs consists of two major components: changes in the value of equity holdings of CEOs, and cash pay (salary and bonus). Results from this work indicate that firms likely beat the market expectation more frequently when the total compensation of their CEOs is closely tied with the value of their equity holdings. Of the total sample, 65 percent (35 percent) are shown to beat (miss) the market expectation. Firms that beat the market expectation show a higher amount of cash pay as well as changes in the value of equity holdings than do their counterparts that miss the market expectation. Further, differences in the changes in the value of equity holdings between the two groups are much more significant than are the differences in cash pay. When the probability of beating the market expectation is regressed on the ratio of changes in the value of equity holdings over cash pay, the dispersion of earnings forecasts and firm size (using the logit model), coefficients on the ratio are positive and statistically significant. Accordingly, CEOs are more concerned about beating the market expectation when they are rewarded through appreciation in their equity holdings than through cash pay.

This paper contributes to accounting literature by documenting managers' influence over stock price through earnings management when their compensation is closely tied with the value of their equity holdings. Traditionally, stock price has been considered to be one of the unbiased measurements for the performance of managers who are assumed not to have direct influence over stock price. Nonetheless, the findings of this study show that managers are able to manipulate stock price to some extent.

The paper is organized as follows. The next section describes prior studies and proposes a hypothesis. Section 3 describes the research design. The results are reported in Section 4. The study concludes in Section 5.

LITERATURE REVIEW AND HYPOTHESES

One stream of earnings management research uses bonus-plan details, not the actual compensation paid, to examine how managers attempt to maximize their cash pay through managing earnings that are above the upper bound or below the lower bound (Healy 1985; Gaver, Gaver &

Austin, 1995; Holthausen, Larcker & Sloan, 1995). The other stream of research examines specific, one-time transactions such as early debt redemptions (Defeo, Lambert & Larcker, 1989), restructuring charges (Dechow, Huson & Sloan, 1994) or non-recurring accounting charges (Gaver & Gaver, 1998) to document how managers manipulate given opportunities to increase their compensation. For similar reasons, Balsam (1998) extends prior studies, using an aggregate measure of accounting policies - discretionary accruals, instead of isolated single transactions.

Balsam (1998) reports that cash pay to CEOs is significantly associated with positive discretionary accruals in conjunction with negative nondiscretionary accruals, but that the association between cash pay and negative discretionary accruals becomes lessoned. These findings are consistent with prior studies that show managers are rewarded for the choice of accounting methods to increase net income, but wholly or partially shielded from their choice of accounting methods that lead to a decrease in net income (Kren & Leauby, 1997; Gaver & Gaver, 1998). Balsam (1998), however, focuses only on the accrual portion of earnings. Recent studies of earnings management report that managers could use both 'misreporting' and 'direct' earnings management to beat the market expectation (Burgstahler & Dichev, 1997; Degeorge, Patel & Zeckhauser, 1999). 'Misreporting' earnings management involves discretionary accruals for outcomes already realized, while 'direct' earnings management represents the strategic choice of investment, sales, and expenditure. Thus, managers can use both accruals and operating cash flows to manage earnings so that this study is motivated to extend prior findings by examining earnings management using both accruals and cash flows to beat the market expectation.

Prior studies in the area of earnings management and executive compensation focus on cash pay only by combining base salary and bonus, while ignoring stock options, long-term performance awards, or other income sources, for a couple of reasons. First, in many cases, cash bonus is directly tied with financial performance. For example, two major types of bonus plans (the pool-type plan or budget-based plan) show bonuses as a function of various predetermined variables including earnings, so that a functional linkage exists between the amount of cash bonus and the earnings. Accordingly, this context offers a sound theoretical basis to investigate managers' incentives for earnings management. Second, cash pay once represented a substantial portion of the total compensation package.

In recent years, firms have tended to move in a direction where CEOs are rewarded with an increase in the value of their equity holdings rather than cash pay. For example, Core, Guay & Verrecchia (2000) report $116.16 (3.83) million as the mean of CEO equity holdings (the sum of salary and bonus), based on the sample from 1993 to 1998; further, a change in the value of equity holdings was, on average, $31.22 million. Thus, CEOs would consider the value of stock and option holdings as an important factor in determining their wealth. Hall & Liebman (1998) report that stock and stock options revaluation explains about 98 percent of the relationship between CEOs' compensation and firm performance. Core, Guay & Verrecchia (2000) confirm the findings of Hall & Liebman (1998) by reporting that stock returns account for more than 90 percent of variation in

total compensation so that the amount of annual cash pay no longer plays a major role in determining the wealth of most CEOs. Even though the total compensation of CEOs is closely tied with a change in the value of their equity holdings, accounting studies have not properly investigated earnings management done by managers who are motivated to maximize their wealth through influencing stock prices. In particular, as indicated by Levitt, a decline in stock prices is sometimes unbearable when a firm fails to meet the market expectation. Under this circumstance, CEOs whose compensation is closely tied with a change in the value of equity holdings might be concerned about the impact of a decline in stock prices on their own wealth. Schroeder (1998) supports this proposition, indicating that CEOs are even more motivated to beat the market expectation as their stock options have been doubled since 1989. Thus, the testing hypothesis is in an alternative form stated:

H1:	The more closely tied the total compensation of CEOs is with the value of their equity holdings, the higher the motivation for CEOs to beat the market expectation.

RESEARCH DESIGN

Sample

The sample consists of the intersection of ExecuComp, IBES, and Compustat databases from 1993 to 1999. ExecuComp provides most data with respect to CEO compensation and equity holdings while IBES includes data regarding quarterly earnings forecasts. Other financial data are collected from Compustat. Earnings forecast errors are estimated by subtracting the market expectation from actual EPS (Brown 1998). The market expectation is measured by using quarterly earnings consensus from the I/B/E/S Monthly Summary File in the month immediately prior to quarterly earnings announcements.[1] Actual EPSs are selected from the I/B/E/S file as well. Earnings forecast error is computed without a deflator, consistent with Degeorge, Patel & Zeckhauser (1997) and Brown (1998).[2] Then, quarterly earnings are selected with an absolute value of earnings forecast error that is less than or equal to five cents per share, which is considered to be those observations that barely miss or beat the market expectation.

In addition, changes in the value of option holdings (optionholdings) are computed based on the Black-Scholes (1973) model. The estimation of the Black-Scholes model is discussed in detail by Core & Guay (2000) and Core, Guay & Verrecchia (2000). Sample firms should report required variables on ExecuComp. Also, prior studies show that earnings management is affected by the dispersion of earnings forecasts and firm size (Brown 1998; Robb 1998; Lee 2002). Thus, the sample includes firms that report variables necessary to compute these proxies in the above three databases. Firm size and the dispersion of earnings forecasts are selected as proxies for the accuracy of earnings forecasts. This procedure yields a total of 11,919 firm-quarterly observations for 4,508

firms from 1993 through 1999 in Panel A, Table 1. Panel B, Table 1 shows the distribution of analysts' quarterly earnings forecast errors that are equal to or less than five cents per share. The number of firms, meeting or barely beating the market expectation, is greater than that barely missing it during the observation period. Further, firms that miss the market expectation report more often negative quarterly earnings than do their counterparts that meet or slightly beat it. For example, 12.3 percent of the firms that miss the market expectation by four cents of earnings per share report negative earnings, compared to six percent, on average, of the total sample that reports negative quarterly earnings. This finding is consistent with that of Brown (1998) who argues that managers for loss firms are less concerned about beating the market expectation during the current year, but instead, are looking for better performance in the future.

Table 1: Sample Distribution for the period from 1993 to 1999						
Panel A: Number of Firm-Observations by Year						
Year	QE	% of Total Sample	Number Firms	% of Sample		
1993	786	6.6	292	6.5		
1994	1,303	10.9	498	11.1		
1995	1,650	13.9	625	13.9		
1996	1,718	14.4	636	14.1		
1997	2,126	17.8	771	17.1		
1998	2,481	20.8	913	20.2		
1999	1,855	15.6	773	17.1		
Total	11,919	100.0	4,508	100.0		
Panel B: Distribution of Earnings Forecast Errors						
Bin	NQE	NQE/QE(%)	PQE	PQE/QE(%)	QE	QE%
-5	44	10.4	380	89.6	424	3.6
-4	63	12.3	451	87.7	514	4.3
-3	82	10.2	721	89.8	803	6.7
-2	87	6.5	1,258	93.5	1,345	11.3
-1	50	4.7	1,017	95.3	1,067	9.0
0	80	4.1	1,880	95.9	1,960	16.4
1	51	4.1	1,192	95.9	1,243	10.4
2	100	4.7	2,011	95.3	2,111	17.7
3	94	7.2	1,212	92.8	1,306	10.9
4	36	5.5	614	94.5	650	5.5
5	27	5.4	469	94.6	496	4.2
Total	714	6.0	11,205	94.0	11,919	100.0

Sample firms are selected from the intersection of ExecuComp, IBES, and Compustat databases (1993 to 1999). Earnings forecast errors are estimated by subtracting the market expectation from actual EPS. The market expectation is measured using consensus of quarterly earnings forecasts issued in the month immediately prior to quarterly earnings announcements. Actual EPSs are selected from the I/B/E/S file as well. In addition, changes in the value of option holdings (optionholdings) are computed based on the Black-Scholes (1973) model. The estimation of the Black-Scholes model is discussed in detail in Table 2. In addition, firm size and the dispersion of earnings forecasts are computed as proxies for the accuracy of earnings forecasts. This procedure yields a total of 11,919 quarterly earnings for 4,508 firms.

Bin	earnings forecast errors per share (cent in unit).
QE	the number of quarterly earnings in each bin.
NQE	the number of firms that report negative quarterly earnings in each bin.
NQE/QE(%)	percentage of NQE over QE.
PQE	the number of firms that report positive quarterly earnings in each bin.
PQE/QE(%)	percentage of PQE over QE.
QE%	percentage of QE in each bin over the number of total sample.

Variables measurement and descriptive statistics

Total annual pay for CEOs consists of two major components: cash pay and stock pay. Cash pay represents salary, bonus, and others, while stock pay is comprised of restricted stock granted, stock options granted and long-term incentive payouts. Core, Guay & Verrecchia (2000) define total compensation as the sum of total annual pay and a change in the value of CEO's stock and option portfolio during the year. A change in the value of the CEO's stock holding (hereafter, ΔStockholdings) is measured by multiplying shares of stock holdings at the beginning of the year by stock return (including dividends) during the year. A change in the value of the CEO's option holding (hereafter, ΔOption holdings) is computed by multiplying the number of options owned by the CEO at the beginning of the year, with an estimated change in an average option price during the year.

A change in the average option price is computed by following the method developed by Core and Guay (2000) and Core, Guay & Verrecchia (2000) based on the Black-Scholes (1973) model. Most variables required for the Black-Scholes model are available from the ExecuComp database. For example, the expected stock-return volatility is measured as a standard deviation of monthly stock returns over the 60 months preceding the end of the fiscal year in which stock options were granted. Expected dividend yield is estimated by choosing a firm's average dividend yield over the past three years. The treasury-bond yield is chosen to estimate the risk free-rate. Some estimates are necessary, however, and Core, Guay & Verrecchia (2000) assume that the expected maturity of an unvested (vested) option is 1 year (4 years) less than its original maturity date.[3] Then, the time-to-exercise is computed by multiplying the expected maturity by 70%. For example, if a firm grants 10-year options, the expected maturity of the unvested (vested) option is 9 (6) years. Accordingly, the unvested (vested) options have a 6.3- (4.2)-year time-to-exercise. Once these estimates are available, the value of options at the beginning of year t+1 is estimated using the

Black-Scholes model. The value of options at the end of year t+1 is estimated in the same way as described above except for the time-to-exercise, which is reduced to .7 of one year. Average exercise prices for exercisable options are estimated as [fiscal-year-end stock price - (current realizable value of exercisable options / number of exercisable options)] and for unexercisable options as [fiscal-year-end stock price - (current realizable value of unexercisable options / number of unexercisable options)].

Once ΔStockholdings and ΔOption holdings are computed, two ratios for the purpose of empirical investigation are computed: S_SB is the ratio of an absolute value of ΔStockholdings over the sum of salary and bonus and O_SB is the ratio of an absolute value of ΔOption holdings over the sum of salary and bonus. The primary objective of this paper is to investigate how CEOs are concerned with beating the market expectation when their total compensation is closely associated with a change in the value of their equity holdings. Thus, the magnitudes of ΔStockholdings and ΔOption holdings relative to cash pay are estimated to capture the percentage of a change in the value of equity in CEOs' total compensation.

