INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

Bell & Howell Information and Learning
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
800-521-0600

UMI®

Downloaded from SHAREOK. Persistent Handle URL: https://hdl.handle.net/11244/258

UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE IMPACT OF ACCOUNTING CONSERVATISM ON THE DIFFERENTIAL INFORMATION CONTENT OF CASH FLOWS AND ACCRUALS

A Dissertation

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

Doctor of Philosophy

By

Lori Mason
Norman, Oklahoma
2001

UMI Number: 3000733



UMI Microform 3000733

Copyright 2001 by Bell & Howell Information and Learning Company.
All rights reserved. This microform edition is protected against
unauthorized copying under Title 17, United States Code.

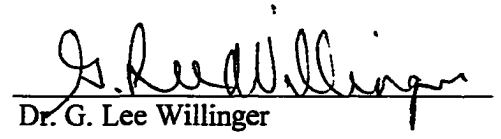
Bell & Howell Information and Learning Company
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

©Copyright by Lori Mason 2001
All Rights Reserved.

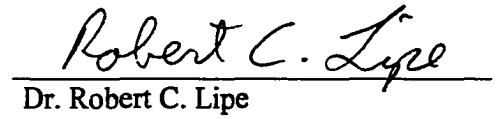
THE IMPACT OF ACCOUNTING CONSERVATISM ON THE DIFFERENTIAL INFORMATION CONTENT OF CASH FLOWS AND ACCRUALS

A Dissertation APPROVED FOR THE
MICHAEL F. PRICE COLLEGE OF BUSINESS

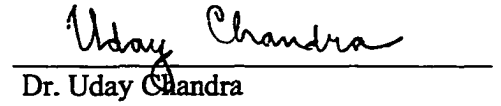
BY



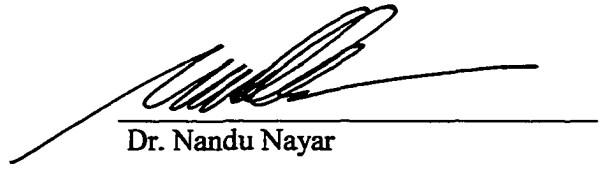
Dr. G. Lee Willinger



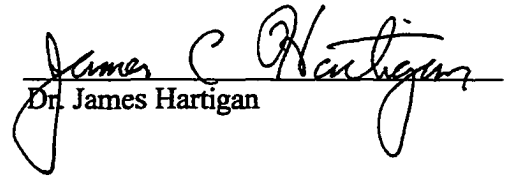
Dr. Robert C. Lipe



Dr. Uday Chandra



Dr. Nandu Nayar



Dr. James Hartigan

ACKNOWLEDGMENTS

There are not words to express the gratitude that I feel for the patience, encouragement and mentoring that I have received from my committee chairs, Professors Bob Lipe and G. Lee Willinger. I would like to thank my committee members, Professors Uday Chandra, James Hartigan and Nandu Nayar for their input and guidance throughout this process. I am also appreciative for all of the help and encouragement that I have received from the Accounting Faculty and the Accounting Ph.D. students as well as the University of Oklahoma throughout completion of this dissertation and the earlier requirements of the Ph.D. program. A special thank you is extended to my children, Mark, Sean, Meagan and Joey who have given nothing but their unconditional love and support throughout this process.

TABLE OF CONTENTS

Chapter

1. Introduction 1

2. Literature Review 4
   2.1. Conservatism 4
   2.2. Cash Flows and Accruals 6
      2.2.1. Studies Not Considering Contextual Factors 6
      2.2.2. Studies Considering Contextual Factors 7
      2.2.3. Conservatism as a Contextual Factor 9

3. Theory 11
   3.1. Feltham and Ohlson (1995) 11
   3.2. Returns Model 13

4. Hypothesis Development 16

5. Methodology 19
   5.1. Sample Selection 19
   5.2. Conservatism 20
      5.2.1. Estimating the Conservatism Score Components 21
         5.2.1.1. Unrecorded Inventory Asset 21
         5.2.1.2. Unrecorded Research and Development Asset 22
         5.2.1.3. Unrecorded Advertising Asset 23
         5.2.1.4. Unrecorded Gains or Losses on Pension Plan Assets 24
         5.2.1.5. Unrecorded Accounts Receivable Asset 25
         5.2.1.6. Unrecorded Depreciation Asset 26
      5.2.2. Adjustments to the Score 27
         5.2.2.1. Scaling Convention 28
         5.2.2.2. Comparing Alternative Weights for R&D and Advertising Expenditures 28
      5.2.3. Conservatism Score, Descriptive Statistics 31
         5.2.3.1. Conservatism Score by Industry and Year 33

6. Hypothesis Testing 35
   6.1. Hypothesis 1 35
   6.2. Hypothesis 2 38
   6.3. Hypothesis 3 40

7. Additional Analyses and Sensitivity Tests 41
7.1. Alternative Measures of Conservatism 41
7.1.1. Feltham and Ohlson's Linear Information Model 41
7.1.2. Market-to-Book Ratio 44
7.1.2.1. Correlations Among Market-to-Book, γ_0 and My Conservatism Score 44
7.2. Hypothesis Testing with Alternative Measures of Conservatism 45
7.2.1. Hypothesis 1 45
7.2.2. Hypothesis 2 46
7.2.3. Hypothesis 3 47
7.3. Equation (3) Coefficients, Implications from Feltham and Ohlson (1995) 48
7.4. Additional Cross-Sectional Analyses 50
7.4.1. Mandated and Nonmandated Score Components 50
7.4.2. Persistence and Growth 51
7.5. Firm-Specific Sensitivity Analyses 52
7.5.1. Teets and Wasley (1996) 53
7.5.2. Firm-Specific Analysis 54
7.5.2.1. Descriptive Statistics for the Firm-Specific Sample 54
7.5.2.2. Results From the Firm-Specific Analysis 55

8. Conclusions 59

Bibliography 62

Appendix 1 67

TABLES

Table

1. Descriptive Statistics 71

2. Alternative Measures for R&D and Advertising Assets 72

3. Conservatism Score Components, Descriptive Statistics 73

4. Conservatism Score Components, By One-Digit SIC Codes 74

5. Conservatism Score Components, By Year 75

6. Hypothesis Testing 77

7. Correlations Among Conservatism Score Components γ_0, and Market-to-Book 78

8. Hypothesis Tests for Alternative Conservatism Measures 79

9. Firm-Specific Analysis 81

CHAPTER 1
INTRODUCTION

Both accounting conservatism and the relative information content of cash flows and accruals are issues that have been recently addressed in the accounting literature.[1] Feltham and Ohlson (1995) present a valuation theory establishing a link between conservatism and the relative information content of cash flows and accruals. Their model predicts that the information content of accruals will increase in conservatism whereas the information content of cash flows will be unaffected. Conservatism is defined as carrying operating assets at an amount less than fair market value. The purpose of this study is to empirically test the implications of conservatism for the information content of cash flows and accruals using the Feltham and Ohlson (1995) framework. This blends three topics that are of interest within the accounting literature: (1) the Feltham and Ohlson (1995) framework, (2) the impact of conservatism on firm value and (3) the relative information content of cash flows and accruals. Results of this study should be of interest to managers, educators and analysts for assessing the potential information content of cash flows and accruals, given conservatism in recording operating assets.

Ohlson (1995) provides the basis for the firm valuation model developed in Feltham and Ohlson (1995). These studies advance a structure which provides a direct link between firm value and accounting data. According to Hand and Landsman (1998, 2), the Ohlson (1995) framework has been advocated by the Coopers & Lybrand

[1]For example Basu (1997); Zhang (1998); and Ahmed, Morton & Schaefer (1998) address the issue of conservatism. The relative information content of cash flows versus accruals is examined by Black (1998); Ali (1994); Dechow (1994); Bowen, Burgstahler and Daley (1987); Cheng, Liu and Schaefer (1996); Bernard and Stober (1989) and Rayburn (1986).

Accounting Advisory Committee (1997) for empirical research evaluating financial reporting standards. This structure is currently used by researchers to ascertain how accounting data maps to firm value (e.g. Collins, Pincus and Xie, 1999; and Barth and Clinch, 1998). Because the Ohlson (1995) framework is used for assessing the value relevance of accounting data, an examination of the model's agreement with the empirical data is of interest. This includes developing knowledge regarding the model's consistency with empirical data given specific accounting conventions such as conservatism.

The second topic addresses how the trade off between relevance and reliability affects the market's perception of accounting information. This trade off is examined in the accounting literature (Deng and Lev, 1998; Lev and Sougiannis, 1996; Barth, Clement, Foster and Kasznik, 1998; Hirschey and Weygandt, 1985; Basu 1997). This paper contributes to the research by providing evidence of how the market assigns weights to net-income components when conservatism is the source of the trade-off between relevance and reliability.

The third topic examines how cash flows and accruals map to firm value. In the Feltham and Ohlson (1995) framework, the consequence of conservatism is that the market should react more strongly to accrual earnings. Yet prior studies do not provide clear evidence that accruals are more value relevant than cash flows, or vice versa (Bernard and Stober 1989; Bowen, Burgstahler and Daley 1987; Wilson 1986 and 1987; Rayburn 1986). Those results prompted Bernard and Stober (1989) to suggest that the relative information content of cash flows and accruals may be determined by certain

contexts, or circumstances.[2] Thus later studies examine the information content of cash flows relative to accruals within several specific contexts. However, Feltham and Ohlson (1995, 693) illustrate that "an incremental dollar of cash earnings is worth less than an incremental dollar of non-cash earnings if, and only if, the accounting (for operating assets) is conservative." For unbiased accounting systems, their model provides no distinction between cash and accrual earnings.

This study examines whether there is differential information content of accruals relative to cash flows associated with the contextual factor of conservatism. A measure of conservatism is developed, and observations are partitioned based on their conservatism 'score.' A returns model, derived from the Feltham and Ohlson (1995) framework, is estimated to measure the information content of cash flows and accruals. The difference in the information content of accruals relative to cash flows is assessed for firms exhibiting a high versus a low degree of conservatism. In general, evidence supports the theory presented by Feltham and Ohlson (1995).