In addition, two moderating variables are computed as earnings management is a function of firm size and the accuracy of earnings forecasts. Brown (1998) reports that large firms tend to manage earnings more frequently than do small firms, as managers of large firms have access to a variety of resources that can be employed to manage earnings. Managers' incentives for earnings management are also affected by the consensus of earnings forecasts. In the presence of high dispersion of earnings forecasts, both investors and managers do not have a reliable prediction of what a firm's future earnings should be, compared to firms with low dispersion of earnings forecasts. Thus, managers of firms with high dispersion of earnings forecasts would be less motivated to beat the market expectation than would their counterparts with low dispersion of earnings forecasts (Robb 1998; Lee 2002). Firm size (SIZE) is computed by multiplying shares outstanding (Compustat Item No. A25) by the fiscal-year end price of common shares (Compustat Item No. A199). The dispersion of earnings forecasts (DIST) is computed by subtracting the lowest from the highest earnings forecasts issued in the month immediately prior to the date of quarterly earnings announcement and then deflating it by an absolute value of actual quarterly earnings.

Panel A, Table 2 shows descriptive statistics of the above variables measured. The mean (median) of salary and bonus is .6 (.48) million, which is lower than 1.21 (.54) million reported by Core, Guay & Verrecchia (2000). Since the sample includes firms that barely beat and miss the market expectation, CEOs with large salaries and bonuses might be excluded from this study. For example, the third quartile (maximum) of salary and bonus in this sample is .72 (11.06) million, while Core, Guay & Verrecchia (2000) report 1.4 (102.45) million for the corresponding figures. A similar pattern is observed for ΔStockholdings and ΔOption holdings. For instance, the mean (median) of ΔStockholdings is 5.36 (.21) million while the mean (median) of ΔOption holdings is .36 (.08) million. Core, Guay & Verrecchia (2000) report .34 and .00 million as the medians of ΔStockholdings and ΔOption holdings, respectively. When ΔStockholdings (ΔOption holdings) is

divided by salary and bonus, the mean of the ratio is 22.76 (4.46). Thus, the total compensation of CEOs appears to heavily depend upon a change in the value of their equity holdings.

Panel B, Table 2 shows descriptive statistics of the variables for sub-samples of firms that beat or miss the market expectation. The group of firms that meet or beat the market expectation (BEAT) shows higher total compensation than do their counterparts that miss the market expectation (MISS). For example, means of ΔStockholdings and ΔOption holdings of MISS are 3.21 and -.13 million, respectively, while means of ΔStockholdings and ΔOption holdings of BEAT are 6.52 and .63 million, respectively. CEOs of MISS also receive less cash pay than do their counterparts of BEAT (by .04 million on average), which is smaller than the difference in changes in the value of equity holdings above. Accordingly, CEOs appear to experience financial losses that mainly arise from a declining value of their equity holdings when their firms fail to meet the market expectation.

Table 2:Descriptive Statistics of the sample for the period from 1993 to 1999									
Panel A: Total Sample									
Variables			Mean	Std Dev	Min	Q1	Median	Q3	Max
Salary+Bonus*			0.60	0.48	0	0.31	0.48	0.72	11.06
Δ Stockholdings*			5.36	63.07	-887.55	-0.52	0.21	2.36	2,587.64
ΔOption holdings*			0.36	7.78	-168.15	-0.52	0.08	1.03	135.88
SIZE *			5.42	17.02	0.02	0.47	1.25	3.94	548.85
DIST			0.33	1.17	0	0.05	0.11	0.25	33.64
S_SB			22.76	105.29	0	0.63	2.54	10.01	4,472.00
O_SB			4.46	13.32	0	0.54	1.58	4.13	517.65
Panel B: Sub-Samples that Miss or Beat the Market Expectation									
Type	OBS	Variables	Mean	Std Dev	Min	Q1	Median	Q3	Max
MISS	4,175	Salary +Bonus*	0.57	0.45	0	0.30	0.46	0.70	7.74
		Δ Stock- holdings*	3.21	58.00	-247.33	1.00	0.01	1.27	2,027.43
		Δ Option holdings*	-0.13	8.29	-168.15	-0.76	-0.05	0.55	135.88
		S_SB	21.30	88.47	0	0.59	2.35	8.93	2,292.13
		O_SB	4.54	17.90	0	0.48	1.39	3.69	517.65
BEAT	7,797	Salary +Bonus*	0.61	0.50	0	0.32	0.49	0.74	11.06
		Δ Stock- holdings*	6.52	65.59	-887.56	-0.29	0.38	2.93	2,587.64
		Δ Option holdings*	0.63	7.48	-168.15	-0.38	0.20	1.31	131.87
		S_SB	23.55	113.29	0	0.67	2.63	10.33	4,472.00
		O_SB	4.42	10.03	0	0.59	1.70	4.30	224.55

Notes:

Δ Stockholdings:	Changes in the value of common stock holdings during the fiscal year.
Δ Option holdings:	Changes in the value of option holdings during the fiscal year.
SIZE:	Firm size is computed by multiplying shares outstanding (Computstat Item No. A25) by the fiscal-end price of common share (Compustat Item No. A199).
DIST:	A difference is computed by subtracting the lowest from the highest earnings forecasts issued in the month immediately prior to the date of earnings announcement and then deflating it by an absolute value of actual earnings.
S_SB:	Ratio of an absolute value of Stockholdings over the sum of salary and bonus.
O_SB:	Ratio of an absolute value of Option holdings over salary plus bonus.
OBS:	Number of quarterly earnings announcements.
MISS:	Quarterly earnings that are less than the mean of earnings forecasts issued in the month immediately prior to quarterly earnings announcements by up to five cents per share.
BEAT:	Quarterly earnings that are greater than or equal to the mean of earnings forecasts issued in the month immediately prior to quarterly earnings announcements by up to five cents per share.

* millions.

Δ Stockholdings is computed by multiplying shares of common stock held by the CEO by a stock return (including dividends) during the year. Optionholdings is computed in a similar way by multiplying the number of options held by the CEO at the beginning-of-the-fiscal year by an estimate of changes in the average option price during the year. The change in the average option price is computed by following the method developed by Core and Guay (2000) and Core, Guay, and Verrecchia (2000), based on the Black-Scholes (1973) model. Most variables needed to compute the Black-Scholes model are available from the ExecuComp database. For example, the expected stock-return volatility is measured as a standard deviation of monthly stock returns over 60 months preceding the end of the fiscal year in which stock options were granted. Expected dividend yield is estimated by choosing a firm's average dividend yield over the past three years. The treasury-bond yield is chosen to estimate the risk free-rate. Nonetheless, some estimates are necessary. Core, Guay, and Verrecchia (2000) assume that the expected maturity of an unvested (vested) option is 1 year (4 years) less than its original maturity date. Thus, the time-to-exercise is computed by multiplying the expected maturity by 70%. For example, if a firm grants 10-year options, the expected maturity of the unvested (vested) option is 9 (6) years. Accordingly, the unvested (vested) options have a 6.3- (4.2)-year time-to-exercise. Once these estimates are available, the value of options at the beginning of year t+1 is estimated using the Black-Scholes model. The value of options at the end of year t+1 is estimated in the same way as described above except for the time-to-exercise, which is reduced to .7 of one year. Average exercise prices for exercisable options are estimated as [fiscal-year-end stock price - (current realizable value of exercisable options / number of exercisable options)] and for unexercisable options as [fiscal-year-end stock price - (current realizable value of unexercisable options / number of unexercisable options)].

EMPIRICAL RESULTS OF LOGIT MODELS

The hypothesis was tested based on a logit model to measure how the amount of changes in the value of equity holdings in CEOs' total compensation affects the probability to beat or miss the market expectation. The logit model is constructed by adopting a dummy variable as a dependent variable that is set equal to zero (a unit value) for observations of MISS (BEAT) and both logarithmic S_SB and logarithmic O_SB as independent variables. As prior studies show that firm size and the accuracy of earnings forecasts moderate earnings management, logarithmic SIZE and DIST are included as control variables. Thus, two logit models are adopted as follows:

$$D = \beta_{0,\,it} + \beta_{1,\,it}\,L(S\_SB) + \beta_{2,\,it}\,DIST + \beta_{3,\,it}\,L(SIZE) + \epsilon_{it} \qquad (1)$$

$$D = \Upsilon_{0,\,it} + \Upsilon_{1,\,it}\,L(O\_SB) + \Upsilon_{2,\,it}\,DIST + \Upsilon_{3,\,it}\,L(SIZE) + \mu_{it} \qquad (2)$$

where

D: *A dummy variable, set equal to a unit value for firms that meet or beat the market expectation (BEAT). Otherwise zero (MISS),*

L(S_SB): *logarithmic S_SB; L(O_SB): logarithmic O_SB; L(SIZE): logarithmic SIZE; and, β, Υ parameters.*

L(S_SB) and L(O_SB) are expected to have positive coefficients as firms with higher S_SB (O_SB) would likely beat the market expectation more frequently than would their counterparts with lower S_SB (O_SB). The mean of quarterly earnings forecasts in the month immediately prior to an announcement of quarterly earnings is adopted as a proxy for the market expectation. The desire of CEOs to beat the market expectation would then be inversely associated with the dispersion of the quarterly earnings forecasts. In other words, the lower the consensus among investors or analysts regarding a firm's future earnings, the lower would be the incentives perceived by CEOs to beat the market expectation. Thus, 2 and 2 will be negative. As indicated by Brown (1998), large firms are better able to beat the market expectation than are small firms. 3 and 3 will be positive. Table 3 shows a Pearson correlation for the above variables. The dummy variable (D) is positively correlated with L(S_SB), L(O_SB), and L(SIZE), but negatively with DIST. Their correlations are statistically significant at the conventional level.

Table 3: Pearson Correlation between Key Variables (ρ-value)				
Variables	L(S_SB)	L(O_SB)	DIST	L(size)
D	0.04	0.02	-0.06	0.02
	(.00)	(.00)	(.00)	(.02)
L(S_SB)		0.45	0.00	0.10
		(.00)	(.72)	(.00)
L(O_SB)			-0.00	-0.10
			(.73)	(.00)
DIST				-0.02
				(.00)
Notes: D (BEAT). a dummy variable, set equal to a unit value when firms meet or beat the market expectation Otherwise zero (MISS). L(S_SB) logarithmic S_SB. L(O_SB) logarithmic O_SB. L(SIZE) logarithmic SIZE. All other variables are as defined in Table 2.				

Both panels in Table 4 report results of logit models. Both L(S_SB) in Panel A and L(O_SB) in Panel B report positive coefficients, which are statistically significant at the conventional level. Thus, the hypothesis is empirically supported by showing that CEOs for which compensation relies more on appreciation in their equity holdings than cash pay are more likely to beat the market expectation of their firm's earnings. Estimates on DIST and L(SIZE) have predicted signs as well. The positive coefficient on L(SIZE) indicates that large firms tend to beat the market expectation more often than do small firms. On the other hand, the negative coefficient on DIST shows that an inverse relation exists between the frequency of beating the market expectation and the dispersion of earnings forecasts.

Table 4: Empirical Results from Logit Models				
Panel A. ΔStockholdings vs. Salary + Bonus				
Logit Model 1: $D = \beta_{0,\ it} + \beta_{1,\ it} L(S\_SB) + \beta_{2,\ it} DIST + \beta_{3,\ it} L(SIZE) + \epsilon_{it}$				
Intercept	L(S_SB)	DIST	L(SIZE)	R^2
(X^2)	(X^2)	(X^2)	(X^2)	
0.41	0.02	-.10	0.03	2%
(18.23***)	(8.53***)	(29.29***)	(5.84**)	
Panel B. Option holdings vs. Salary + Bonus				
Logit Model 2: $D = \gamma_{0,\ it} + \gamma_{1,\ it} L(O\_SB) + \gamma_{2,\ it} DIST + \gamma_{3,\ it} L(SIZE) + \mu_{it}$				
Intercept	L(O_SB)	DIST	L(SIZE)	R^2
(X^2)	(X^2)	(X^2)	(X^2)	
0.48	0.05	-.10	0.02	2%
(25.97***)	(8.01***)	(29.65***)	(2.83*)	
All variables are as defined in above tables. * statistically significant at the level of .1; ** statistically significant at the level of .05; *** statistically significant at the level of .01.				

CONCLUSIONS

CEOs beat the market expectation of quarterly earnings more frequently as a change in value of their equity holdings constitutes a larger portion of their total compensation. The findings are in contrast to those of prior studies that primarily focus on cash pay in investigating the association between earnings management and CEO compensation, while assuming that managers are motivated to increase cash pay through earnings management. In other words, manipulating stock prices

through earnings management has not drawn much attention from academic research even though financial practitioners have expressed their concerns in recent years. The findings of this paper confirm the speculation raised by financial practitioners that CEOs might be more concerned about beating the market expectation as their compensation is primarily tied with a change in the value of their equity holdings.