The remainder of this paper is organized as follows. Section 2 contains a literature review, theory is discussed in section 3 and hypothesis development is explained in section 4. Methodology and descriptive statistics are presented in section 5, hypothesis testing and main results are shown in section 6, sensitivity analyses are in section 7 and section 8 contains concluding remarks.

---

[2]Bernard and Stober (1989) did not empirically identify any particular context that gives rise to a differential information content of cash flows and accruals.

CHAPTER 2
LITERATURE REVIEW

The topics of conservatism and the relative information content of cash flows and accruals will be discussed in turn.

2.1 Conservatism

The conservatism constraint for accounting has been in existence since before the turn of the century. In general, "conservatism is broadly identified with aggressive expense recognition and less than aggressive revenue recognition," Demski (1993, 1). Ceteris paribus, the presence of conservatism results in lower net income and asset values thus facilitating the contracting role of accounting numbers. For instance, "a stated function of the accountant's conservatism was to offset the manager's optimism (presumably encouraged by earnings-based compensation plans)," Watts and Zimmerman (1986, 206). Kinney (1993, 2) asserts that "disclosure of only loss contingencies . . . may lie in the historical role of accounting numbers to facilitate contracts . . ., as a means of controlling bias of optimism of preparers/asserters . . ." Yet the purpose of financial reporting is not limited to facilitating contracts.

The objectives of financial reporting include meeting the information needs of investors as well. By understating income and the book value of assets, conservative reporting represents a trade off between the two primary qualitative characteristics of accounting, relevance and reliability. For example, an increase in the market value of fixed assets may be useful information to investors when determining security prices. If this increase were immediately recognized, the information would be provided in a timely

manner and allow for a potentially more accurate prediction of future cash flows. Hence the information would be relevant. Yet an estimate of the increase in value may not be objective, or verifiable. Accordingly, recognition will be deferred until the occurrence of an objective, verifiable event allowing a more 'reliable' amount to be reported in the financial statements.

Although conservatism trades off relevance for reliability, in an efficient market investors should be able to assess the conservatism inherent in financial statements when they set security prices (Brennan, 1993). Prior literature addresses the value relevance of items not maintained in the financial statements due to the trade-off between relevance and reliability. For instance Lev and Sougiannis (1996) and Hirschey and Weygandt (1985) find a relation between Research and Development (R&D) expenditures and stock price. Deng and Lev (1998) provide evidence that investors 'undo' the immediate expensing of acquired R&D. Barth, Clement, Foster and Kasznik (1998) show that brand value estimates provide significant explanatory power for stock prices and returns incremental to advertising expenses. This research demonstrates that investors do weigh items not recognized in the financial statements when determining price.

Prior literature also examines whether investors appear to distinguish between differing degrees of conservatism resulting from alternative accounting procedures. Harris and Ohlson (1987) find that firms using the successful efforts (SE) method for exploration and development expenditures have a higher market-to-book ratio than firms using the full cost (FC) method. Bandyopadhyay (1994) shows that investors' reaction to

the earnings announcement of SE firms is greater than that to FC firms.[3] When looking at inventory and depreciation methods, Salamon and Kopel (1993) also conclude that investors attach a higher value to earnings when more conservative accounting methods are employed.

Basu (1997) finds that investor reaction is greater to good news than to bad news in reported earnings. He attributes his result to conservatism's asymmetric effect on the timeliness and persistence of earnings; bad news is recognized immediately whereas good news is deferred and/or only partially recognized. Overall, prior evidence suggests that conservatism impacts firm value; implying that investors consider inherent conservatism when setting security prices.

2.2 Cash Flows and Accruals

Within this section, the existing literature will be partitioned according to whether or not contextual factors are considered.

2.2.1 Studies Not Considering Contextual Factors

The primary focus of earlier studies is to assess whether both cash flows and accruals are informative to investors. Informativeness is inferred for a component of net income when a returns-earnings relation results in a nonzero multiple on that component. Evidence indicates that both cash flows and accruals are informative (Bowen, Burgstahler

[3]However, Bryant (1999) uses a within firm design and finds no difference between the value relevance of full cost and successful efforts earnings.

and Daley 1987, Rayburn 1986, and Wilson 1986 and 1987).[4] Yet, there are mixed results regarding the relative weights, or multiples, investors seem to put on accruals versus cash flows. For example, Patell and Kaplan (1977) find that investors appear to assign equal weights to cash flows and accruals while evidence presented in Bowen, Burgstahler and Daley (1987) suggests that investors place more weight on cash flows than accruals.

Wilson (1986) finds that both cash flows and total accruals are weighted more heavily than earnings as a whole and, that more weight is placed on total accruals than on cash flows. In an attempt to replicate Wilson's (1987) work, Bernard and Stober (1989) find that the results do not generalize to time periods other than those reported in Wilson's (1987) study.[5] Accordingly, Bernard and Stober (1989) abandon the assumption that the informativeness of cash flows and accruals is consistent across firms and time.

2.2.2 Studies Considering Contextual Factors

Bernard and Stober (1989) seek a relation describing the relative information content of cash flows and accruals that is robust to alternative time periods. They look to explanations such as macroeconomic conditions (interest rates and GNP growth), firm size and the composition of current accruals. Insignificant associations between these factors and the information content of cash flows and accruals lead them to conclude that

[4]Cites are not intended to be exhaustive.

[5]Bernard and Stober attempted to replicate Wilson's (1987) results indicating a more favorable response the larger (smaller) are cash flows (current accruals).

(1989, 648) "differences in the valuation implications of cash flows and the various accrual accounts are more contextual than any of the models examined here."

Since Bernard and Stober (1989), the information content of cash flows and accruals has been examined in light of several contextual factors. One of those factors is the persistence of earnings and/or its components. Ali (1994) provides evidence of a positive association between the persistence of earnings, working capital from operations and cash flows and their respective information content. His measure for persistence uses the absolute change in the variable of interest. Cheng, Liu and Schaefer (1996) examine the incremental information content of cash flows within the context of *earnings* persistence. Their evidence suggests that as the persistence of earnings decreases, the incremental information content of cash flows increases.

Contextual factors are not limited to persistence.[6] Dechow (1994) identifies situations where cash flows are expected to suffer from timing and matching difficulties, thus inhibiting their ability to reflect firm performance. These instances are (1) the length of the performance measurement interval, (2) the volatility of working capital requirements and investing and financing activities, and (3) the length of the firm's operating cycle. Dechow (1994) finds that accruals are more informative in situations where these three factors constrain the ability of cash flows to reflect firm performance. Black (1998) finds that the information content of various components of cash flows is associated with a firm's life-cycle stage.

---

[6]When demonstrating the difference between incremental and relative information content, Biddle, Seow and Siegel (1995) compare the information content of operating cash flows, net income and net sales for selected industries. They find that relative and incremental information content varies between industries. Yet since industries are used for 'illustrative purposes,' the authors do not hypothesize which variables are expected to possess greater information content.

2.2.3 Conservatism as a Contextual Factor

The purpose of this paper is to investigate conservatism as a potential contextual factor. While no published study directly examines this factor, Basu's (1997) study of how conservatism affects the information content of total earnings bears some relation to the current paper. Basu (1997) discusses conservatism in terms of the asymmetric accounting treatment for good and bad news and uses the requirements of SFAS #121 to illustrate the asymmetry. When the book value of an asset exceeds its market value, SFAS #121 requires the asset to be written down immediately to reflect all of the 'bad news.' Conversely, if an asset's fair market value exceeds its book value, the 'good news' is not recognized immediately; instead, the good news seeps into earnings as the undervalued asset produces large revenues and low depreciation expenses. Basu (1997) asserts that this asymmetric accounting treatment results in transitory accruals which render the accrual portion of current period's earnings less persistent for bad news. He shows that the ERC is lower for bad news earnings relative to good news earnings and that this appears to be attributable to the response coefficient associated with accruals, not cash flows.

Feltham and Ohlson's (1995) prediction of a higher return response to accruals is based on conservatism in recording operating assets. Initially, Basu's (1997) prediction that conservatism leads to a lower ERC for bad news appears contradictory. But notice that in Basu's (1997) example, good news leads to an asset being recorded at less than its market value whereas bad news results in the asset reflecting its market value. Thus Basu (1997) and Feltham and Ohlson (1995) both predict a higher ERC in situations where operating assets are recorded conservatively.

Both Basu (1997) and Feltham and Ohlson (1995) predict higher ERC's for conservatively recorded assets. However, only Feltham and Ohlson (1995) allow for a-priori predictions regarding the relative information content of cash flows and accruals; thus I use their framework. A more detailed discussion of their model follows.

CHAPTER 3
THEORY

Within this section the implications of the Feltham and Ohlson (1995) valuation model for the differential information content of cash flows and accruals will be discussed. This is followed by the derivation of a returns model which isolates the effect of conservatism on the differential response to operating accruals.

3.1 Feltham and Ohlson (1995)

Current market value is modeled as book value plus the present value of expected abnormal earnings. A firm's book value (bv) is the sum of its book values for net operating assets (oa) and net financial assets (fa) such that bv = oa + fa. Expected abnormal earnings are expected earnings less expected 'normal earnings.' Expected earnings can be described as the expected rate of return on the fair market value of a firm's assets whereas expected 'normal earnings' represents the interest charge on the book value of a firm's assets. Feltham and Ohlson (1995, 694) also assume "...A flat, non-stochastic, term-structure on interest rates...," and that the expected return on net assets is equal to the interest charge. Therefore if book value is equal to market value, expected abnormal earnings are zero.

The book values of financial assets (eg. marketable securities and bonds payable) are presumed to approximate their fair market values implying that expected abnormal earnings from financial assets are zero. In contrast, the book values of operating assets are presumed to be less than or equal to their fair market values. Thus operating assets may be expected to generate future abnormal earnings. The magnitude of those abnormal

earnings is determined in part by the gap between fair market and book values. This gap can be influenced by accounting conservatism; for example, the lower of cost or market rule and alternative inventory cost flow assumptions. Hence the degree of conservatism in recording operating assets can influence the magnitude of expected abnormal earnings.

Accordingly, when modeling a firm's current market value (P_t) as current book value (bv_t) plus expected abnormal earnings, Feltham and Ohlson's (1995) proposition (3) allows for the influence of conservatism in recording operating assets. In essence, expected abnormal earnings are derived from two sources; the persistence (α_1) of current-period abnormal operating earnings (ox^a_t) and an adjustment for the conservatism (α_2) in recording operating assets in place (oa_t).[7] Expected abnormal earnings also stem from some multiple (β) of current non-accounting information (v_t):

$$P_t = bv_t + \alpha_1 ox^a_t + \alpha_2 oa_t + \beta * v_t \qquad (1)$$

Using the model expressed in equation (1) along with some additional assumptions, Feltham and Ohlson (1995) show that a firm's market value is expected to change by $1 + \alpha_1$ for a dollar of cash flows and by $1 + \alpha_1 + \alpha_2$ for a dollar of accruals. Cash flow refers to operating plus investing cash flows. The premise is that the return response associated with a dollar of earnings is a function of whether the dollar is associated with a change in financial or operating assets. In their model, cash flows give rise to financial assets

[7] Where $\alpha_1 = \omega_{11} / (R_f - \omega_{11})$ and $\alpha_2 = \omega_{12} R_f / (R_f - \omega_{11})(R_f - \omega_{22})$; ω_{11} is the persistence of abnormal earnings, ω_{12} is conservatism and ω_{22} is the growth in operating assets. Persistence is the main effect for α_1 and is also contained in the denominator of α_2. Conservatism is the main effect for α_2 meaning that neither persistence nor growth can affect α_2 if earnings are unbiased (e.g. $\omega_{12} = 0$). The reader is referred to Appendix 1 for a more detailed explanation.

whereas operating accruals give rise to operating assets.[8] Since current-period cash flows affect financial assets, they are not expected to generate abnormal earnings. Thus one dollar in current-period cash flows is worth one dollar plus an adjustment for persistence (α_1).

In contrast to cash flows, current-period accruals affect operating assets. The market uses the conservatism in beginning-of-period operating assets to form expectations for future abnormal earnings. When operating assets are recorded conservatively, positive accruals result in an increase in expected abnormal earnings. This increase is reflected in price via α_2, the additional multiplier to accruals for conservatism. However, negative accruals imply that some abnormal earnings opportunities attributable to conservatism have been lost, implying a greater decrease in price due to the adjustment for conservatism. Accordingly, Feltham and Ohlson (1995, 718) conclude "the more conservative the accounting the greater is the multiple associated with accrued earnings."

3.2 Returns Model

To examine the implications of cash flows and accruals for the change in a firm's market value, I will use several of Feltham and Ohlson's (1995) assumptions. Those assumptions are:

(1) clean surplus, $bv_t = bv_{t-1} + x_t - d_t$
(2) the operating asset relation, $oa_t = oa_{t-1} + ox_t - c_t$
(3) abnormal earnings are defined as $x^a_t = x_t - [bv_{t-1}*(R_f - 1)]$

[8] The operating asset relation states that $oa_t = oa_{t-1} + ox_t - c_t$ where oa, ox and c represent operating assets, operating earnings and cash flows respectively. The financial asset relation states that $fa_t = fa_{t-1} + i_t + c_t - d_t$ where fa, i and d represent financial assets, interest and dividends respectively.

(4) the net interest relation, $i_t = (R_f - 1)fa_{t-1}$, which also specifies a flat, non-stochastic term structure for interest rates and an equality between book and market values for financial assets (1995, 694)
(5) from the net interest relation, $x^a_t = ox^a_t$ where ox^a_t is abnormal operating earnings, defined as $ox_t - [oa_{t-1}*(R_f - 1)]$

bv_t and oa_t are as previously defined; d_t = dividends in period t; x_t = total earnings in period t; c_t = cash flows in period t; i_t = interest income in period t; and R_f = the risk-free rate plus one. Operating earnings, ox_t, consist of operating accruals and cash flows while total earnings, x_t, encompass earnings from operating and financial activities.

Taking the one-period change for equation (1) and making the appropriate substitutions yields:

$$P_t - P_{t-1} = x_t - d_t + \alpha_1\{[x_t - bv_{t-1}*(R_f - 1)] - [x_{t-1} - bv_{t-2}*(R_f - 1)]\} + \alpha_2(ox_t - c_t) + \beta(v_t - v_{t-1}) \quad (2)$$

Based on equation (2), α_2 (conservatism) is associated with the level of current-period operating accruals, ($oac_t = ox_t - c_t$). Rearranging terms, and deflating all variables by beginning-of-period market value, P_{t-1}, allows equation (2) to be expressed in a returns framework as follows:[9,10]

$$Ret_t = \theta_0 + \theta_1 x_t + \theta_2 \Delta x_t - \theta_3(\Delta bv_{t-1}) + \theta_4 oac_t + e_t \quad (3)$$

[9]Deflating by beginning-of-period price also reduces spurious correlation related to size (Christie 1987).

[10]Ohlson (1995, 668) defines v as value-relevant information that is independent from current and past earnings. V is unobservable and while some correlation between v and conservatism is possible, since v is by definition uncorrelated with current and past earnings, excluding v from equation (3) does not induce bias on the coeffiecients being tested (Gujarati 1994, 457).

For the sake of parsimony, firm-specific subscripts and the deflator, P_{t-1} are not shown.[11] Comparing equations (2) and (3) shows that θ_1 is expected to be '1;' θ_2 provides an empirical estimate of α_1 (persistence); θ_3 is a function of α_1 multiplied by $R_f - 1$; e_t represents other information; and θ_4 is a measure of α_2 (conservatism). Thus, θ_4 is an empirical measure of the differential response to operating accruals relative to operating cash flows.

[11]Variable definitions are as follows: x is earnings before extraordinary items and discontinued operations, compustat data item #18; bv is book value, compustat data item #60; oac is operating accruals, [Δ total assets - Δ cash and short-term securities - Δ investments and advances, equity method and other] - [Δ total liabilities - Δ short-term debt in current liabilities - Δ long-term debt]; compustat data items [Δ#6 - Δ#1 - Δ#31 - Δ#32] - [Δ#181 - Δ#34 - Δ#9]. Ret is returns, defined as market-adjusted returns cumulated over the 12-month period ending three months after the fiscal year end. Because market-wide returns have a low association with earnings (Dechow 1994, 13), removing that portion of returns may improve the power of the tests. Overall results are similar whether using raw returns, or the value or equal-weighted market adjustments. Reported results use the equal-weighted market adjustment.

CHAPTER 4
HYPOTHESIS DEVELOPMENT

The influence of conservatism can be seen within Generally Accepted Accounting Principles (GAAP). Some examples are the historical cost principle and the expensing of research and development costs. Since conservatism is a stated constraint for GAAP, corporate accounting practice in the United States may be expected to exhibit overall conservatism. For this reason, operating accruals are expected to possess differential information content (θ_4) relative to cash flows. The following hypothesis regarding a cross-section of sample firms is stated in its null and alternative forms:

H_{10}: The market's valuation of operating accruals is less than or equal to that of cash flows ($\theta_4 \leq 0$ in equation 3).

H_{1A}: The market's valuation of operating accruals is greater than that of cash flows ($\theta_4 > 0$ in equation 3).

Although GAAP places boundaries on accounting practice, a firm still has a host of available options that may increase or decrease its degree of conservatism.[12] These options may take the form of accounting method choices as well as other business decisions.[13] One example of an accounting method choice is the alternative inventory cost flow assumptions of FIFO and LIFO. Other business decisions affecting a firm's degree of conservatism include investments in items that GAAP records at less than fair

---

[12]Managers' discretion for choosing a firm's overall conservatism could provide a signal about that firm's future (earnings) prospects. Hence the underlying economic structure for the return-earnings relation may include signaling. Since managers could use their discretion in either an opportunistic or an efficient manner, it is unclear whether a given level of conservatism signals positive or negative future economic prospects. In the absence of a clear theory of signaling via conservatism, I assume that positive and negative signals are randomly distributed across conservatism partitions, and thus I rely on equation (3) as the reduced form of the underlying economic model.

[13]Feltham and Ohlson (1995) do not discriminate between alternative sources of conservatism such as mandated accounting methods and managerial discretion. This distinction may provide avenues for future research.

market value such as research and development or advertising. The multitude of accounting choices and business decisions a firm makes may consist of some more conservative and some less conservative alternatives (Salamon and Kopel 1993, Hagerman and Zmijewski 1979). Thus conservatism exists on a continuum with its available range constrained by existing accounting standards and concepts.

Feltham and Ohlson (1995) show that the differential information content of accruals relative to cash flows is increasing in conservatism. This implies that increases in the degree of conservatism will be associated with increases in θ_4, the differential information content of accruals. To test for this effect, I compute a measure of the relative amount of conservatism for each firm-year observation. However, my conservatism score will likely contain noise making it difficult to observe the expected monotonic relation. A more statistically powerful test excludes firms exhibiting a medium degree of conservatism and compares the differential response to operating accruals, θ_4, between firms with high versus low conservatism. I predict that θ_4 will be greater for firms displaying 'high' conservatism. Hypothesis 2 in its null and alternative forms follows:

H_{20}: The differential information content of accruals relative to cash flows [θ_4 from equation (3)] for firms exhibiting a 'high' degree of conservatism is expected to be less than or equal to that of firms exhibiting a 'low' degree of conservatism.

H_{2A}: The differential information content of accruals relative to cash flows [θ_4 from equation (3)] for firms exhibiting a 'high' degree of conservatism is expected to be greater than that of firms exhibiting a 'low' degree of conservatism.

Hypothesis 2 does not consider the relation between the conservatism score and θ_4 for firms exhibiting a 'medium' degree of conservatism. Since Feltham and Ohlson's

(1995) assertion applies to all degrees of conservatism, a stronger test of the theory will test for a positive association between the conservatism score and the differential information content of accruals over cash flows across all firms. Hypothesis 3 is stated in its null and alternative forms as follows:

H_{30}: The association between the differential information content of accruals relative to cash flows [θ_4 from equation (3)] and the conservatism score is expected to zero or negative.