In general, managers' opportunistic behavior was thought to be discouraged by rewarding them through appreciation in their equity holdings. Under the efficient market assumption, stock prices are assumed to faithfully represent a firm's value, and are of a primary concern for shareholders. Thus, when equity compensation is employed, managers are believed to work towards improvements in the true value of a firm in the long-term in contrast to other types of compensation such as cash bonuses that might motivate managers to focus on a firm's short-term gains with which their bonuses are tied at the expense of a firm's long-term benefits. Nonetheless, the findings of this study indicate that a shift from cash to equity compensations for CEOs seems to invite another type of earnings management with an intention to influence stock prices. Future studies in this area need to investigate the issue of earnings management to influence stock prices that are believed to be resilient to being manipulated.

ENDNOTES

[1] O'Brien (1988) and Brown & Kim (1991) report that more recent forecasts are a better proxy for the market's earnings expectation, but Brown (1998) prefers the earnings consensus, which is the benchmark widely accepted in Wall Street (Nocera 1998).

[2] This approach offers several advantages: 1) it is easy to interpret the results; 2) using a deflator eliminates some observations; and 3) the number of observations in each bin except for the zero bin depends upon the deflator (Brown 1998).

[3] CEO stock option awards are selected from the Standard & Poor's ExecuComp database by following the method suggested by Aboody & Kasznik (2000). ExecuComp reports the expiration date of options awarded during the year, not their exact awarding dates. According to the investigation of Aboody & Kasznik (2000), however, no substantial difference exists between the expiration and awarding dates of options except for reloading options that were excluded in the selection of this sample.

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DEFINED-BENEFIT PENSION PLAN EARNINGS: EMPLOYEE STAKEHOLDER BENEFIT OR CORPORATE PROFIT CENTER?

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ABSTRACT

Elevated profits from economic and managerial trends affecting defined benefit pension plans may have influenced perceived earnings quality of various recent annual financial reports. Rising investment returns and interest rates incorporated into actuarial assumptions increased spreads between pension asset and liability balances throughout the 1990s. Hybrid programs such as cash balance pension plans further reduced pension obligations during this same period. These circumstances can provide opportunities for immediate recognition of pension income and profit reserve banks impacting future earnings under Statement of Financial Accounting Standards No. 87 guidelines. Concluding discussions center on the possible influence of past pension management decisions and negative economic conditions on pension plan financial reporting and funding requirements.

INTRODUCTION

Estimates of future employee turnover, compensation levels, employment years, and remaining life expectancies contribute to funding requirements of defined-benefit (DB) retirement programs. For nearly twenty years, Statement of Financial Accounting Standards (SFAS) No. 87 has represented the accounting profession's seminal effort to report economic realities of these benefit commitments within annual financial statements.

Prior to SFAS No. 87 resolution, pension-reporting guidelines matched pension expenses with revenues. Pension liabilities reflected differences between actual funding and expense levels. Many in the financial community perceived this emphasis on expense measurement reliability as lowering the relevance of retirement obligation values on balance sheets. Significantly underfunded pension plans could appear as assets simply with increased pension funding relative to pension expense estimates.

SFAS No. 87 expanded disclosure of underfunded DB liabilities that predominated during the late 1980s and early 1990s by comparing pension fund asset and obligation market values. However, application of more reliable current compensation totals, rather than anticipated higher future salaries, for calculating pension obligations within the final version of SFAS No. 87 effectively reduces potential long-term pension amounts appearing in annual fiscal reports. SFAS

No. 87 attempts to recognize pension expense under assumed economic and financial market changes in plan asset and obligation balances.

Depressed investment portfolio valuations coupled with generous benefit grants in lieu of wage increases during the early 1990s initially fashioned numerous underfunded pension liabilities under SFAS No. 87 procedures. However, ensuing above-average market returns and benefit sponsor decisions enabled some businesses to more favorably reflect pension plan financial positions under SFAS No. 87 principles throughout the second half of the same decade.

This manuscript will attempt to highlight how economic circumstances, pension funding decisions, and contractual agreements can combine to establish pension profit centers that may affect user perceptions of earnings quality. Three pension benefit topics will be predominantly examined, including:

• *Creation, maintenance, and expansion of pension profit centers under the SFAS No. 87 financial reporting framework that can enhance operating profits and agency costs, along with methods to extend pension income effects over multiple reporting periods;*
• *Financial reporting citations of the effects of various corporate strategies on pension income and overall earnings results;*
• *Future implications of changing economic conditions on pension plan financial reporting and funding.*

SFAS NO. 87: A PENSION PROFIT CENTER TOOL?

Rising returns on plan asset investments and benefit cutbacks can widen positive spreads between pension plan assets and liabilities. These expanded ranges can instantaneously produce pension income contributions to annual earnings reported to shareholders. SFAS No. 87 procedures can also defer some investment gains over numerous reporting periods to augment reported earnings in spite of economic downturns (Weil, 2001).

Some financial statement users have expressed concerns with classification of pension results within annual income statements. Pension benefits have traditionally been classified as normal operating expenses while external investment gains have generally been excluded from primary operating profits. However, recent pension investment gains have at times been netted against other operating expense results to indirectly augment operating income figures (Schilit, 2002), albeit consistent with traditional treatments of pension expense as a regular operating cost. Singh (2000) states that pension profit centers reflect trends in management philosophy that pension asset surpluses belong to shareholders, rather than employee beneficiaries. This logic has justified corporate decisions to include excess pension investment returns in operating income while raising investor concerns as to operational earnings quality (Weil, 2001).

Recognition of pension income from investment sources would appear to be more closely controlled by outside economic factors, rather than internal operations. Excess returns from pension

trust funds can be interpreted to represent legal claims of active employees and retirees, rather than shareholders. Including pension profits in operational results could distort investor perceptions of operational performance while preferentially improving executive stock option and bonus compensation wealth. A Federal Reserve Board research study uncovered "systematic overvaluations" of recent stock capitalizations of S&P 500 DB companies caused by investor difficulty in separating material pension profits from operational results (Weil, 2003).

Several recent events have addressed shareholder perceptions regarding information quality of pension profits, earnings, and executive compensation disclosures. Upon urging by the Securities and Exchange Commission, IBM agreed to explicitly reveal pension return contributions to overall profits within the management discussion section of its 10-K filing (Bulkeley, 2002). Perhaps more importantly, Standard and Poor (S&P) announced that it would deduct pension costs but exclude pension plan gains from operating earnings calculations used to compute financial ratios for its stock index members (Sender, 2002). This plan will likely impact future price/earnings ratios and stock valuations of some S&P members, along with future financial reporting in general. One pension lobby organization has further contended that the Employee Retirement Insurance Security Act be modified to prohibit pension profits from appearing within corporate income statements (Pension watchdogs, 2003).

Meanwhile, early in 2002, McDermott International revealed plans to exclude future pension income totals from senior executive compensation formulas (Schultz, February 2002). Other organizations followed with similar management policies, such as General Electric, Delta Air Lines, Verizon Communications, and AK Steel (Drucker & Francis, 2003). While these announcements purportedly represented corporate governance reform, motivations for reclassifying pension losses as special income statement items appeared to some financial observers as suspiciously contradictory to previous accounting practices that integrated pension profits in operating income for bonus calculations during previous stages of economic growth and retirement benefit amendments. These commentators challenged that eliminating escalating pension costs from operating income data during slowed economic growth intervals effectively increases executive bonus payouts as overall corporate earnings decline (Drucker & Francis, 2003). As documented later in this paper, General Electric and IBM have been particularly scrutinized by financial media as benefiting from pension income incorporated into operating income figures during the late 1990s.

Table 1: Measurement Components of SFAS No. 87 Pension Expense (Income)	
1.	Annual service cost
2.	Interest accrual on beginning period projected benefit obligation
3.	Actual return of pension plan assets
4.	Amortization of prior service costs or givebacks
5.	Amortization of unexpected actuarial gains and losses

Table 1 illustrates the five major components of pension benefit recognition on income statements according to SFAS No. 87 guidelines. Changes in cumulative plan assets and projected benefit obligations (PBO) underlie these measurements. General economic circumstances, employee contractual agreements, funding decisions, and actuarial estimates primarily determine these values. Items 1, 2, and 4 in Table 1 are predominantly associated with increased projected benefit obligations and resultant pension expense recognition. Actual return on plan assets represents the major offset to pension expense calculations.

Actuarial amendments of plan asset and liability estimates determine the fifth pension expense/income element. These actuarial gains and losses frequently offset each other with minimal impact on overall pension expense amounts. However, some companies have attained significant unexpected gains through a combination of increased estimated plan return rates and reduced PBO amounts determined by higher interest settlement rates and extended life expectancy projections. These cumulative gains are deferred until reaching a "corridor" threshold based upon a percentage of the higher of beginning-of-period plan assets or PBO values. Actuarial gains exceeding this threshold figure are amortized over estimated average remaining service years per active employees and can be further spread into the future by lengthening estimated employee service periods.

Plan amendments of prior service benefits can produce another stream of pension income. In recent years, popular cash balance pension plan adoptions have often temporarily frozen pension benefits, particularly to senior employees. Reporting entities have commonly categorized these modifications as benefit givebacks, subsequently reducing PBO values. Although benefit givebacks are deferred similarly to unexpected actuarial gains and losses, they are not subject to threshold barriers but can be entirely recognized as pension credits over estimated remaining employee service years. This methodology can permit companies to immediately impact pension expense or income outcomes.

FINANCIAL REPORTING EFFECTS OF CASH BALANCE PENSION PLANS

Conversions of DB plans into hybrid cash balance (CB) pension plans have been integral components of many pension revisions that occurred during the 1990s. Telecommunications, financial services, and utility industries particularly spearheaded this CB conversion movement. A recent survey of 680 DB employers by benefits consultant Hewitt Associates revealed that 22 percent offered CB programs in 2002, up from six percent in 1995 (Benefits differ, 2003).

Under typical CB constructs, individual employee accounts determine accumulated retirement benefits, similar to defined contribution (DC) plan account balances. Annual percentages of fixed salaries or absolute dollar amounts serve as bases for annual contributions to individual CB account totals. However, similar to DB plans, CB accrued benefits may not be uniformly matched with actual funding of pension obligations. Interest accruals on accumulated CB benefits typically

employ long-term treasury note or consumer price indices. CB programs alter benefit formulas under different actuarial assumptions and commonly remove early retirement subsidies.

According to Arcady and Mellors (2000), the following financial reporting circumstances typically occur with CB plan adopters:

> • *Reduction of any previous unrecognized prior service cost balances with continued lowered expense amortization over revised employee service life periods;*
>
> • *Creation of pension plan givebacks, producing pension credits once again subject to amortization over the remaining employee service period.*

Long-term employees have lost as much as 20-50% of their total retirement earnings from benefit formula changes contained in cash balance structures (Schultz & MacDonald, 1998). These "wearaway" provisions effectively produce employment years for senior CB participants when no incremental pension benefits are earned above previously earned DB amounts. Temporarily frozen pension benefits can immediately reduce prior service benefit costs and lessen the present value of pension obligations. Management may represent unexpected gains from these pension obligation decreases as benefit giveback credits to be dispersed over estimated average remaining service lives of CB plan employees.

Cash balance conversions often lower pension liability measurement bases from expected final to current average salary quantities. This benefit formula change produces additional benefit giveback credits that can offset pension cost accruals. Cash balance formats may also authorize vested employees who leave an organization to immediately rollover benefit accumulations into other retirement packages and eliminate retirement accruals for departing non-vested employees, thus further reducing overall PBO totals and increasing pension credits.

In summary, CB plan conversions can temporarily halt current DB benefit levels, shift measurement bases for additional benefit accruals, remove early retirement subsidies, and eliminate benefit obligations of departing employees. These conditions may shrink pension liability balances in conjunction with creation of pension income reserves that can be managed over multiple reporting periods. A recent study has suggested the existence of this income "banking" phenomenon by noting increased percentages of pension income contained in operating earnings for Standard and Poor 500 companies despite significant declines in actual stock market prices (Weil, 2001).

OTHER FINANCIAL CIRCUMSTANCES CREATING PENSION INCOME CENTERS

Some large corporations have instituted other procedures that could influence pension income amounts disclosed under the SFAS No. 87 accounting model. Table 2 outlines some of the more common DB plan revision methodologies that could have some bearing on pension income reserves. Companies such as Lucent, Kmart, Sears, and Bank of America reduced 401(k)

contributions in conjunction with changes in their DB retirement packages to further improve reported earnings (Schultz, June 20, 2001). Other CB adopters have additionally granted incentive stock options that could possibly eliminate recognition of a portion of future benefit expenses under current financial reporting guidelines for stock options established in SFAS No. 123.