H_{3A}: The association between the differential information content of accruals relative to cash flows [θ_4 from equation (3)] and the conservatism score is expected to be positive.

CHAPTER 5
METHODOLOGY

Sample selection, the conservatism score and descriptive statistics will be discussed in turn.

5.1 Sample Selection

To be included in the sample, firms must have sufficient financial statement and returns data on Compustat and CRSP so that a conservatism score can be computed and model (3) can be estimated. Since the going-concern assumption implicit within the Feltham and Ohlson (1995) model may be violated in loss situations (Hayn, 1995), firms with current-period losses are excluded from the sample.[14]

Feltham and Ohlson (1995) use a residual income model for specifying earnings. Negative book values imply negative expected earnings, which are not consistent with the going concern assumption. Negative book values also create difficulty for interpreting market-to-book ratios. For these reasons, firm-year observations with a negative book value are deleted. To avoid potential Compustat data measurement errors induced by a change in fiscal year end, the year of the change is excluded. These criteria result in a sample of 3,825 firm-year observations representing fifty-five 2-digit SIC codes over the years 1975 through 1996.

Descriptive statistics for the sample are shown in table 1. The means of market and book value of equity are 587.89 and 286.92 million, respectively. There appears to

[14]Results are sensitive to the inclusion of losses, consistent with Hayn's (1995) findings that losses are valued differently from profits.

be a bias toward larger firms although comparison of the mean and median values also indicates that there are extreme observations. For completeness, descriptive statistics on market-to-book, net operating assets, earnings, abnormal operating earnings, raw returns and the conservatism score are also included in table 1. To the extent that results are related to sampling criteria and/or data requirements necessary for model estimation and building a conservatism score, findings may not generalize to the entire population of firms.

5.2 Conservatism

Feltham and Ohlson (1995) define accounting conservatism as recording operating assets at something less than their market values. An ideal conservatism score would accurately measure the difference between the market values and the recorded values of operating assets, but such a measure is not feasible. Fortunately, a proxy that captures the relative magnitude of conservatism across firms is sufficient to empirically test Feltham and Ohlson's (1995) theory of a link between conservatism and the differential return response to operating accruals.

The conservatism score should reflect the unrecorded portion of a firm's operating assets, relative to other firms. For some operating assets, sufficient data are available so that their unrecorded values can be directly estimated. One example is inventory. In general, firms that use the LIFO cost-flow assumption report a lower book value for inventory than under alternative assumptions such as FIFO or average cost. When firms use LIFO, they disclose the difference between the inventory value computed under LIFO and an alternative cost flow assumption in the footnotes as the LIFO reserve. Thus the LIFO reserve represents the unrecorded inventory asset.

The LIFO inventory cost-flow assumption is one of many circumstances in which a firm may understate its recorded assets relative to other firms. Other examples are investments in research and development and advertising, provisions made for the allowance for doubtful accounts, assumptions regarding the life of long-term assets and unrecorded gains and losses on pension plan assets. These items are considered because they can be estimated from financial statement data and may result in differential unrecorded asset values across firms.

5.2.1 Estimating the Conservatism Score Components

The contribution of each of the aforementioned items to a firm's relative degree of conservatism will be discussed in turn.

5.2.1.1 Unrecorded Inventory Asset

If prices have risen in the past, the LIFO cost-flow assumption results in a lower recorded value for inventory than alternative cost-flow assumptions such as first-in-first-out (FIFO) and average cost. Even though increasing prices are necessary for LIFO to result in an unrecorded asset, the LIFO assumption is considered to be conservative relative to the alternative cost-flow assumptions. For instance Salamon and Kopel (1993), Zmijewski and Hagerman (1981) and Pincus (1991) all consider the LIFO cost-flow assumption to represent a conservative accounting choice.[15] Firms that use the LIFO cost-flow assumption are required to report a LIFO reserve. This is measured as the

[15] Within the current sample, 1457 firm-year observations show a LIFO reserve. Of those observations, 1448 are greater than zero lending empirical support to the notion that on average, the LIFO cost-flow assumption represents a more conservative accounting choice.

difference between the recorded inventory values using LIFO and an alternative cost-flow assumption. The LIFO reserve amount is available on Compustat as data item #240 and is used to estimate the unrecorded inventory asset.

5.2.1.2 Unrecorded Research and Development Asset

In general, current accounting standards require outlays for R&D to be immediately expensed, resulting in an amortization rate of 100% for the related assets. To the extent that the expenditure provides a future economic benefit, an unrecorded intangible asset results. Hirschey and Weygandt (1985) and Bubblitz and Ettredge (1989) provide evidence that there are expected future economic benefits associated with investments in R&D. In addition to their findings substantiating R&D's future economic benefit, Lev and Sougiannis (1996) also estimate economic amortization rates for R&D expenditures by 2-digit SIC code. To the extent that the economic amortization rate and/or the outlay for R&D differ across firms, so do the unrecorded assets related to R&D. Thus R&D expenditures potentially contribute to cross-firm differences in conservatism.

Lev and Sougiannis' (1996, 121) economic amortization rates, δ, and useful lives, T, can be used to estimate the unrecorded asset resulting from R&D expenditures as follows:

$$\sum_{k=0}^{T} \delta_k \, (R\&D_{t-k}) \qquad (4)$$

where t is the current period and k is the k^{th} prior period. Thus $R\&D_{t-k}$ is research and development expense (Compustat data item #46) for the k^{th} lag. δ_k is a fraction representing the unamortized percentage of the k^{th} lag's (0 . . . T) R&D expenditures.

Using equation (4) to directly estimate the unrecorded R&D asset would be my first choice if lagged R&D data were readily available. However, requiring non-missing lags causes large reductions in sample size and eliminates certain industries. Thus, I use an alternative measure that takes the current level of R&D spending and "grosses it up" based on the industry-specific δ's and expenditure growth rates. Sensitivity analysis presented below for the firms with complete data suggest that (4) and the "gross-up" method produce similar mean amounts of unrecorded R&D assets, and the rank correlations between the two measures are very close to 1.0.

5.2.1.3 Unrecorded Advertising Asset

Outlays for advertising are also immediately expensed, and to the extent that the advertising expenditures provide future economic benefits, an unrecorded intangible asset results. Hirschey and Weygandt (1985), Bubblitz and Ettredge (1989) and Lev and Sougiannis (1996) show that there are expected future benefits arising from current-period advertising expenditures. Hirschey and Weygandt (1985, 333) provide economic amortization rates for advertising expenditures based on whether the firm is a member of a durable versus a nondurable goods industry.

Hirschey and Weygandt's (1985, 333) economic amortization rates, δ, and useful lives, T, are used to estimate the unrecorded asset resulting from advertising expenditures as follows:

$$\sum_{k=0}^{T} \delta_k (ADV_{t-k}) \qquad (5)$$

where t is the current period and k is the k^{th} prior period. Thus ADV_{t-k} is advertising expense (Compustat data item #45) for the k^{th} lag. δ_k is a fraction representing the unamortized percentage of the k^{th} lag's (0 . . . T) advertising expenditures. As with R&D, using equation (5) to directly measure the unrecorded advertising asset would be my preference if data were readily available.

5.2.1.4 Unrecorded Gains or Losses on Pension Plan Assets

Pension Plan Assets consist primarily of stocks and bonds and would normally be considered financial assets. However, a firm's management has discretion when estimating an expected rate of return on those assets, and in general, the difference between the expected and the actual rate of return is not immediately recognized in the financial statements. This creates a current-period difference between the fair value and book value of pension assets equal to the difference between the expected and the actual rate of return multiplied by the pension plan assets. The cumulation of these differences represents the unrecorded portion of pension plan assets. This unrecorded pension asset may vary among firms and thus contribute to differences in overall conservatism.

The unrecognized gain or loss on pension plan assets attributable to the current year is measured as the difference between the total actual return and the total expected return on pension plan assets. The total actual return on pension plan assets is Compustat data item #333 while the expected return is defined as underfunded plus overfunded pension plan assets, Compustat data items #296 and #287, multiplied by the anticipated

long-term rate of return, Compustat data item #336. Since this unrecorded asset is cumulative, it is cumulated over all available years.

5.2.1.5 Unrecorded Accounts Receivable Asset

Firms are allowed some discretion when estimating their uncollectible accounts receivable. Because the accounts receivable asset is reported net of the estimated uncollectible amounts, the proportion of receivables shown as an asset may vary across firms. When firms face similar circumstances regarding account collectibility, the firm reporting the lower net percentage of receivables has created an unrecorded asset contributing to its conservatism.

The unrecorded asset is measured as the difference between the actual allowance, Compustat data item #67, and a firm-specific minimum allowance. A firm's minimum allowance is obtained by multiplying the firm's gross receivables by an industry-based minimum percentage.[16] This industry-based minimum percentage is defined as the lowest ratio of the allowance for uncollectible accounts to gross receivables within that industry for period t, as follows:

$$\text{Min}_{j,t}\left(\text{Allowance}_{j,t} / \text{Gross Receivables}_{j,t}\right) \qquad (6)$$

where industry *j* is defined by its two-digit SIC code.

Within an industry, there may be a divergence of credit policies. As the credit policy becomes more lenient, the portion of net sales outstanding would be expected to increase. Thus a divergence in credit policies may be reflected in days' sales in

[16] Gross receivables are computed as the sum of the allowance for uncollectible accounts and net receivables; Compustat data items #67 + #2.

receivables.[17] To accommodate credit policy differences, the industry-based minimum allowance percentage is adjusted for days' sales in receivables.

$$\text{Min}_{j,t}\left(\frac{\text{Allowance}_{j,t}/\text{GrossReceivables}_{j,t}}{\text{Days' Sales in Receivables}_{j,t}}\right) * \text{Days' Sales in Receivables}_{i,t} \qquad (7)$$

Intuitively, a firm having more days' sales in receivables has a more liberal credit policy and probably expects more losses from non-payment. These expected losses are not an unrecorded asset. Therefore my measure of the firm's minimum allowance reflects cross industry differences in allowance percentage plus within industry differences in credit policy. The firm's minimum allowance is computed by multiplying firm *i*'s gross receivables by the firm-specific minimum percentage requirement from equation (7). The difference between a firm's actual allowance and its required minimum allowance represents the unrecorded asset associated with accounts receivable.