Table 2: Strategies Creating SFAS No. 87 Pension Income Reserves
1. Changing benefit formulas to reduce pension obligations
2. Eliminating early retirement subsidies to reduce obligations
3. Lowering compensation formulas from final to career average salary basis to reduce obligations
4. Freezing current benefits
5. Substitution of defined-contribution and stock option plans for defined-benefit plans for new employees
6. Exclusion of additional compensation (bonuses) from pension benefit formula
Source: Schultz, E. E. (2000, July 27). Companies Find Host of Subtle Ways to Pare Retirement Payouts. *Wall Street Journal*, A1, A6.

These various financial maneuvers have collectively supplemented various corporate earnings statements. In 1998, 25% of S&P 500 companies reported pension income from DB plans (Singh, 2000). During that same fiscal year, pension income of companies such as USX, Unocal, and Northrup Grumman embodied more than 10% of operating results. These figures grew in 1999 with 32 of 87 (37%) S&P 100 firms generating pension returns greater than operating profits (Singh, 2000). Net pension costs for Standard and Poor 100 companies totaled only $155 million during 1999 compared with nearly $5 billion of cumulative expenses for similar companies during 1997 (Schultz, June 6, 2000).

Cash balance programs present opportunities to lower present values of accrued DB annuities for participating employees by lengthening mortality and retirement age of projections prior to implementing CB benefit formula changes. Actuarial modifications of DB liabilities are usually classified as unexpected gains subject to corridor restrictions, but these CB amendments might be absorbed into other retirement givebacks to immediately smooth income over several fiscal periods. Management assumptions of comprehensive employee conversions to CB plans could further maximize these actuarial gains.

The lack of minimum thresholds for recognizing retirement givebacks could bias corporate managers to categorize more CB liability reductions as prior service cutbacks rather than as unexpected actuarial gains. It is conceivable that the entire PBO savings, including actuarial gains, may possibly be attributed to pension shrinkage from CB adoption, resulting in potentially substantial unrestricted credits to earnings. In a comment letter to proposed Internal Revenue

Service regulatory changes, the Pension Rights Center emphatically declared that CB plans had allowed companies to realize "immediate and substantial savings in pension costs that significantly boosted the employers' bottom line" (Workers seek pension plan protections, 2003).

Rising interest settlement rates, enlarged contributions to overfunded plans, and greater equity concentrations of pension investments during prosperous economic times can unleash sizeable disparities between actual pension returns and accrued interest costs. For instance, median pension plan investment returns increased by 40% during 1998-1999 while reported pension liabilities expanded by an average of only 5% per year (Byrnes, 2000). The average stock concentration of pension investments rose to 67.5% in 2000, increasing investment risk of DB portfolios (Byrnes, 2000).

Some financial service organizations have approved 401(k) asset rollovers into managed DB investment portfolios. This wealth transfer places DC contributions into "virtual" mutual funds that mirror diversified DB pension investment packages. Excess returns above DC contribution requirements can be captured within these DB portfolios to broaden differences between DB asset returns and costs.

Phased retirement plans sanction continued employment without additional DB benefit accruals (Schultz, July 27, 2000). Arrangements with older employees to transfer DB lump-sum distributions into individual retirement savings accounts and to forego early retirement subsidies immediately shrink pension liabilities and may contribute additional pension credits to earnings.

Corporate spin-offs can transfer or eliminate pension liabilities (Schultz, December 2000). Vested benefits of transferred employees can be frozen after completion of a division sale while fund assets continue to reap investment profits. Indirect agreements that transfer fund assets equal to current pension obligation levels at the division sale date permits selling corporations to preserve remaining fund surpluses for operational or expansion activities. Furthermore, under federal law, acquiring organizations can reduce reassigned PBOs by eliminating early retirement plans for vested transferred workers.

Combined employee stock option plans (ESOP) and DB pension arrangements, commonly called "floor-offset" plans, have been utilized by companies such as Enron Corporation to generate pension gains by permanently reducing PBO amounts with substituted ESOP valuations (Schultz, January, 2002). In the Enron case, permanent replacement of DB liabilities with ESOP values ultimately caused near elimination of all retirement benefits for Enron employees as the its stock capitalization collapsed during bankruptcy proceedings. Questions remain as to the legality of these maneuvers to permanently reduce pension benefits (Schultz, February 2002).

Companies have lobbied Congress in recent years to raise deductible contribution ceilings for DB pension plans, ostensibly for improved protection of benefit obligations. The Economic Growth and Tax Relief Reconciliation Act of 2001 increased annual deductible DB pension contributions with unlimited deductible funding beginning in 2004 (Enriching human capital, 2001). This amendment promises to open new avenues for higher pension funding, added investment

returns, and improved cash flows from higher deductible contribution allowances. Excess DB pension funding could also offset disclosure of essentially unfunded executive pension plans in overall company pension liabilities (Schultz, June 20, 2001).

EFFECTS OF PENSION PROFIT CENTERS ON REPORTED EARNINGS

Several disclosure developments have emerged to enhance financial income measures by trimming retirement benefit obligations. This section elaborates on various pension management strategies and financial statement effects of companies that appear to have benefited from the pension income movement of the previous decade. Table 3 catalogs the earnings impact of some of these strategies.

Although widely viewed as an innovator in operating efficiencies, General Electric has revealed material pension profit percentages contained in its operating earnings figures. Its 1999 pension income amounted to nearly $1.4 billion, or 9% of operating income, along a $16.9 billion reserve of deferred pension gains at the conclusion of the same fiscal year (Byrnes, 2000). Pension plan assets nearly doubled liabilities during this period, while robust actual pension investment returns prolonged a decade-old policy of non-cash funding of annual obligations.

Table 3: Various Pension Strategies and Earnings Effects		
Company	Strategy (Year)	Pension Income (Year)
Bank of America	Cash Balance Plan Conversion with Increased DC	$149 Million (1999)
	Contribution Pledge (1998)	
GTE Corporation	Early Lump-Sum Distribution to Current Employees	
	With No Future Benefit Accruals (2000)	$487 Million (2000)
International Business Machines	DB Multiplier Cutbacks and Program Substitutions	$252 Million (1995)
	(1991-2001)	$1.8 Billion (1996)
		$1.17 billion (2000)
		$4.2 billion (2001)
Lucent Technologies	12.5% DB Reduction Accompanied by Increased	$614 Million (1999)
	DC Contribution Pledge (1998)	

In 1998, Lucent Corporation pledged to increase 401(k) contributions to counter a 12.5% cut in its DB benefit calculations (Schultz, July 27, 2000). The company also added a variable performance component to DC contributions based upon earnings-per-share growth. This performance contribution approach enticed employees to agree to accept potentially larger 401(k) contributions in exchange for diminished DB pension funding. These collective actions added

nearly $614 million of pension profits (11% of operating income) to Lucent's 1999 overall profits. Lucent's actual 401(k) funding decreased by nearly 10% throughout the same period, further improving operating earnings (Schultz, June 20, 2001). Pension income amounts persisted in 2000 despite falling stock market valuations (Weil, 2001).

During 1991, IBM Corporation initiated a series of DB multiplier cutbacks and program substitutions that culminated in $252 million of pension income during 1995 (Schultz, July 27, 2000). From 1996-1999, IBM booked another $1.8 billion of cumulative pension profits. In 1999, IBM established a controversial cash balance plan that was challenged by employees as age-discriminatory and stimulated federal pension disclosure legislation (Enriching human capital, 2001). However, the Department of the Treasury and Internal Revenue Service have subsequently updated regulations that largely remove cash balance plans from age discrimination guidelines promulgated under Section 411 of the federal tax code (Department of Treasury, 2002; Schultz & Francis, 2003). Congress has countered with legislation to rescind the new CB tax policies (Schultz & Francis, 2003).

Changes in IBM's pension liability from the proposed CB plan change initially resulted in another 7% ($184 million) contribution to IBM's 1999 operating income, with $11.6 billion in deferred gains disclosed during the same reporting period (Brynes, 2000). Pension profits expanded to $1.17 billion in 2000, according to IBM's annual 10-K filing (Bulkeley, 2002). Finally, another $4.2 billion of projected pension income was reported in 2001, even though IBM's pension investments sustained an actual loss of 2.4 billion for the same fiscal period (Lee, 2002).

Bank of America instituted a cash balance plan in conjunction with improved DC contributions that increased pension income from $28 million in 1998 to $149 million for the following year. Similar to the Lucent strategy, Bank of America consequently reported a 14.7% reduction in actual DC contributions in 2000 (Schultz, June 20, 2001). The financial reporting effects of its mid-2000 decision to allow $1.4 billion of 401(k) asset rollovers into its managed DB may assist in extending positive future earnings growth from overfunded DB asset portfolios.

Finally, GTE Corporation fashioned a $487 million unexpected gain in 2000 from implementation of a phased retirement system that allows retirement-eligible employees to receive lump-sum DB distributions while forgoing additional DB benefits from subsequent employment. This system could yield steady streams of PBO declines and deferred gains if additional employees select this early retirement distribution option in the future.

Assorted firms have stretched out pension income proportions of operating results during recessionary periods (Weil, 2001). An average of six percent of operating profits came from pension profits during 2000, up from 4% during the preceding year. These figures may reflect income reserve features of SFAS No. 87 as companies begin to tap deferred prior service credit deferrals obtained from previous superior market returns and benefit program revisions.

Some financial experts believe that SFAS No. 87 permits companies to counteract actual pension return declines with inflated long-term average return percentages and pension asset values,

netting actual unexpected pension losses against previously deferred gains, and deferring cumulative actual losses to future reporting periods (Henry, 2001). It has been asserted that some companies have apparently utilized these financial reporting options to maintain and increase reported pension profits during early stages of the recent bear market (Weil, 2001).

As market capitalizations began to tumble during 2000, expected average investment returns of the late 1990s fashioned over $7 billion of pension profits for large S&P businesses. Companies such as Verizon Communications, General Electric, and SBC Communications each disclosed double-digit percentage supplements to operating results of over $1 billion, respectively, from pension profits during 2000. Pension income growth for many S&P 500 firms persisted in the first half of 2001 (Henry, 2001), suggesting that declines in pension asset values and returns may take several years to depress earnings growth. A Bear Stearns study warned investors of impending pension earnings declines under long-term recessionary conditions (Brown & Weil, 2001). Using standardized assumptions, Bear Stearns analysts predicted that pension profit contributions to earnings of large DB companies could be halved during 2003.

Indeed, Northrup Grumman reported an over $70 million decrease in its 2001 first-quarter pension income compared with the preceding first-quarter period (Brinkley, 2001). This downward earnings trend spiraled into 2001 third-quarter results with another 32% drop in reported pension income from comparable periods (Squeo, 2001). Ultimately, Northrup Grumman posted pension expense of $140 million during its 2003 second quarter, effectively shifting its pension profit base into a cost center (Squeo, 2003). Table 4 attempts to further document other company-specific impacts of an extended economic slowdown on equity-based pension investments and associated actual and forecast earnings announcements during 2002-2003.

Table 4: Incremental Actual and Forecast Pension Costs Under Adverse Economic Conditions		
Company	Year	Pension Plan Earnings Shortfalls
General Electric	2002 (actual)	$500 million drop in pension income
General Motors	2003 (forecast)	$2 billion increase in pension expense
Northwest Airlines	2002 (actual)	$200 million in pension expense
SBC Communications	2003 (forecast)	$1-2 billion increase in pension expense
Verizon Communications	2003 (forecast)	Drop in pension income contribution to net income from 35 cents to 2-8 cents
Sources: Northwest, 2002; White, 2003; Young, November, December 2002; Various *Wall Street Journal Global Newsbriefs*		

Rather than allocating pension reserves, various financial analysts speculate whether some organizations have overstated long-term asset return projections to sustain positive return/interest spreads while incurring actual pension investment losses (Lee, 2002). For example, despite

pessimistic economic forecasts, many firms maintained 9.5% expected return rates for 2001, while other organizations raised 2001 pension return estimates (Henry, 2001). Some companies applied expected return rates between 10-11% to plan asset valuations during this timeframe. Meanwhile, average actual DB returns had plunged to .8% in 2000, while average pension obligations rose by 11.8% from increased present valuation calculations brought about by lowered interest rates (Market crunch, 2001).

Use of higher expected return rates could sustain current period pension income whereas gain reserves banked during more prosperous reporting periods could offset unexpected actual investment losses. Certain organizations such as US Steel, Verizon Communications, and Northrup Grumman maintained 9.5-10% expected return rates even as deteriorating economic conditions persisted in 2002 (Sprinzen, 2002). The average estimated pension return rate for Standard and Poor (S&P) 500 firms was 9% for 2002 (Kary, 2003). Merrill Lynch predicted that these same S&P businesses will reduce their estimated return rates to an 8% average for 2003 (US companies face huge difficulties, 2003). Meanwhile, S&P stock valuations had cumulatively declined 46% from March 2000 until the end of the 2002 third quarter. (Underfunded pension plans, 2002). Table 5 provides some quantitative evidence of firm reluctance to reduce expected pension return rates during economic downturns.

Table 5: Estimated Earnings Shortfalls From 1% Decline in Expected Pension Return Rates		
Company	Projected Earnings Shortfall (millions)*	Pretax Income Impact
General Motors	(767)	-32.0%
IBM	(390)	-3.6%
Caterpillar	(88)	-7.5%
United Technologies	(109)	-3.9%
Dupont	(200)	-2.9%
Ford Motor	(345)	-29.2%
Alcoa	(74)	-4.5%
Raytheon	(123)	-104.7%
3M	(63)	-2.9%
* Based Upon 2001 Annual Earnings Statements Source: Henry, D., M. Arndt & D. Brady (February 18, 2002). The Pension Bomb. *Business Week*, 86-7.		

These examples can serve to caution financial markets as to the motivation behind impending financial reporting pension "reforms" currently pervading management, regulatory, and legislative circles. Under certain conditions, such changes can transform traditional pension cost centers into income opportunities predominantly unrelated to operating performance and perhaps realized by

reductions in overall employee retirement benefits. Investors should be aware that SFAS No. 87 intricacies can offer corporate opportunities for future earnings management drawn from gain reserves generated from earlier pension formula adjustments and inflated projected investment return rates. Nevertheless, corporate decisions to increase concentrations of pension fund equity investments could yield rising pension costs during extended economic downturns. Higher concentrations of equity reserves not only increase investment risk, but ongoing bear markets could rapidly shrink deferred pension profits and long-term earnings growth for shareholders.

FUTURE FINANCIAL IMPLICATIONS FOR PENSION PROFIT CENTERS

Overfunded pension plans, higher proportions of equity investments in pension fund portfolios, benefit cutbacks, and rising interest rates helped bring about favorable conditions for pension income growth during the 1990s. However, these favorable economic conditions may have masked prospective financial risks for retirees, current employees, sponsoring organizations, and shareholders. If pension income reserves diminish during prolonged stagnant market cycles, additional pressures for further benefit cutbacks affecting current and retired workers may ultimately emerge from worsening accounting numbers. It can be argued that persistent inferior pension fund returns from economic downturns may add pressure for additional early retirement proposals, cash balance conversions, changes in actuarial assumptions, or decreases in eligible compensation/multiplier formula variables to neutralize mounting pension expenses computed under SFAS No. 87.

Diminishing plan asset growth could also be accompanied by higher pension liability amounts as regulatory interest rate reductions attempt to stimulate economic activity during recessionary periods. This combination of factors has been characterized as an economic "perfect storm" that has transformed many overfunded asset plans into a cumulative $300 billion underfunded liability status on corporate balance sheets (Wessel, 2003). These poor economic circumstances threatens to force companies with previous self-funded plans to divert vital operating cash flows toward meeting federally mandated pension funding requirements.

The pension industry has asked Congress to raise interest rates that determine federal defined-benefit funding requirements from 30-year Treasury bond rates to Aa corporate bond levels (Schultz, December 2001). A retirement savings bill recently passed by the House of Representatives would eliminate the 30-year Treasury bond provision (Chen, 2002). Subsequent congressional and Bush administration pension reform proposals have recommended temporarily substituting high-grade corporate bond rates for the 30-year Treasury note surrogate standard presently used to calculate pension funding contribution requirements (Schultz & Francis, 2003; McKinnon, 2003). These initiatives would lessen cash flow deposit pressures for recently underfunded programs by reducing present value PBO amounts. However, some federal legislators

have balked at these proposals as allowing DB sponsors to shirk pension funding responsibilities while polishing balance sheet liability numbers (Wells, 2003).

Actuarial projections suggest that a single percentage increase in pension accrual rates will reduce PBO values by 10-15 percent. For General Motors, its pension funding percentage would improve from 75 to 91 percent by removing $7 billion of its ending 2002 PBO totals, thus adding potentially huge unexpected actuarial gains to pension reserve troughs (Plan would alter gauge for pension shortfalls, 2003). Moreover, some legislators and pension advocate groups insist that these higher discount rates could also provide impetus for corporate leaders to further diminish or eliminate other lump-sum payout features of employee DB plans, resulting in another source of unexpected deferred gains to offset prospective investment losses (Wells, 2003). These circumstances could place additional financial pressures on the currently underfunded Pension Benefit Guaranty Corporation (PBGC) and American taxpayers, similar to former savings and loan government bailout costs incurred during the 1980s (A pension "guaranty", 2003). The United States General Accounting Office and the Secretary of Labor Elaine Chao have now concluded that PBGC insurance is at "high risk" and in immediately need of coverage and pension deposit overhauls (Schultz, July 2003; Statement of Labor Secretary, 2003).

CONCLUSION

This paper has attempted to depict how prosperous economic conditions, pension plan cutbacks, and current financial reporting standards can combine to establish pension profit center banks that may significantly impact future financial earnings. Defined-benefit pension sponsors can take advantage of earlier enhanced returns deferred in pension income reserves to supplement current operational profits.

FASB Chairman Robert Herz has publicly stated that he does not "think that FAS 87 is a good (reporting) model. It contains various levels of smoothing devices that can only be described as Rube Goldberg-like invention" (Dale & Whitman, 2003; para. 17). In adding pension accounting to the FASB agenda, the board has discussed subjects with business leaders from increased frequency of pension financial reporting to complete abandonment of the current SFAS No. 87 framework by recognizing market value changes in pension assets and liabilities in quarterly earnings figures (Accounting board, 2003).

This market value approach has been adopted in Great Britain for 2005 under Financial Reporting Standard (FRS) No. 17 (Call for British pension rule, 2003) and is also favored by the International Accounting Standards Board (Accounting board, 2003). Critics of FRS No. 17 have pointed out that a market-based measurement base for DB pension plans risks possible acceleration of plan substitutions or terminations by sponsoring firms (Call for British pension rule, 2003).

Despite corporate assertions that overfunded pension funds protect future benefit payouts, some financial critics contend that pension profit centers have boosted performance earnings

numbers and heightened agency costs of executive compensatory bonus and stock option packages. According to Schultz (February 2002, A6), "cutting pensions for regular workers indirectly boosts compensation (based upon earnings), and thus the pensions of top executives". Overfunded employee pension fund asset balances partially instituted by cutbacks in DB benefit obligations can permit businesses to conceal lucrative underfunded executive pension arrangements within comprehensive pension disclosures. Although economic conditions drive pension returns and costs, accounting procedures initially designed to improve pension plan disclosure relevance within financial statements may also perpetuate pension income contributions to earnings data during economic slowdown cycles.

Compromises in the SFAS No. 87 standard setting process can produce pension measurements that may arguably be fine-tuned through actuarial changes, long-term investment return estimates and benefit formula modifications. While permitting companies to stabilize pension costs during periods of modest investment returns, the Financial Accounting Standards Board may have inadvertently sanctioned blueprints for corporate managers and consultants to bank pension gains associated with generous assumed fund profits and employee benefit cutbacks in the name of generally accepted accounting principles. It remains to be seen if these past pension profit center decisions will return to haunt employees, retirees, executives, shareholders, and taxpayers under long-term adverse stock market conditions. A fertile empirical research topic in this field may be investigation of possible agency cost relationships between estimated pension income growth rates, benefit cutbacks announcements and executive compensation package compositions.

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MARKET TIMING AND
THE USE OF PROTECTIVE PUTS

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ABSTRACT

Over the last 30 years, the relationship between stock returns, dividend yields, interest rates, and industrial production figures is examined to determine if active trading rules could be used for successful market timing, including the use of at-the-money theoretically priced protective puts. The findings suggest none of the market timing models tested outperform the S&P 500. A strategy of purchasing at-the-money protective put options when the market timing models indicate the market will decline results in risk-adjusted returns that exceed the S&P 500. However, the highest risk-adjusted returns result from buying at-the-money put options each month while holding the S&P 500 index. Therefore, we conclude that interest rates, dividend yields, and industrial production numbers do not provide any additional information as to when to exit the market or when buying at-the-money protective puts may be more valuable.

INTRODUCTION

Market timing involves using some decision criteria to determine when investors should move wealth into or out of the stock market. The appropriate decision criteria to use in determining when to be in the market and when to be out of the market is the first step in developing a market timing model.

There have been a number of studies that have documented the relationship between economic variables and stock prices (Schwert, 1990; Sill, 1995; Choi, Hauser & Kopecky, 1999; Nasseh & Strauss, 2000). At this point, some of the relationships are well known. For example, the stock market generally does better when market interest rates are on the decline. Prather and Bertin (1998) and Lee (1997) find a strong relationship between short-term interest rates and stock returns. Stock market returns are also positively correlated with earnings and dividend yields (Wu & Wang, 2000). Peavy (1992) finds that the interactive effect of dividend yields and interest rates explained 96 percent of the change in the S&P 500 index from 1979 to 1989. The stock market also performs better when economic measures indicate that the economy is expanding. The change in industrial production has been shown to be an important indicator of stock market activity (Schwert, 1990).

Several studies have evaluated the merits of market timing to earn risk-adjusted returns that exceed a simple buy-and-hold strategy. Wagner, Shellans, and Paul (1992) and Larsen and Wozniak (1995) present evidence in favor of market timing. Wagner, Shellans, and Paul (1992) rely on information from professional investment analysts to show that market timing can produce superior risk-adjusted returns. They use information on returns from 1985 to 1990. Brocato and Chandy (1994) use the same data as Wagner, Shellans, and Paul (1992) to show that random market timing can work as well as informed market timing. However, they conclude that market timing does not outperform a simple buy-and-hold strategy.

Larsen and Wozniak (1995) study the performance of market timing over a longer time period. Using data from 1972 to 1992, they find their discrete regression model (DRM) market timing approach outperforms a buy-and-hold strategy. Larsen and Wozniak (1995) use interest rates, S&P 500 earnings and dividends, the change in industrial production, and inflation in their market timing model. Brocato and Chandy (1995) comment on the Larsen and Wozniak (1995) paper. They question the cost of implementing the Larson and Wozniak (1995) market timing approach. They also conclude that Larson and Wozniak have not proven that the average investor can earn excess risk-adjusted returns on a consistent basis using a market timing approach.

The purpose of this study is twofold. First, we present returns using different market timing parameters and compare the returns to a buy-and-hold strategy over the period from 1972 to 2001. The market timing strategies involve shifting wealth between the S&P 500 index and the one-year risk-free asset. Second, we present an alternative method of market timing where investors purchase protective puts when the market timing factors indicate they should be out of the market.

Our findings indicate that some of the market timing rules do result in higher risk-adjusted returns than a buy-and-hold strategy over the period 1972 to 2001. However, the returns from these rules are not superior to a simple buy-and-hold strategy across each of the ten year sub-periods. A strategy of purchasing at-the-money put options when the market timing models indicate investors should be out of the market does produce better risk-adjusted returns than a buy-and-hold strategy across all time periods. However, none of the active strategies result in better risk-adjusted returns than a simple strategy of purchasing at-the-money put options each month while holding the S&P 500 index. This strategy results in higher average returns than a buy-and-hold strategy with a standard deviation of returns almost 40 percent lower.

RESEARCH METHODOLOGY

Since previous research has suggested a fairly strong link between interest rates, dividend yields, industrial production and stock returns, the goal of this study is to determine whether these variables can be used either in isolation or in combination to create profitable trading strategies. The assertion that interest rates and dividends should be related to stock returns has a strong theoretical foundation; the simple application of discounting the present value of all future cash flows from a

share of stock. The typical equation that is examined under the assumption of a constant growth rate for dividends is the Gordon-Shapiro model, which is P0 = D1/(k-g); where P0 is the price of the stock, D1 is the expected cash dividend, k is the required return, and g is the growth rate of dividends. Mathematically, it is simple to show that if dividends rise, or the required return falls, the stock price must rise. Changes in the required return are directly influenced by changes in interest rates. The positive relation between industrial production and stock returns also has a strong economic foundation as it is at the core of economic output and future growth.

In this study, rather than using the absolute value of dividends, dividend yields are used. We use dividend yields to normalize the dividend relative to the price of the underlying asset. Since the dividend yield is measured as dividends divided by price, changes in this variable will only arise from relative changes between dividends and prices. Thus, if dividends rise faster than prices, dividend yields will be increasing and the prediction for future stock price movements is positive. Similarly, if prices rise faster than dividends, future prices are predicted to rise more slowly or possibly fall. In either case, dividend yields should be positively related to stock returns.

In order to determine the value of interest rates, dividend yields, and industrial production for earning superior risk adjusted stock returns, the following decision rules are applied:

Decision Rule 1:	If the current one-year T-bill rate is less than the average one-year T-bill rate over the preceding 12 months, move wealth into the stock market; otherwise invest in one-year T-bills.
Decision Rule 2:	If the current dividend yield is greater than the average dividend yield over the preceding 12 months, move wealth into the stock market; otherwise invest in one-year T-bills.
Decision Rule 3:	If the current percentage change in industrial production is greater than the average percentage change in industrial production over the preceding 12 months, move wealth into the stock market; otherwise invest in one-year T-bills.