5.2.1.6 Unrecorded Depreciation Asset

Relative differences in accounting conservatism may also result from differences in the assumed useful life for depreciable assets. Ceteris paribus, at any point during an asset's useful life, accumulated depreciation will be lower when a longer useful life is assumed. This results in higher book values for assets when firms opt to assume longer useful lives. In contrast, firms that opt for shorter asset lives will report lower book values resulting from a higher balance in accumulated depreciation.

[17] Days' sales in receivables is computed as gross receivables divided by sales per day; Compustat data items [(#2 + #67) / (#12/360)].

Accordingly, the unrecorded depreciation asset will be measured as a firm's accumulated depreciation in excess of the accumulated depreciation that would have been recorded if an industry-based maximum asset life were assumed. This industry-based benchmark is computed for each 2-digit SIC code, for each year. To obtain a firm's unrecorded depreciation asset, it is first helpful to determine the excess depreciation a firm has taken in percentage terms. This is done as follows:

$$1 - \left(\text{Average Life of Assets}_{i,t} \Big/ \max\left(\text{Average Life of Assets}_{j,t}\right) \right) \qquad (8)$$

where the average life of assets is gross property plant & equipment divided by depreciation expense [Compustat data items (#7) / (#103)] for firm *i* (industry *j*), period *t*. The balance in firm *i*'s accumulated depreciation account for period *t* is then multiplied by the appropriate excess depreciation percentage, yielding the unrecorded depreciation asset. This computation is only valid for firms using the straight-line method for depreciation. Thus, to include this item in the conservatism score, the sample is limited to firms that use straight-line depreciation.

5.2.2 Adjustments to the Score

Adjustments are made to facilitate comparison among firms' overall degrees of conservatism. First, since score components are measured in total dollars I use a scaling convention. Second, grossing up the unrecorded R&D and advertising assets provides for comparisons between firm-years with and without all lagged data. Both of these adjustments are discussed in turn.

5.2.2.1 Scaling Convention

Recall that Feltham and Ohlson's (1995) definition of conservatism is based on the disparity between the book and market values of operating assets. My conservatism score proxies for the difference between market and book values by estimating the unrecorded value of firms' operating assets. Since a firm's degree of conservatism is related to how its operating assets are recorded, I scale the sum of a firm's conservatism score components by its recorded net operating assets. This gives a conservatism score that is a ratio of a firm's unrecorded operating assets to its recorded net operating assets.

5.2.2.2 Comparing Alternative Weights for R&D and Advertising Expenditures

The unrecorded R&D and advertising assets are the sum of the unamortized portions of R&D and advertising expenditures made over the asset's economic life. Thus estimating R&D and advertising assets may require all relevant expenditure data for as many as seven *prior* years, depending on the firm's industry membership. Table 2 shows how such a stringent data requirement can reduce the sample size. Before imposing data requirements for the remaining score components, excluding firms without complete expenditure data reduces the available sample from 11,942 to 7,504 and 9,434 to 1,684 for the R&D and advertising assets, respectively. Table 2 also provides evidence that the loss of observations is not evenly distributed across industries. The number of two-digit SIC codes having nonzero expenditure data is reduced from 53 to 42 for the R&D asset and from 62 to 36 for the advertising asset. Thus the more restrictive data requirements would not only reduce the available sample but would also exclude certain industries.

I could use only current-period expenditures for R&D and advertising in my estimate of relative conservatism. Table 2 shows that when including only current-period expenditures, the magnitudes of these assets are less than forty percent of their magnitudes when all relevant years' expenditures are included. This suggests that including only current-period expenditures may understate the contribution of R&D and advertising expenditures to a firm's overall conservatism score.

I try several alternatives to preserve data points and to maintain an appropriate weighting of R&D and advertising within the conservatism score. The first alternative is to include actual expenditures for all available periods and to assume expenditures of zero when an observation is missing. The second is to assume that expenditures are constant from year-to-year. The third alternative is to estimate a growth rate for these expenditures, on an industry basis, then use the growth rate and current-period expenditures to estimate prior years' expenditures as follows:

$$\mathbf{Lag}_{i,n} = \left(\frac{\text{Expenditures}_{i,t}}{(1 + \text{growth}_j)^n} \right) \tag{9}$$

where $\text{lag}_{i,n}$ is the estimated expenditure for firm i, for the n^{th} prior period. The subscript t denotes the current-period and j represents firm i's two-digit SIC code.

Estimates using each of the three alternatives are shown in table 2. For the sample of firm-year observations having *no* missing data for prior-period expenditures, the estimate employing all available periods provides a reasonable benchmark for the unrecorded R&D and advertising assets. This mean estimate is 0.267 for R&D and 0.461 for advertising. The mean (median) annual growth rate for R&D expenditures is 0.328 (0.121) and 0.332 (0.108) for advertising. The positive growth rates indicate overall

increasing expenditures during the sample period, and the difference between the means and medians indicates positive skewness. The positive outliers are large in magnitude providing a mean value approximately three times the median for both R&D and advertising expenditures. If the mean values are used to proxy for growth, the effect of extreme observations may be to understate the estimated assets. Hence to mitigate the potential for understatement of the R&D and advertising assets, the median values are used to proxy for growth rates.[18]

Since growth rates are on average positive, assuming that prior-period's expenditures are equal to current-period expenditures tends to overstate the assets. This can be seen in table 2 when examining firms with no missing data. The R&D (advertising) asset is 0.306 (0.523) when lagged expenditures are assumed equal to current-period expenditures versus 0.267 (0.461) when actual data are used. Incorporating growth provides an estimate of 0.258 (0.429) for R&D (advertising) thus alleviating the overstatement and providing a measure closer in magnitude to the value obtained using actual data. For firms with missing data, estimating prior-period lags provides an asset larger in magnitude than when replacing missing lags with values of zero. This is to be expected and provides further arguments in favor of estimating lagged R&D and advertising expenditures using current-period expenditures and adjusting for growth.

Since the objective of the conservatism score is to allow firm-year observations to be ranked, I compare the relative ranking of asset values when using estimates for prior-

[18] If a firm is not publicly traded during the entire growth estimation period, I assume that it existed as a private firm for the remainder of that period.

period expenditures versus actual data. For firm-year observations with no missing prior-period expenditure data, Spearman rank correlations between asset values obtained from estimating prior-period lags while incorporating growth and those obtained from actual data are 0.976 for R&D and 0.959 for advertising. Both correlations are positive and significantly different from zero at the 0.01 level.

Overall, comparing estimates from current-period expenditures adjusted for growth with actual data suggests that the estimated values are similar in magnitude and preserve the relative ranking of observations. Thus to preserve data points, estimated values of prior-period expenditures are used to compute the R&D and advertising assets. Descriptive statistics follow.

5.2.3 Conservatism Score, Descriptive Statistics

For a firm year to be included, the observation is required to have certain nonmissing conservatism score data. In Compustat, items with missing values are distinguished from items with insignificant or zero values. A firm year having an insignificant or zero value for one or more of the conservatism score components is not excluded. For instance, if a firm does not invest in research and development, the unrecorded asset related to R&D is entered as zero, and the firm is not excluded from the sample. Excluding those firms could potentially add unnecessary bias to the sample via excluding industries where R&D investments are infrequent. Since pension gains and losses are cumulative and there is no a-priori reason to believe that any year's gain or loss contributes more or less proportionally to the unrecorded asset, I use all available data

and set missing observations to zero.[19] Again, this concession is made to preserve data points. Each of the remaining items is required to have nonmissing current-period data.

Using the residual income model for earnings, negative operating assets implies negative expected operating earnings. This appears inconsistent with the going-concern assumption presumed by Feltham and Ohlson (1995). Thus firms with negative operating assets are also excluded from the sample.

Table 3 shows the descriptive statistics for the 3,825 firm-year observations that meet all of the data requirements. The mean (median) conservatism score is 0.536 (0.392), indicating that the unrecorded portion of operating assets is 53.6% (39.2%) of recorded operating assets. Overall, the unrecorded R&D, advertising and depreciation assets are the largest components of the conservatism score.

The maximum (minimum) conservatism score is 77.64 (-0.515). The discrepancy between the mean and median values of 0.536 and 0.392 suggests that the maximum value may be extreme. A closer examination indicates that the 99th percentile value for the conservatism score is 2.573 and the 1st percentile value is 0.014. The advertising asset ranges from 0 to 55.47 yet the 99th and 1st percentiles are 1.19 and 0, respectively. Much of the difference between the maximum value and the 99th percentile is due to a low denominator.[20] Several inventory assets were negative. This indicates that, for some

[19] Data for pension gains and losses is not available on Compustat prior to 1991. Subsequent to 1991 this data is frequently missing and constraining firms to have all data available for pension gains and losses after 1991 results in eliminating all firm-year observations from 1991 onward. Pension gains and losses differ from R&D and advertising in that their life may be infinite and there is no a priori basis to assume a relation between these gains and losses from one year to the next. The contribution of pension gains and losses is also quite minimal when compared to the other conservatism score components.

[20] The firm-year observation with the largest advertising asset has a denominator value of 0.032, meaning that its net operating assets are 0.032 million. To illustrate the extremity of this observation, the maximum observed value for the advertising asset and the total conservatism score is 21.14 and 21.45 when this firm-year is excluded, compared to 77.64 and 55.47 when this firm-year is included.

firm-years, inventory prices are on average lower than in the prior years when LIFO layers were added.

Firm years were allowed to have zero values for some of the conservatism score components.[21] Table 3 indicates that the unrecorded asset for depreciation is most often nonzero (3,716 of the 3,825 firm-year observations). On the other end of the spectrum, information for unexpected gains and losses is available for only 333 firm-year observations. This is to be expected since the information for this computation was not available on Compustat prior to 1991. The conservatism score items may also vary by the nature of a firm's business and/or by year. Thus, descriptive statistics for the conservatism score and its components are shown by industry in table 4 and by year in table 5.