If all of these decision rules work, then combinations of the three may provide even better returns. Thus, the results include the returns from these three decision rules as well as the combinations of interest rates and dividends, interest rates and industrial production, and interest rates, dividend yields, and industrial production.

The application of the first and third decision rules is straightforward while the application of decision rule 2 is slightly more convoluted. This is due to the extremely high seasonal nature of dividends, and thus the dividend yield. Therefore, before decision rule 2 is applied, the dividend data has to be seasonally adjusted. The method that we apply is an abridged version of the Census II decomposition method developed by the Bureau of the Census of the U.S. Department of Commerce (Makridakis, Wheelwright & McGee, 1982).

An alternative to exiting the market when the market timing rules indicate to do so is to purchase at-the-money put options, usually referred to as protective puts. This strategy has two benefits. First, the expense of liquidating the investor's portfolio is eliminated. Second, to the extent

that the variables only predict an increasing probability of negative returns, investors could protect themselves from these negative returns simply by purchasing put options. This would allow them to participate in market gains if the predictions are not accurate. The only cost of this strategy would be the expense of the put option minus the dividend yield that would still be collected by holding the market portfolio.

To calculate the option prices for the end of each month, we use daily returns for the S&P 500 from 1971 to 2002. Merton's constant dividend model is used (Merton, 1973). The put option is an at-the-money one-month option. The volatility estimate is calculated based on the daily returns over the previous 60 days. A comparison of our theoretical option values to actual option values indicate that our theoretical option values are generally within five percent of the actual option values. Even if the calculated values were off 10 percent or more, this would not affect the results to any great degree since the option values are used to determine the percentage cost of buying the index. Since the percentage cost of using put options is approximately 1.3 percent, even a 10 percent underestimation in the put option price only increases the cost by another 0.13 percent per month, which does not substantially affect the results.

The results are based on monthly returns for the S&P 500 from 1972 through 2001. The decision to invest in the market each month is based on the previous 12 months of data. Industrial production is lagged one additional month since each month's figures are generally released two weeks after the first of the month.

RESULTS

Table 1 examines the three strategies of market timing from a pure predictive standpoint. It shows the annualized returns that can be realized if an investor is able to continuously attain the returns from being in the market only when the market timing strategies indicate the market will increase. As an example, an investor that invests in the market only when interest rates are falling and dividend yields are rising would have an annualized return of 22.2 percent from 1972 to 2001. This compares to only a 13.6 percent return for a simple buy-and-hold strategy.

Unfortunately, this return is not actually possible since the strategy has the investor in the market only 20 percent of the time. Table 1 does point out how some strategies would have led to superior risk-adjusted returns over the last 30 years, but none of the strategies consistently outperforms a simple buy-and-hold strategy across all three 10 year sub-periods. For example, the interest rate, dividend yield, and industrial production strategy had an annualized return of 36.88 percent from 1982 to 1991. During the following ten year period, the same strategy had a -18.92 percent annualized return. Fortunately, the strategy only has investors in the market 7.5 percent of the time during this decade. However, this example gives a clear indication that the strategies themselves, although based on sound economic principles, do not provide much reliability for outperforming a simple buy-and-hold strategy.

Table 1: Returns on the S&P 500 for Months in the Market							
S&P 500 return for months in which rules state to get in.							
Period	Statistic	Buy-and-hold	R	D	IP	R and D	R and IP	R, D, and IP
72 to 01	Return	13.60%	17.51%	17.20%	9.86%	22.20%	14.69%	13.58%
	Std. Dev.	15.54%	15.02%	15.39%	15.73%	15.10%	15.01%	15.41%
	Coeff. Var.	1.14	0.86	0.89	1.60	0.68	1.02	1.14
	% in Market	100%	53.61%	39.17%	45.0%	19.17%	25.28%	19.17%
72 to 81	Return	7.81%	16.20%	13.80%	-1.38%	24.62%	4.66%	7.81%
	Std. Dev.	15.85%	13.39%	16.49%	15.08%	14.71%	13.65%	14.11%
	Coeff. Var.	2.03	0.83	1.19	-10.90	0.60	2.93	1.81
	% in Market	100%	35.83%	62.5%	40.83%	23.33%	16.67%	23.33%
82 to 91	Return	19.22%	23.85%	24.09%	15.37%	24.48%	14.76%	36.88%
	Std. Dev.	16.62%	15.97%	14.14%	19.39%	14.82%	18.30%	16.18%
	Coeff. Var.	0.87	0.67	0.59	1.26	0.61	1.24	0.44
	% in Market	100%	65.0%	40.0%	46.67%	26.67%	31.67%	26.67%
92 to 01	Return	14.04%	11.73%	12.71%	16.32%	3.44%	23.41%	-18.92%
	Std. Dev.	14.02%	14.95%	14.17%	11.81%	19.25%	11.36%	19.00%
	Coeff. Var.	1.00	1.27	1.12	0.72	5.59	0.49	-1.00
	% in Market	100%	60%	15%	47.5%	7.5%	27.50%	7.5%

The obvious drawback from basing any conclusion on Table 1, is that it is not possible to earn these annualized rates of return over time. This is because each strategy results in significant periods of time when investors are out of the market. To address this issue, we assume investors shift their portfolio from the S&P 500 to one-year T-bills when the strategies suggest exiting the market. Table 2 shows the actual geometric annualized returns that are realized based on each strategy. Standard deviations and coefficients of variation are given for the S&P 500 total index, which includes dividend reinvestment, and the various trading strategies for the 1972 to 2001 time period and the three interim decades.

From 1972 to 2001, the average geometric return for the S&P 500 total index is 12.17 percent with a standard deviation of 15.54 percent. The return on the S&P 500 total index for the 1972 to 1981, 1982 to 1991, and 1992 to 2001 time periods were 6.55 percent, 17.75 percent and 13.15 percent respectively. Although some of the trading strategies are effective over certain time periods, from a pure expected return framework, none of the strategies consistently outperform a simple buy-and-hold strategy.

Table 2: Market Timing Returns With Alternative of Investing in the Risk-Free Asset								
Geometric Annual Returns								
Period	Statistic	Buy-and-hold	R	D	IP	R and D	R and IP	R, D, and IP
72 to 01	Return	12.17%	12.36%	10.19%	7.81%	9.60%	8.87%	7.69%
	Std. Dev.	15.54%	11.00%	9.77%	10.63%	6.76%	7.16%	4.44%
	CV	1.28	0.89	0.96	1.36	0.70	0.81	0.58
72 to 81	Return	6.55%	10.54%	9.84%	3.53%	10.79%	6.73%	7.22%
	Std. Dev.	15.85%	8.15%	13.19%	10.26%	7.39%	5.84%	5.32%
	CV	2.42	0.77	1.34	2.90	0.68	0.87	0.74
82 to 91	Return	17.75%	17.58%	14.02%	10.58%	12.22%	9.72%	10.28%
	Std. Dev.	16.62%	12.79%	9.25%	12.85%	7.87%	9.37%	4.70%
	CV	0.94	0.73	0.66	1.22	0.64	0.96	0.46
92 to 01	Return	13.15%	8.61%	5.72%	9.73%	4.78%	8.78%	4.25%
	Std. Dev.	14.02%	11.50%	5.08%	8.24%	4.31%	5.70%	2.75%
	CV	1.07	1.34	0.89	0.85	0.90	0.65	0.65

However, the dividend yield strategy, the combined interest rate and dividend yield strategy, the combined interest rate and industrial production strategy, and the combined interest rate, dividend yield, and industrial production strategy all outperform the buy-and-hold strategy on a risk-return basis for each time period. On average, investors using these strategies give up three to four percent in returns to reduce the standard deviation of returns from approximately 15 percent to the 6-7 percent range. However, investors following the combined interest rate, dividend yield, and industrial production strategy from 1992 to 2001 earn even less than the one-year Treasury rate; although the coefficient of variation is quite low. The reason the coefficient of variation is low is because investors are only in the market 7.5 percent of the time from 1992 to 2001 using this strategy. In addition, when this strategy did suggest to enter the market, the market performed poorly (see Table 1) leading to a geometric annualized return during this decade of only 4.25 percent (see Table 2).

Another problem with implementing one of the above strategies are the transaction costs associated with entering and exiting the market. Although this is less of an issue now with the ease of buying and selling index mutual funds, most of the strategies involve a significant number of trades. For the overall period, the number of trades ranged from a low of 25 using the interest rate and dividend yield strategy to a high of 145 times following the industrial production strategy.

Thus, an alternative to completely exiting the market is simply to purchase at-the-money protective puts. This, in substance, insures the portfolio at its current value with the only cost being the price of the put option. However, the price of purchasing the put option is not trivial. On average, the option cost as a percentage of the S&P 500 market price is 1.38 percent. During the 1980's and 1990's, when the options would have actually been available, the cost averaged 1.45 percent of the S&P 500 index level. Although this cost is partially offset by the dividend yield, this cost still averages 1.12 percent in the 1980's and 1.3 percent in the 1990's. Thus, if the market remained flat, an investor following this strategy experiences an annualized loss of over 12 percent. Even given these costs, the results from using a protective put strategy are noteworthy. Table 3 shows the geometric returns from buying at-the-money put options on the index during any month in which the strategy suggests investors should exit the market. For the overall time period, every strategy outperforms a simple buy-and-hold scenario on a risk-adjusted basis when using put options instead of liquidating and investing in one year T-bills. In addition, every strategy except the industrial production strategy actually has a higher geometric return than the buy-and-hold strategy.

Table 3: Market Timing Returns with Put Options									
Market Timing Returns with Put options									
Period	Statistic	Buy-and-hold	R	D	IP	R and D	R and IP	R, D, and IP	Put option
72 to 01	Averages	12.17%	13.94%	12.55%	11.18%	13.59%	12.68%	12.73%	12.58%
	Std. Dev.	15.54%	12.70%	12.01%	12.98%	10.72%	11.01%	10.11%	9.64%
	CV	1.28	0.91	0.96	1.16	0.79	0.87	0.79	0.77
72 to 81	Averages	6.55%	12.91%	9.16%	7.48%	13.04%	10.78%	11.37%	11.46%
	Std. Dev.	15.85%	11.24%	13.99%	13.05%	10.91%	10.62%	10.38%	9.73%
	CV	2.42	0.87	1.53	1.74	0.84	0.98	0.91	0.85
82 to 91	Averages	17.75%	17.40%	18.63%	13.76%	17.75%	14.34%	16.61%	15.81%
	Std. Dev.	16.62%	14.02%	12.24%	15.17%	11.96%	12.87%	11.15%	10.81%
	CV	0.94	0.81	0.66	1.10	0.67	0.90	0.67	0.68
92 to 01	Averages	13.15%	11.51%	9.78%	12.98%	9.79%	12.55%	9.92%	10.14%
	Std. Dev.	14.02%	12.75%	9.30%	10.29%	9.06%	9.34%	8.63%	8.23%
	CV	1.07	1.11	0.95	0.79	0.93	0.74	0.87	0.81

An examination of the three interim 10 year sub-periods generally reaffirms this result. The active trading strategies using protective puts generate higher returns with lower standard deviations than a buy-and-hold strategy. The 1992-2001 period is an exception. Over this period, none of the

strategies have a higher return than a buy-and-hold strategy. However, all of the strategies except the interest rate strategy have higher risk-adjusted returns. The dramatic improvements in performance using protective puts instead of exiting the market indicate that buying at-the-money protective puts on the index are driving the results, despite their expense.

The last column in Table 3 shows the payoffs of buying at-the-money protective puts every month. An investor holding the S&P 500 index and purchasing a one-month protective put every month, would earn a 12.58% return with a 9.64% standard deviation for the overall time period. This is a higher expected return and lower standard deviation than an investor would earn by holding the S&P 500 index alone.

However, index options were not available during the 1972-1981 time period when it appears they are most valuable. Even so, index options were available during most of the 1980's and the 1990s. During the 1980's, the return on the monthly protective put strategy would result in a return approximately 2 percent below a buy-and-hold strategy. During the 1990's, the protective put strategy would provide a return approximately 3 percent below a buy-and-hold strategy. The lower yields are more than offset by the reduction in risk of the monthly protective put strategy. The standard deviations of returns in the 1980's and 1990's are 35-40 percent lower than for a buy-and-hold strategy. For example, during the 1992-2001 time period, the annualized return and standard deviation for the S&P 500 index are 13.15 percent and 14.02 percent, respectively. The annualized return and standard deviation for the S&P 500 index with monthly protective puts are 10.14 percent and 8.23 percent, respectively. From a pure risk-return standpoint as measured by the coefficient of variation, the protective put strategy consistently and unequivocally outperforms the buy-and-hold strategy.