5.2.3.1 Conservatism Score by Industry and Year

Table 4 shows the conservatism score by one-digit SIC code. The average conservatism score ranges from a mean (median) of 0.245 (0.243) for SIC codes 0 to 999 and 1.235 (0.444) for SIC codes 7000 to 7999. As expected, the components vary by SIC code. For instance, the mean advertising asset ranges from .671 for personal and business services to 0.012 for other services (social, educational and government). The mean R&D asset ranges from 0.237 for insurance, real estate and investment brokers (SIC codes 6000-6999) to 0.004 for wholesale and retail (SIC codes 5000-5999). The R&D

[21] There are 16 firm years with a negative conservatism score and for each of these observations, unrecorded pension gains and losses is the cause for the negative score. Hence the unrecorded losses on pension plan assets exceed the positive impact of the other score components. Overall results are not sensitive to the exclusion of these 16 observations from the sample.

asset for SIC codes 6000-6999 results partially from development of software for providing technology and asset management services.[22] Its magnitude is reflective of smaller net operating asset values for SIC codes 6000-6999, resulting in a smaller deflator when computing the unrecorded R&D asset.[23]

Table 5 shows the mean conservatism score and its components by years. The mean score and components tend to vary over years as well. Although not monotonic, there seems to be an increasing trend in the score. There also appears to be an increasing trend in advertising and R&D assets over the years. The differences in the conservatism score items and the score itself over years could be a function of economic and/or competitive conditions or simply the industry composition of the sample within those years. However, a thorough examination of this issue is beyond the scope of this paper. Tests of hypotheses follow.

[22] Compustat data item #46, Research & Development expenditures includes software costs that are capitalized under SFAS #86. Some firms within SIC codes 6000-6999 do capitalize portions of their software development expenditures. There is no reason to believe that capitalization is unique to these SIC codes within the current sample. I am unaware of Compustat data items that identify firms which capitalize portions of their R&D expenditures. Lev & Sougainnis (1996) also use data item #46 and make no adjustments for capitalized software development costs when estimating the unamortized percentages of R&D expenditures. Thus capitalized expenditures are incorporated in the rates used for computing my unrecorded R&D asset. Penman & Zheng (1999) also base their unrecorded R&D asset on data item #46 and Chan, Lakonishok & Sougiannis (1999) use data-item #46 to proxy for the off-balance sheet amount of R&D spending. Thus my usage of data item #46 is also consistent with existing literature.

[23] The mean (median) net operating assets are 52.28 (15.36) million for insurance, real estate and investment brokers compared to 389.91 (56.93) million for the overall sample.

CHAPTER 6
HYPOTHESIS TESTING

The purpose of this paper is to empirically examine whether there is a differential response to accruals relative to cash flows within the context of accounting conservatism. To test this question, a return-earnings relation derived from Feltham and Ohlson (1995) is used and firm-year observations are segregated on their relative degrees of conservatism. Tests of hypotheses follow.

6.1 Hypothesis 1

Hypothesis 1 predicts that on average, operating accruals will display differential information content over cash flows. This requires the entire sample of firms to practice a sufficient amount of conservatism. Recall that under Feltham and Ohlson (1995), conservatism must be present for the response to operating accruals to differ from the response to other components of earnings, and θ_4 captures that difference.

A pooled, cross-sectional time-series model provides a direct test of hypothesis 1. Yet according to Bernard (1987), cross-sectional dependence in the dependent variable results in understated OLS standard errors thus overstated t-statistics. To avoid using OLS statistics, Bernard (1987) suggests estimating the model on an annual, cross-sectional basis and testing the significance of the mean for the annual coefficients. In a similar fashion, I estimate θ_4 for each of the 300 groups of firm years that are partitioned

on their conservatism scores and test whether the mean of the estimated θ_4 is reliably different from zero.[24] Compared to annual estimation, partitioning on conservatism has the advantage of providing more degrees of freedom for assessing predictions about θ_4. As with Bernard's method, I also avoid using OLS t-statistics. For comparative purposes, I present results for the pooled, cross-sectional estimation and for the 300 partitions in table 6.

Recall from equation (3) that θ_1 is the return response common to earnings from both financial and operating activities. The sum, $(\theta_2 + \theta_3)$, represents the incremental return response to abnormal operating earnings relative to earnings from financial activities. The response common to operating accruals and cash flows is $(\theta_1 + \theta_2 + \theta_3)$ while θ_4 captures the additional response to operating accruals. Thus $(\theta_1 + \theta_2 + \theta_3 + \theta_4)$ is the return response to operating accruals and $(\theta_1 + \theta_2 + \theta_3)$ is the response to operating cash flows. In table 6, results from the pooled, time-series cross-sectional specification indicate that the response common to financial and operating earnings is 1.16 and significantly positive at 0.01. The sum of the coefficients on abnormal operating earnings, $(\theta_2 + \theta_3)$, is 0.697 and is also significantly greater than zero at 0.01.[25] This

[24] The choice of 300 partitions is arbitrary however it should allow an acceptable trade off between sufficient observations within partitions for estimating equation (3) and a sufficient number of partitions to assess correlations in subsequent analyses. This number also provides degrees of freedom comparable to those afforded when running later sensitivity analyses using a firm-specific design. One alternative is to control for the cross-sectional dependence in returns originating from similarities in industry membership and in time periods by allowing a separate intercept for each one-digit SIC code and year combination. This allows more degrees of freedom than Bernard's method but may not control for all cross-sectional dependence in the dependent variable. A pooled, cross-sectional estimation incorporating separate intercept terms gives results and significance levels similar to those from the partitioning method.

[25] Results for $(\theta_2 + \theta_3)$ are not shown in table 6. This analysis was done to examine whether the opposite and significant directions of these two coefficients were offsetting to the point that their sum would not be reliably different from zero.

provides evidence of a positive and significant return response to earnings from operating and financing activities and, a significantly positive incremental response to abnormal operating earnings. Mean coefficients across the 300 partitions suggest a similar conclusion.

However, the pooled, cross-sectional specification shows that the coefficient representing the differential response to operating accruals relative to operating cash flows, θ_4, is –0.016 and not reliably different from zero. The mean θ_4 coefficient across the 300 conservatism partitions is 0.054 and not significantly different from zero. Thus both tests indicate that the null hypothesis of zero or negative differential information content for operating accruals relative to cash flows cannot be rejected.[26]

[26] Since θ_4 does not exhibit significance, overstated OLS t-statistics are not an issue for tests of hypothesis 1. The return response to earnings from operating and financial activities, θ_1, and the incremental response to abnormal operating earnings, $(\theta_2 + \theta_3)$ are significantly positive. Thus to provide further confidence in results from the pooled, time-series cross-sectional method, the model is estimated for each conservatism partition. The mean coefficients across partitions for θ_1 and $(\theta_2 + \theta_3)$ are 0.683 and 2.340. Both exhibit positive significance at 0.01. For completeness, the mean θ_4 is 0.054 and not significantly different from zero.

6.2 Hypothesis 2

Hypothesis 2 examines whether the differential return-response to operating accruals is greater for firms exhibiting a 'high' versus a 'low' degree of conservatism.[27] To test hypothesis 2, the 300 partitions are categorized as possessing either 'high' or 'low' conservatism. Partition 300 (1) represents the firms with the highest (lowest) overall conservatism scores. Equation (3) is estimated for each of the 300 partitions. Parametric and nonparametric tests are used to assess the statistical significance of differences in θ_4 for the high versus the low conservatism categories. Both types of tests are performed to provide insight as to the robustness of results. The middle 100 conservatism partitions are included in the first analysis and then excluded to determine if there is statistical improvement afforded when only the more extreme conservatism score partitions are compared.

Panel B of table 6 presents results for the Wilcoxon rank sums, medians and means tests. When all partitions are included, partitions 151-300 (1-150) represent the high (low) conservatism groups. The first column of table 6 shows the Wilcoxon rank sums, number of partitions in each category with a median that exceeds the median for all

[27] Referring to equation (3), it may be argued that simultaneity could be a problem when estimating the association between the conservatism score and the differential return response to current-period operating accruals. This is because current-period operating accruals are included in the conservatism score denominator as a component of net operating assets. However, I expect current-period operating accruals to be a small portion of the overall score because the score is based on data over several years while operating accruals are for the current period only. In addition, these variables may contain different information sets. Taken together, the potential for simultaneity should be reduced. However, I still examine the relation between these two variables. Pearson correlations between current-period operating accruals and the conservatism score numerator (unrecorded operating assets) and denominator (net operating assets) are 0.340 and 0.473, respectively. Both correlations are significant at the 0.01 level. This is likely to be the result of scale. However, when examining the relation between the entire conservatism score and current-period operating accruals, the correlation of -0.003 is not significantly different from zero at the 0.10 level. This correlation also indicates that the regression, Conservatism Score = $b_0 + b_1$Operating Accruals, gives a b_1 coefficient that is not significantly different from zero at 0.10. Thus simultaneity is not examined further.

300 partitions and the means for the upper and lower partitions. The mean θ_4 for the upper (lower) partitions is 0.192 (-0.084) and is significantly greater for the high conservatism group at the 0.05 level. The test of medians shows that of the 150 upper (lower) partitions, 87 (63) partitions exhibited a θ_4 coefficient above the median. The medians test indicates that the number of upper partitions with a median above the sample median is significantly greater than that for the lower partitions, at the 0.01 level. The overall median, not reported, for the upper (lower) partitions is 0.174 (-0.076) compared to the sample median of 0.025. The Wilcoxon rank sums test also provides evidence that θ_4 is on average larger (smaller) for the upper (lower) partitions at the 0.01 level of significance.

Because θ_4 is expected to increase in conservatism, removing the middle 100 partitions and comparing the highest and lowest one-third of the partitions should result in differences that are at least equal to those when the middle partitions are included. The second column of table 6, panel B shows results for the Wilcoxon, medians and means tests when the middle partitions are excluded. The mean θ_4 for the upper and lower 100 conservatism partitions is 0.269 and -0.004, respectively. The mean for the upper partitions is significantly greater than the mean for the lower partitions at the 0.05 level. Removing the middle partitions results in a magnitude for the difference in means that is approximately equal to the magnitude when all partitions are included. Lack of improvement in the magnitude for the difference suggests that the middle partitions contribute to differences in θ_4 as well.