The protective put strategy also outperforms all of the active trading strategies on a risk-adjusted basis. Thus, it does not appear that the trading strategies themselves have any added value in determining when investors should purchase protective put options.

CONCLUSION

Over the last 30 years, the relationship between stock returns, dividend yields, interest rates, and industrial production figures is examined to determine if active trading rules could be used for successful market timing. This study finds a simple relationship does not appear to exist between these factors that is consistent enough to be used to unequivocally outperform a simple buy-and-hold strategy. Although some of the strategies do appear to outperform the S&P 500 on a risk-adjusted basis, the key finding is that buying a protective put when the rules indicate the market may decline is superior to getting out of the S&P 500 and into a one year Treasury.

In fact, we find that the results are driven by the performance of the protective put portfolio. For the total time period as well as for the interim decades, the risk-adjusted performance of buying an at-the-money put option along with the underlying index exceeds both the buy-and-hold portfolio

and all of the active market timing strategies. Thus, it does not appear that interest rates, dividend yields, or industrial production numbers give any additional information as to when to exit the market or when buying at-the-money protective puts may be more valuable.

Table 1 shows the average arithmetic annualized returns, standard deviations, and coefficients of variation following months in which the one year T-bill rate (R) was below its one year average; for months in which the dividend yield (D) was above its one year average; and for months in which industrial production (IP) was above its one year average. Results from combinations of the rules are also given as well as the percentage of time each strategy would have an investor in the market. The time period covers Jan. 1972 to Dec. 2001.

Table 2 shows the geometric annual returns, standard deviations, and coefficients of variation that could have been achieved if one invested in the S&P 500 following months in which the one year T-bill rate (R) was below its one year average; for months in which the dividend yield (D) was above its one year average; and for months in which industrial production (IP) was above its one year average. When not in the market, it is assumed the investor earns the one year Treasury rate. Results from combinations of the rules are also given as well as the percentage of time each strategy would have an investor in the market. The time period covers Jan. 1972 to Dec. 2001.

Table 3 shows the geometric annual returns, standard deviations, and coefficients of variation that could have been achieved if one invested in the S&P 500 following months in which the one year T-bill rate (R) was below its one year average; for months in which the dividend yield (D) was above its one year average; and for months in which industrial production (IP) was above its one year average. When conditions are not met, it is assumed the investor purchased a one month at-the-money protective put. Results from combinations of the rules are also given. The time period covers Jan. 1972 to Dec. 2001.

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A PERSPECTIVE ON
JOINT COST ALLOCATION SCHEMES

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ABSTRACT

In this study, we review joint cost allocation schemes currently available to evaluate the strength and the weakness of those schemes using the evaluation criteria introduced by previous researches. This paper may provide practical implications to academician and practitioners as well regarding which allocation scheme is best fitting into a particular situation.

The physical measure based allocation scheme satisfies uniqueness, core, full allocation, monotonicity, and simplicity properties but not additivity, defensibility, goal congruency, and equity properties. Symmetry property is moderately supported by this scheme. This study provides practical implications as to which allocation scheme is best fitting into a particular situation.

The sales value at splitoff scheme may satisfy additivity, defensibility, uniqueness, full allocation, simplicity, goal congruency, management motivation, symmetry, and simplicity properties but not core and equity properties. Monotonicity property is moderately supported by this scheme. The estimated net realizable value scheme may satisfy uniqueness, goal congruency, full allocation, and simplicity properties but does not satisfy additivity, equity, and core properties. Defensibility, management motivation, symmetry, and monotonicity properties are moderately supported by this scheme.

Among Moriarity's, Louderback's, and L-M scheme, L-M scheme seems to be the best allocation scheme because L-M allocation is in the core, a strength of Louderback scheme, and has all five advantages of Moriarity's scheme. This scheme may satisfy additivity, goal congruency, management motivation, core, symmetry, equity, full allocation, and simplicity properties but not uniqueness property. Monotonicity and defensibility properties are moderately supported by the scheme.

In general, game theory based schemes are theoretically sound. Recasting cost allocation problems into a game-theoretic context developed these schemes, which may hurt the validity of the scheme. And computations of allocated costs using these schemes are generally very complex, especially when there are many participating divisions. Thus, this scheme may satisfy goal congruency, management motivation, equity, core, symmetry, full allocation, and monotonicity properties but not simplicity property. Defensibility property may be moderately supported by this scheme. Additivity is supported by Shapley value based schemes but not by ICPS.

INTRODUCTION

Joint cost allocations have been controversial in accounting profession for a long time mainly because it is not a process of cost attribution but a process of cost allocation. A cost allocation process is an arbitrary assignment of costs that cannot be attributed to individual products. Nevertheless, joint cost allocations have been pervasive in practice. Credible major reasons for the extensive use of joint cost allocations in practice are: first, computing inventory costs and cost of goods sold for financial reporting and other regulatory purposes; second, coordinating the activities of decision makers in a decentralized firm; third, computing cost reimbursement under contracts when only a portion of a business's products or services is sold or delivered to a single customer.[1]

Due to strong practical demand for and advantages of joint cost allocations, considerable number of studies have been conducted on this issue and produced quite a few allocation schemes that is practically applicable or insightful. However, there is no a scheme superior to the others because each scheme has its own strength and weakness relative to others. Thus, there are still hot controversies on joint cost allocations such as whether or not to allocate, whether it is possible to have an optimal solution to any cost allocation case, and which is the best allocation scheme among available for a particular case. The objective of this paper is to review joint cost allocation schemes currently available to evaluate the strength and weakness of those schemes using the evaluation criteria introduced through prior researches.[2] In doing so, we hope to find some answers to those controversial issues regarding the joint cost allocation.

PROPERTIES OF JOINT COST ALLOCATION

Joint-cost allocation properties are characteristics that preserve attributes of joint cost allocation procedures and hence can evaluate any particular allocation scheme. For example, Thomas (1974) proposed three criteria to evaluate allocation schemes: additivity, defensibility, and uniqueness. An allocation scheme is additive if it yields an identical per unit charge regardless of accounting scheme used to compute the joint costs. Thus, an additive allocation scheme is invariant with respect to the choice among alternative accounting schemes. According to defensibility and uniqueness properties, an allocation scheme should be able to defense its position and produce a unique solution to a particular joint cost allocation case. Moriarity (1975) suggested goal congruency, management's motivation, and equity among participating divisions as criteria for the evaluation. Goal congruency property requires that the scheme provide a goal congruency between divisional managers and the top manager of a firm, while management motivation requires that the scheme provide incentives to divisional managers to continue to look for less costly alternative means of obtaining the joint product. According to equity property, the scheme should provide cost allocations fair to all participating divisions. Core and symmetry properties are two criteria

introduced in game theory based allocation schemes. The core is a situation where any participant in a game would not change its choice any more and hence it is a solution to the game like joint productions. As Balachadran said, an allocated joint cost can be in the core if and only if, for any coalition, the cost allocated to any subgroup or any coalition of divisions is less than or equal to the cost which the grand coalition of all divisions would incur if it stays alone. The core concept is an important criterion in game theoretic approach because the core is essential for the stability of the game. Symmetry property requires that identical goods be assigned identical per unit costs on the basis of some common standard. Billera et al. (1981) introduced new cost allocation criteria such as full allocation and monotonicity. According to the full allocation property, all joint costs should be allocated to participating division, no more or no less. The property of monotonicity means that per unit charge is non-negative for all goods produced in the joint production process if the joint production function is non-decreasing.[3] Gangolly (1981) introduced another criterion called free of envy, which is necessary for the stability of coalitions among participating divisions for joint productions. To be free of envy, a cost allocation scheme must assign identical costs to centers in the same set in the partition. Thus, free of envy property is similar to symmetry property. Other popular evaluation criterion is simplicity requiring that the scheme should be easy to use. In sum, evaluation criteria for joint cost allocation schemes are additivity, defensibility, uniqueness, goal congruency, management motivation, equity, core, symmetry, full allocation, monotonicity, and simplicity. We will review joint cost allocation schemes currently available to evaluate the strength and the weakness of those schemes using the above-addressed evaluation criteria.

PHYSICAL MEASURE BASED ALLOCATION SCHEMES

This scheme allocates joint costs to joint products on the basis of the relative weight, volume, or other physical measure at the splitoff point of the joint production. The main advantage is its simplicity, but it's very hard to select a physical unit that is most relevant to the joint product. Even if we can select the most relevant physical unit, the allocation may bear no relation to the revenue-producing power of the individual products and hence may lead to a poor decision on common resource allocation. Using the linear principal-agent framework, Hemmer (1996) showed that a key condition for a physical unit based allocation to be optimal is that there be no jointness in the production. Only when the common capacity can be subdivided and assigned unambiguously to the various products, can their relative contribution to overall profit be ignored when allocating the cost of that capacity. Thus, the physical measure based scheme may satisfy uniqueness, core, full allocation, monotonicity, and simplicity properties but not additivity, defensibility, goal congruency, and equity properties. Symmetry property is moderately supported by this scheme.

MARKET VALUE BASED ALLOCATION SCHEMES

There are three popular schemes that allocate joint costs using market-based data: i.e., sales value at splitoff scheme, estimated net realizable value scheme, and constant gross margin percentage net realizable value scheme.

The sales value at splitoff scheme

This scheme allocates joint costs to individual products on the basis of the relative sales value at the splitoff point of the total production. The justification of this scheme for a profit-maximizing firm can be addressed using an optimization program, Lagrange multipliers, and Kuhn-Tucker theory. In other words, the joint cost allocation is an optimization problem with some constraints including non-negative Lagrange multipliers, which should satisfy the Kuhn-Tucker's necessary conditions for the optimality. An optimization program for the joint costs allocation to maximize a firm's profit (Z) would be:

$$\text{Max } Z = P_1 * Q_1 + P_2 * Q_2 - C * X + {}_1(n * X - Q_1) + {}_2(m * X - Q_2) \qquad (1)$$
$$\text{Subject to: } Q_1 \quad n * X,$$
$$Q_1 \quad m * X,$$
$$\text{\& all variables are non-negative}$$

Where P_i = the price of product 'i' for i = 1, 2,
   Q_i = the quantity of product 'i' for i = 1, 2,
   P_i = $F(Q_i)$: the demand function of product 'i',
   $_i$ = the Lagrange multiplier of product 'i',
   C = the unit cost of common resource,
   X = the number of common resource,
   n = the number of product 1 produced by one unit of common resource,
   m = the number of product 2 produced by one unit of common resource

In order to satisfy the Kuhn-Tucker condition,
   $Z / Q_i \quad 0, Q_i \quad 0$, and $Q_i * Z / Q_i = 0$ for i = 1, 2.
   $Z / {}_i \quad 0, {}_i \quad 0$, and $_i * Z / {}_i = 0$ for i = 1, 2.
   $Z / X = C - n_1 - m_2 = 0$: Joint cost is equal to summation of costs allocated to each product.

Under these conditions, joint costs allocated to one unit of product 1 and that of product 2 should be $_1$ and $_2$, respectively. And $_i$ will constitute the marginal cost of each product, which is equal to the market price of each product. Therefore, Lagrange multipliers ($_i$) will provide guidance for

incremental decisions on expanding output or purchasing input. If there is no further process after split-off point, each division's optimization program will be as follow:

$$\text{Max } Z_i = P_i * Q_i - \text{}_i * Q_i \tag{2}$$

Subject to: $P_i, Q_i, \text{}_i \geq 0$ for i = 1, 2.
    In order to satisfy the Kuhn-Tucker condition,
     $\partial Z_i / \partial Q_i \leq 0, Q_i \geq 0, Q_i * \partial Z_i / \partial Q_i = 0$ for all i.

These same conditions should be satisfied for the firm as a whole to maximize its profit. Therefore, the profit maximizing decisions of independent divisions will be consistent with the global maximizing decision of the firm. Furthermore, each division will demand the common raw material and processing service in such a way that the two product output decisions, though reached separately, will be consistent with each other and with the production decision of the firm as a whole.

Thus, the primary advantages of this scheme are: first, it is objective; and second, it does not need any assumption about actions after the splitoff point: third, it is simple; fourth, it satisfies the goal congruency criterion. But its disadvantage is that this scheme can't be used if there are no sales values available at the splitoff point. The sales value at splitoff scheme is widely used in practice when selling price data are available even if further processing is done. Thus, this scheme may satisfy additivity, defensibility, uniqueness, full allocation, simplicity, goal congruency, management motivation, symmetry, and simplicity properties but not core and equity properties. Monotonicity property is moderately supported by this scheme.