The medians test shows that 62 (38) of the 100 upper (lower) partitions have a median above the median of 0.108 for all 200 partitions. Again, the number of upper

partitions with a median above the sample median is significantly greater than that for the lower partitions at the 0.01 level. The Wilcoxon rank sums test continues to show that θ_4 is significantly greater in the upper partitions than in the lower partitions at 0.01. Overall these tests suggest that the null hypothesis can be rejected in favor of the alternative hypothesis that as conservatism increases, so does the differential response to operating accruals relative to cash flows.

6.3 Hypothesis 3

The objective of hypothesis 3 is to ascertain whether there is a positive association between the conservatism score and θ_4 for all firms. The conservatism score ranges from 77.64 to –0.515 while the 99th and 1st percentile values are 2.573 and 0.014. This suggests that the highest score(s) are extreme in their magnitudes relative to other score values. Thus to reduce noise, median values of the conservatism score are used to test hypothesis 3. The first two columns in table 6 panel C show the Pearson and Spearman correlation coefficients between the median conservatism score and θ_4 for all 300 partitions. The Pearson correlation coefficient is 0.119 and significantly positive at the 0.05 level while the Spearman correlation coefficient is 0.153 and significantly positive at the 0.01 level.

When excluding the middle 100 partitions the Pearson correlation is 0.129 and remains significant at the 0.05 level. The Spearman correlation indicates a positive correlation of 0.174 that is significant at the 0.01 level. Both the Pearson and Spearman tests suggest that the null of no association between the conservatism score and the differential information content of operating accruals can be rejected.

CHAPTER 7
ADDITIONAL ANALYSES AND SENSITIVITY TESTS

This chapter is divided into three sections. In the first section I discuss alternative measures of conservatism and then compare them to my conservatism measure. Within the second section, I investigate the relation of the differential information content of operating accruals, θ_4, with combinations of score components representing items for which specific accounting treatment is either mandated or nonmandated. I also briefly examine the relation between my findings for θ_4 and proxies for the denominator components of the conservatism multiplier, persistence and growth. In the third section I use a firm-specific design to analyze the robustness of results presented in section 6.

7.1 Alternative Measures of Conservatism

Although they do not attempt to measure firms' unrecorded assets, alternative proxies for conservatism exist. Finding a positive relation between my score and several alternatives may give the reader confidence that my score is capturing the notion of conservatism. Thus within the following section, I assess correlations among my score and two additional proxies for conservatism. I also revisit hypothesis testing and compare results obtained using my score versus the alternatives.

7.1.1 Feltham and Ohlson's Linear Information Model

One alternative measure of conservatism can be derived from Feltham and Ohlson's (1995) linear information model. They specify future abnormal operating earnings as a function of the persistence (ω_{11}) of this period's abnormal operating

earnings (ox^a_t), the conservatism (ω_{12}) embedded in this period's net operating assets (oa_t) and other information (v_t) as follows:

$$ox^a_{t+1} = \omega_{11} ox^a_t + \omega_{12} oa_t + v_t + \varepsilon_{t+1} \quad (10)$$

Since ω_{12} is an adjustment for the understatement of the book value of operating assets relative to their market value, the magnitude of ω_{12} is expected to increase as the gap between market and book value increases. Thus an estimate of ω_{12} can proxy for conservatism. To facilitate assessments of whether ω_{12} and my conservatism score appear to capture a similar construct, I estimate ω_{12} for each of the 300 conservatism partitions. I expect the estimate of ω_{12} to be larger (smaller) for the upper (lower) partitions.

Equation (10) is estimated by conservatism partition as follows:

$$ox^a_{i,t} = \gamma_0 oa_{i,t-1} + \gamma_1 ox^a_{i,t-1} + e_{i,t} \quad (11)$$

To estimate conservatism, I deflate all variables by beginning-of-period net operating assets, resulting in $oa_{i,t-1}$ being expressed as a constant. Other information is lumped into the error term. Abnormal earnings for firm *i*, time *t*, $ox^a_{i,t}$, are defined as earnings less an interest charge, where the interest charge equals the beginning-of-period book value multiplied by the risk-free rate. The one-year treasury bill rate proxies for the risk-free rate. The term $oa_{i,t}$ is operating assets for firm *i*, time *t*. Operating assets are defined as they were for equation (3). Deflation expresses $oa_{i,t-1}$ as a constant and its coefficient, γ_0 represents the mean ratio of abnormal operating earnings to net recorded operating assets. Net recorded operating assets are also used as a scalar for my score.

Book values for net operating assets are key components in calculating my score and γ_0, and the conservatism in these book values can change from period to period.

Thus, I use assets from the same point in time for assessing the relation between γ_0 and my score. Since beginning-of-period net operating assets is used to estimate γ_0, I use the beginning-of-period conservatism score. This is available for 3,281 of the original 3,825 observations.

To assess the correlation between γ_0 and the conservatism score, equation (11) and the median conservatism score are estimated for each of 300 partitions comprised of the 3,281 observations. The mean (median) coefficient on prior-period abnormal operating earnings, γ_1, is 0.898 (0.945) and significantly greater than zero at 0.01. The mean (median) estimate for conservatism, γ_0, is 0.019 (0.015) and is also positive and significant at the 0.01 level.

Table 7 shows that the Pearson (Spearman) correlation between γ_0 and the median total conservatism score is 0.292 (0.174). Both of these correlations are positive and significant at 0.01. Correlations between each component of the score and γ_0 are also examined. Both parametric and nonparametric correlation coefficients are not significantly different from zero for the unrecorded assets from inventory and unrecognized gains and losses on pension assets. Correlations between the remaining components of the conservatism score and γ_0 are positive and significant at the 0.10 level. Although not all components exhibit a positive and significant correlation with γ_0, the total conservatism score does at the 0.01 level. This evidence suggests that my conservatism score and γ_0 show similarities.

7.1.2 Market-to-Book Ratio

Feltham and Ohlson (1995) assert that the market-to-book ratio may be an indicator of conservative accounting practice. If market value is greater than book value then conservatism is assumed present. They temper this assertion by acknowledging that the variance in stock prices may inhibit the ratio's ability to proxy for conservatism in recording operating assets. Market-to-Book is used as a proxy for conservatism by Givoly and Hayn (2000) and Myers (1999), it is also used by Collins and Kothari (1989) to measure growth opportunities and/or risk. Because stock prices may contain factors unrelated to conservatism in recording operating assets in addition to being subjected to random variance, the market-to-book ratio may not provide a superior indication of conservatism relative to my conservatism score or γ_0. A-priori, I expect that each of these measures provide an indication of conservatism. Thus finding a relation among my score and these alternatives gives some confidence that my score is capturing the underlying construct of conservatism.

7.1.2.1 Correlations Among Market-to-Book, γ_0 and My Conservatism Score

The reduced sample of 3,281 firm years has the necessary data for assessing the relation among all three proxies for conservatism: market-to-book, my score and γ_0. Since a firm's conservatism may vary across time, I use beginning market-to-book so that all conservatism alternatives are measured at the same point in time. Table 7 presents correlations for the median market-to-book ratio, median conservatism score and estimated γ_0 for the 300 partitions. The Pearson (Spearman) correlation between market-to-book and γ_0 is 0.204 (0.143) and significantly positive at 0.05. Although not correlated with each component of my score, the Pearson (Spearman) correlation between market-to-book and my total score is 0.258 (0.471) while the Pearson (Spearman)

correlation between γ_0 and my total score is 0.292 (0.174); all correlations are significantly positive at 0.01.[28] Evidence suggests an association among market-to-book, γ_0, and my score, lending confidence that my score captures the underlying construct of conservatism. Since a relation among these measures is demonstrated, I revisit hypothesis testing and use the alternative measures of conservatism to partition firm-year observations.

7.2 Hypothesis Testing with Alternative Measures of Conservatism

Within this section I revisit the hypotheses while partitioning on market-to-book. Penman and Zheng (1999) use a measure of conservatism that includes the unrecorded R&D, advertising and inventory assets only. I partition firm years using this group of components as well, hereafter referred to as the reduced score. For ease of comparison, results obtained from partitioning on my conservatism score are also included in the tables. I partition firms on the γ_0 coefficient obtained in equation (11) in later firm-specific analyses.

7.2.1 Hypothesis 1

The alternative form of hypothesis 1 predicts that the return response to operating accruals will be greater than that to cash flows. Hypothesis 1 is simply a test of whether the mean θ_4 coefficient from equation (3) is significant and positive across partitions. Because this is a test of the average value for the coefficient across all partitions, I do not expect alternative partitioning methods to give conflicting results for hypothesis 1.

[28] I also examine the relation between market-to-book and a larger sample which more closely represents the sample used for hypothesis testing. Pearson (Spearman) correlations between my total score and market-to-book are 0.310 (0.447) and significant at the 0.01 (0.01) level for the 3,821 firm-year observations having end-of-period data for both conservatism proxies.

Estimates (not presented) for the pooled sample and the 300 partitions formed using various conservatism specifications all show a θ_4 coefficient that is not reliably different from zero. This suggests that the null hypothesis of a zero or negative differential response to operating accruals cannot be rejected. As expected, these results are consistent under all conservatism measures.

7.2.2 Hypothesis 2

The alternative form of hypothesis 2 posits that the differential return response to operating accruals will be greater for firm years exhibiting a 'high' versus a 'low' degree of conservatism. The 300 partitions are categorized as possessing either 'high' or 'low' conservatism where partition 300 (1) represents the firm years with the highest (lowest) overall conservatism scores. Equation (3) is estimated for each of the 300 partitions. The θ_4 coefficients obtained for the 'high' conservatism category are compared to the θ_4 coefficients for the 'low' conservatism category. To remain consistent with analyses in section 6, the middle 100 conservatism partitions are included in the first analysis and then excluded to determine if there is statistical improvement afforded when only the more extreme conservatism score partitions are compared.