The estimated net realizable value scheme

This scheme allocates joint costs on the basis of the relative net realizable value of each product. This scheme is often used for products that have no ready market value at splitoff point. However, this scheme requires assumptions about events occurring after the splitoff point. Therefore, this scheme is more subjective than the sales value at splitoff scheme and is also more complicated to implement if there are several sequential splitoffs in the process. Hemmer (1996) showed that, in settings where joint products result in fixed expected proportions from a common input, the optimal scheme of allocating joint costs is based on the net realizable values of the final products. In other words, the optimal allocation scheme allocates the cost of the common resource to products in proportion to their actual net realizable values relative to the expected sales values net of any directly traceable costs for all products. Thus, this scheme may satisfy uniqueness, goal congruency, full allocation, and simplicity properties but does not satisfy additivity, equity, and core

properties. Defensibility, management motivation, symmetry, and monotonicity properties are moderately supported by this scheme.

The constant gross margin percentage net realizable value scheme

This scheme allocates joint costs to joint products such that all products have equal gross margin percentage. The growth margin percentage is calculated by subtracting all products' separable costs and the joint costs from revenue. Then, this gross margin percentage is applied to all products. Therefore, relative to the net realizable value scheme, this scheme subsidizes products with relatively high separable costs, which may cause sub-optimal allocation of resources. Thus, this scheme may satisfy full allocation and simplicity properties, only. All the other properties are not supported by this scheme.

SCHEMES BASED ON PROPERTIES OF THE ALLOCATION PROCESS

These schemes are developed to satisfy the allocation properties that are necessary and desirable in the allocation process. However, a set of properties used in developing an allocation scheme varies with schemes. Supporters of a scheme tend to couch their arguments in the vernacular of their own criteria, which may cause constant debates over the joint cost allocation issues.

Moriarity's allocation scheme

Moriarity (1975) sets forth an ingenious scheme of allocating joint cost that is based not only on mutual satisfaction among participating divisions but also on incremental savings of those divisions. He argues that the saving from choosing joint production rather than independent production or outside purchase should be allocated to each participant in proportion to its contribution to the total saving. In a case that there is no further process after the splitoff point, the joint cost allocated to each product or division (X_i) would be:

$$X_i = Y_i - (Y_i \, / \, Y_j) * (Y_j - JC) \text{ for all } j \ N. \tag{3}$$

Where Y_i = the cost of product 'i' if purchased from outside or produced independently,
  JC = the total production costs of joint products,
  Y_j = the total costs of joint products if purchased from outside or produced separately,
  $Y_j - JC$ = the total cost saving from joint production relative to outside purchase or
    independent production.
  N = the products manufactured through the joint production process.

In a case that there is further production processes after the split-off point, Moriarity's allocation formula will be

$$X_i = (Z_i \ / \ Z_j \ ) * (JC + I_i \ ) \text{ for all j } N. \tag{4}$$

Where I_i = the incremental processing cost of the product 'i' after the splitoff point ,
Z_i = Minimum $(Y_i, JC + I_i)$ for all j N.

Moriarity suggests 5 advantages of his scheme over existing allocation techniques. First, the cost object is never charged more than the next best scheme of providing the products. Second, the allocation process involves a comparison of the cost of joint products with the next best alternative. Third, every cost object shares in saving resulting from the decision to incur the joint cost. Fourth, some cost is allocated to every cost object using the joint product. Fifth, the procedure provides an incentive to manager to continue to search for less cost alternative means of obtaining the joint product. Conclusively, Moriarity's scheme is good in terms of goal congruency, management effort and fairness (or equity). However, from the game theory point of view it is not in the core because there may be subsidization of one or more divisions. Thus, this scheme may satisfy additivity, equity, goal congruency, management motivation, full allocation, and simplicity properties but not uniqueness, core, and symmetry properties. Monotonicity and defensibility properties are moderately supported by the scheme.

Louderback's allocation scheme

Louderback (1976) suggested another joint cost allocation scheme, in which joint costs are allocated in proportional to the ability of the participant to bear the burden factor, $Y_i - I_i$, on the top of the incremental processing cost. $(Y_i - I_i)$ stands for the ability of division 'i' to bear the burden or not going out for independent procurement. Thus, the total cost allocated to division 'i' (X_i) would be;

$$X_i = I_i + JC * [(Y_i - Ii) \ / \ _j (Y_j - I_j)] \text{ for all j } N. \tag{5}$$

Subject to Y_j I_j for all j N.
Where Y_i = the cost of product 'i' if purchased from outside or produced independently,
          JC = the total production costs of joint products,
          I_i = the incremental processing cost of the product 'i' after the splitoff point ,
          N = the products manufactured through the joint production process.

This scheme provides an allocation that lies in the core of the game among collaborators. Thus, this scheme may satisfy additivity, uniqueness, goal congruency, management motivation, equity, core, symmetry, full allocation, and simplicity properties but not monotonicity property. Defensibility property may be moderately supported by the scheme.

Louderback-Moriarity allocation model

Balanchandran and Ramakrishnan (1980) propose a new allocation scheme using the propensity to contribute of each division concept. The model (L-M model hereafter) has the five advantages of Moriarity's and the core property of Louderback. They argue that the joint cost should be allocated in proportional to the propensity to contribute of each division (PTC_i). Because each division would pay the difference between the least cost of procurement by alternative sources (Y_i) and its incremental process cost (I_i) for joint product, $PTC_i = Y_i - I_i$. Thus, the total costs allocated to division 'i' (X_i) according to L-M model would be

$$X_i = I_i + JC \, (PTC_i \, / \, PTC_j) \text{ for all } j \, N. \tag{6}$$

Subject to $Y_j \, I_j$ for all j N.
Where $PTC_i = Z_i - I_i$ for all i N,
$Z_i = \text{Min } [JC + I_i, Y_i]$
Y_i = the cost of product 'i' if purchased from outside or produced independently,
JC = the total production costs of joint products,
I_i = the incremental processing cost of the product 'i' after the splitoff point,
N = the products manufactured through the joint production process.

L-M allocation is in the core and has all five advantages of Moriarity's scheme. L-M allocation is also easier to compute and interpret the economic intuition behind the mechanism. Thus, this scheme may satisfy additivity, goal congruency, management motivation, core, symmetry, equity, full allocation, and simplicity properties but not uniqueness property. Monotonicity and defensibility properties are moderately supported by the scheme.

Game theory based allocation schemes

Cost allocation schemes based on game theoretic Shapley value concepts with accounting related assumptions have been introduced in accounting literature. In order to compute the Shapley Value, a grand coalition is assumed to be formed by the successive addition of divisions. Each division is then charged then charged with an expected marginal cost computed by assuming that all of the possible orders are equally likely.

Jensen (1977) developed an allocation scheme based on a set of five axioms such as follows: first, full allocation: second, the allocation to each user should be based only on the incremental costs caused by the user and not on the incremental costs of other users: third, the allocation should be independent of labeling or ordering of users; fourth, if all cost increments for a certain user increase by a certain percentage, then the allocation to the user should increase by the same percentage; finally, the cost allocation function should be 'twice continuously differentiable. These axioms are designed to satisfy the properties of the Shapley value based allocation scheme. Jensen's allocation scheme was designed to provide a mutually satisfactory allocation among participating divisions. A mutually satisfactory allocation is an allocation to which all collaborators in the game agree. But his allocation scheme doesn't have any extra advantages over Moriarity's except that Jensen's allocation is in the core. It may be due to the validity issues regarding those axioms.

Hamlen et al. (1977 & 1980) introduced the class of generalized Shapley allocation schemes using the core concept in the game theory. Their allocation satisfies the core condition and does not provide unique solution, preventing any alterations that might recover the core conditions or achieve other goals set by the management. But the computation of the joint allocation using their schemes is complex, especially when there is a large number of participating divisions. This may be a primary reason for the limited use of this scheme in practice.

J.S. Gangolly (1981) proposes a cost allocation scheme called Independent cost proportional scheme (ICPS) based on considerations of proportional equity and using a game theoretic approach. The total costs allocated to individual division 'i' under ICPS ($_i$) are the sum of its share in the cost savings to all possible coalitions of divisions in a firm. That is:

$$_i = \sum_{R \subset N} {}_i (R) \tag{7}$$

Where R = the coalition that the division 'i' joins.

N = {1, 2, ……, n) : the firm consists of n divisions and hence subsets of N are coalitions of divisions.

ICPS allocations have both core membership and Moriarity's principle of proportional equity. He argues that the ratio of allocated cost savings to independent cost will be the same for all participants in any coalition, if cost savings from the economy of scale is the only reason for joint producing or purchasing. The total costs allocated to an individual division under ICPS are the sum of its share in the cost savings to all possible coalitions of divisions in the firm. ICPS has following properties: first, the ICPS allocations lie in the core when marginal cost is non-increasing; second, the ICPS allocations are homogeneous in costs, that is, if the costs change by an input factor, so do the allocated costs; third, The ICPS allocations are free of envy since they allocate identical costs to each division in the same set in the partition; fourth, If a division does not contribute toward lower cost, the ICPS will allocate such division its independent cost; fifth, The ICPS allocations are not

determined by any single cost center; finally, the ICPS allocations are not invariant under strategic equivalence. In other words, they are dependent on accounting schemes of computing the joint costs and additional costs after the splitoff point. The ICPS may have limitation in use due to the lack of invariance and the assumption that cost savings from the economy of scale is the only reason for joint producing or purchasing.

Game theory based allocation schemes have strong theoretic foundations in economics. Recasting cost allocation problems into a game-theoretic context developed these schemes. Although the results are mathematically elegant, they require the acceptance of a set of axioms, the full effect of which may not be entirely understood in terms of the problem at hand. The computation of allocated costs using these schemes is generally very complex, especially when there are many participating divisions. And hence, the use of these schemes in practice is very limited. Thus, this scheme may satisfy goal congruency, management motivation, equity, core, symmetry, full allocation, and monotonicity envy properties but not simplicity property. Defensibility property may be moderately supported by this scheme. Additivity is supported by Shapley value based schemes but not by ICPS.

CONCLUSIONS

In this study, we review joint cost allocation schemes currently available to evaluate the strength and the weakness of those schemes using the afore-mentioned evaluation criteria introduced by previous researches. This paper may provide practical implications to academician and practitioners as well regarding which allocation scheme is best fitting into a particular situation.

The main advantages of the physical measure based allocation scheme are its simplicity and objectivity. But it's very hard to select a physical unit that is most closely relevant to the joint product. This scheme may satisfy uniqueness, core, full allocation, monotonicity, and simplicity properties but not additivity, defensibility, goal congruency, and equity properties. Symmetry property is moderately supported by this scheme.

The sales value at splitoff scheme is widely used in practice when selling price data are available even if further processing is done, while the estimated net realizes value scheme is often used for products that have no ready market value at the splitoff point. The constant gross margin percentage net realizable value method has significant weakness and hence is not widely used relative to the other two market value based allocation schemes. The sales value at splitoff scheme may satisfy additivity, defensibility, uniqueness, full allocation, simplicity, goal congruency, management motivation, symmetry, and simplicity properties but not core and equity properties. Monotonicity property is moderately supported by this scheme. The estimated net realizable value scheme may satisfy uniqueness, goal congruency, full allocation, and simplicity properties but does

not satisfy additivity, equity, and core properties. Defensibility, management motivation, symmetry, and monotonicity properties are moderately supported by this scheme.

Among Moriarity's, Louderback's, and L-M scheme, L-M scheme seems to be the best allocation scheme because L-M allocation is in the core, a strength of Louderback scheme, and has all five advantages of Moriarity's scheme. This scheme may satisfy additivity, goal congruency, management motivation, core, symmetry, equity, full allocation, and simplicity properties but not uniqueness property. Monotonicity and defensibility properties are moderately supported by the scheme.

In general, game theory based schemes are theoretically sound. Recasting cost allocation problems into a game-theoretic context developed these schemes, which may hurt the validity of the scheme. And computations of allocated costs using these schemes are generally very complex, especially when there are many participating divisions. And hence, the use of these schemes in practice is very limited. Thus, this scheme may satisfy goal congruency, management motivation, equity, core, symmetry, full allocation, and monotonicity properties but not simplicity property. Defensibility property may be moderately supported by this scheme. Additivity is supported by Shapley value based schemes but not by ICPS.

ENDNOTES

[1]   There are some research findings that support cost allocations. For example, using the mechanism design approach where information asymmetry exists between the owner and divisional managers, Rajan (1992) showed that an appropriate choice of joint cost allocation rate could guarantee that divisional managers will submit budgets for the desired output levels. Each division's production is then made to conform to its budget by taking into account excessive differences in the two values and hence the firm as a whole reaches equilibrium.

[2]   Due to computational complexities that seriously limit the practical use, allocation schemes using notions of nucleolus and lp-centers are not discussed in this paper.

[3]   The homogeneity property is subsumed in the additivity property in Billera et al. (1981).

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