Table 8, panel A shows results for tests of differences in θ_4 between the upper and lower conservatism partitions. When either the reduced score or market-to-book is used for partitioning, none of the tests provide evidence of a greater differential return response to operating accruals for the upper partitions, at the 0.10 level of significance. This suggests that although a correlation between market-to-book and my conservatism score exists, my score distinguishes between firms in a manner which allows the differential

response to operating accruals to be more readily detected when using these analysis techniques. Results also suggest that a measure more comprehensive than the sum of the unrecorded R&D, advertising and inventory assets is needed for assessing the differential information content of operating accruals.

7.2.3 Hypothesis 3

Hypothesis 3 addresses whether a positive association exists between the conservatism score and θ_4 across partitions. Table 8, panel B shows the Pearson and Spearman correlation coefficients between the median conservatism score and the estimated differential return response to operating accruals, θ_4, for the partitions. When firms are partitioned on the reduced score, both Pearson and Spearman correlations between the conservatism score and θ_4 are not reliably different from zero at the 0.10 level.

Evidence for market-to-book gives Pearson correlations that are positive and significant at the 0.01 level while Spearman correlations are not reliably different from zero at 0.10. Thus, evidence is not consistent when partitioning on market-to-book. Sorting on my score shows a significant and positive relation between conservatism and θ_4 and is consistent for both Pearson and Spearman correlations. Overall this suggests that my conservatism score partitions firms in a manner that makes a positive association between θ_4 and conservatism more apparent when compared to market-to-book and the reduced score.

7.3 Equation (3) Coefficients, Implications from Feltham and Ohlson (1995)

Feltham and Ohlson's (1995) theory provides for additional predictions about the coefficients from the return-earnings relation in equation (3). The response to earnings in general is $(\theta_1 + \theta_2 + \theta_3)$. The θ_1 coefficient is the return response to earnings from financial activities and the sum of θ_2 and θ_3 represents the differential response to abnormal earnings from operating activities. Since financial activities are not expected to generate abnormal earnings, Feltham and Ohlson's (1995) theory predicts that θ_1 will be equal to '1.' However, their prediction is based on total returns whereas I use a market-adjusted measure of returns. Thus, I cannot make predictions about the magnitude of my estimate of θ_1.

Recall that conservatism is expected to affect the differential response to operating accruals only. Thus, the coefficients capturing the return response to operating cash flows are not expected to vary across conservatism partitions. Predictions and tests for differences in means between the high and low conservatism groups are shown in Exhibit 1:

EXHIBIT 1

	Low Conservatism Lower 150 Partitions		***Difference in Means Between High and Low Conservatism Partitions 300 Partitions***	
	Predicted Value	**Estimate**	**Predicted Value**	**Estimate**
θ_1	?	0.336	0	0.693
$(\theta_2 + \theta_3)$	?	2.402***	0	-0.122
$(\theta_1 + \theta_2 + \theta_3)$	?	2.737***	0	0.571
θ_4	?	-0.084	>0	0.192***

*indicates significance at 0.10 ** indicates significance at 0.05 ***indicates significance at 0.01
All tests examine whether coefficients, and their differences, are equal to zero.

The mean θ_1 across all 300 conservatism partitions is .683 and significantly different from zero at 0.01; this mean is not different from one at the 0.10 level of significance. The θ_1 coefficient is 1.029 (0.336) for the upper (lower) conservatism partitions, and the difference of 0.693 is not reliably different from zero at the 0.10 level. Wilcoxon rank sum scores and tests of medians (not reported) also show that the difference in θ_1 between the upper and lower partitions is not significantly different from zero at 0.10.

Exhibit 1 shows that the mean response to abnormal operating cash flows ($\theta_1 + \theta_2 + \theta_3$) is not different for the upper versus the lower partitions at the 0.10 level of significance. The Wilcoxon rank sum scores and the tests of medians (not reported) provide similar inferences. The Pearson (Spearman) correlation between the median conservatism score and the response to abnormal operating cash flows for the 300 partitions is 0.086 (0.044) and not reliably different from zero at the 0.10 level. The Pearson and Spearman correlations of -0.037 and -0.092 between the differential response to abnormal operating cash flows and the median conservatism score are not significantly different from zero at 0.10. Taken together, evidence suggests that the response to cash flows is not systematically different across conservatism partitions.

7.4 Additional Cross-Sectional Analyses

Within this section I examine the relation of the differential return response to operating accruals with (1) mandated and nonmandated conservatism score components and (2) growth and persistence.

7.4.1 Mandated and Nonmandated Score Components

Feltham and Ohlson (1995) do not distinguish between origins of conservatism when making their predictions about its relation with the differential return-response to operating accruals. Components of my score can be segregated into two categories based on whether or not accounting discretion is available to managers. Financial Accounting Standards require that R&D and advertising outlays be immediately expensed. Thus, specific accounting treatment is mandated. For the remaining components, financial accounting standards allow some flexibility. Prior literature shows an association between managers' accounting choices and the return-response to earnings.

This raises the question of whether the link between conservatism and the differential response to operating accruals (θ_4) in table 6 is primarily due to mandatory or nonmandatory conservatism. I investigate this question by estimating the following equation using the original (300) conservatism partitions formed for hypothesis testing:[29]

$$\theta_{4,p} = b_0 + b_1 \text{NONMANDATED}_p + b_2 \text{ MANDATED}_p \qquad (12)$$

where the subscript p, (1...300), represents the conservatism partitions. θ_4 is the estimated partition-specific coefficient on operating accruals from equation (3), NONMANDATED is the median sum of the inventory, accounts receivable, depreciation and pension assets while MANDATED is the median sum of the unrecorded R&D and advertising assets.

[29] To test whether the mandatory or nonmandatory score components have a greater impact on the differential response to operating accruals in general, I would need to re-sort my sample on these components. A full examination is beyond the scope of this paper. However, some preliminary analyses suggest no distinction in the impact of mandatory versus nonmandatory items.

EXHIBIT 2

b_0	b_1	b_2
-0.174	0.828*	0.114*

*indicates significance at 0.10, tests are one-tailed

Exhibit 2 shows that the coefficient on both subsets of score components is greater than zero at the 0.10 level, indicating that my estimate of θ_4 is associated with both mandated and nonmandated items, given the other. Yet my main focus is to determine whether either subset of items is more highly associated with θ_4. A test of $(b_1 - b_2)$ gives an F-value of 1.798; showing that the difference in these coefficients is not reliably different from zero at the 0.10 level and suggesting that neither set of components is more highly associated with my estimate of θ_4.

7.4.2 Persistence and Growth

In their model of a firm's market value equation (1), Feltham and Ohlson (1995) define the conservatism multiplier on operating assets, α_2, as $\omega_{12}R_f / (R_f-\omega_{11})(R_f - \omega_{22})$. ω_{12} represents conservatism in recording operating assets, ω_{11} is the persistence of abnormal earnings, ω_{22} is the growth in operating assets and R_f is the risk-free rate. Since the conservatism multiplier increases in persistence and growth, I expect that the differential return response to operating accruals from equation (3), θ_4, may exhibit a positive association with persistence and growth. Thus, I assess the relation between θ_4 and proxies for these variables.

Feltham and Ohlson (1995) define persistence as the multiplier, ω_{11}, on abnormal operating earnings from their linear information model, presented as my equation (10). Thus I use an estimate of this multiplier from my equation (11), γ_1, to proxy for persistence. Since Feltham and Ohlson (1995) define growth in terms of operating assets, I use the percentage change in net operating assets to proxy for growth.[30]

To assess the relation of persistence with my findings for the return response on operating accruals in table 6, I partition firm-year observations on their conservatism score and estimate θ_4 and γ_1 for each partition.[31] Pearson and Spearman correlations between these estimates are not reliably different from zero at the 0.10 level. To examine θ_4's relation to my proxy for growth, I assess the correlation between the partition-specific

[30] Findings are not sensitive to using the percentage change in total versus net operating assets.

[31] A thorough examination of whether the differential information content of operating accruals is related to growth and persistence in general would require re-sorting the sample on those variables. A complete examination of this relation is beyond the scope of this paper. I use the original partitions because my objective is to assess the correlation between these variables and my estimate of θ_4, used for hypothesis testing.

estimate of θ_4 and the partition-specific median percentage change in net operating assets. I find that these Pearson and Spearman correlations are also not significantly different from zero at the 0.10 level. Thus when using these estimation techniques, I do not find empirical evidence of a systematic and significant relation between these proxies for persistence and growth and my estimate for the differential return-response to operating accruals.

7.5 Firm-Specific Sensitivity Analyses

To this point, I have utilized cross-sectional designs. Teets & Wasley (1996) show that cross-sectional estimation provides a smaller coefficient when compared to a firm-specific estimation for the same sample. Further, the downward bias in the cross-sectional coefficients may not be evenly distributed across groups, leading to incorrect inferences about between-group differences.

7.5.1 Teets and Wasley (1996)

Teets and Wasley (1996) attribute the downward bias in cross-sectional response coefficients to 'disproportionately heavy weights' being placed on firm-years with a higher variance in the independent variable. Although this variance is the appropriate deflator, to the extent that firm-years with higher variances are systematically distributed among partitions, so is the downward effect on the response coefficients.

Thus a systematically higher variance of operating accruals within the lower conservatism partitions may contribute toward earlier findings in favor of Feltham and Ohlson's (1995) predictions. To assess this likelihood, I obtain the variance of operating

accruals for each of the 300 conservatism partitions and find that the mean variance for the upper (lower) 150 partitions is 0.063 (0.141) and is significantly greater for the lower partitions at the 0.01 level.[32] The Spearman rank correlation coefficient between the median conservatism score and the variance of operating accruals is -0.387 and significant at 0.01. Both the Wilcoxon rank sums and the medians test show that the variance for operating accruals is significantly greater for the lower conservatism partitions, at the 0.01 level. These tests indicate a systematic difference in the variance of operating accruals among conservatism partitions that may have contributed to earlier findings of an association between conservatism and the differential information content of operating accruals, θ_4. To alleviate this effect, Teets and Wasley (1996) suggest a firm-specific design. Thus I employ a firm-specific design which also allows investigation of another conservatism measure, the coefficient on operating assets from equation (11), γ_0.

7.5.2 Firm-Specific Analysis

Descriptive statistics are presented and followed by results from firm-specific analyses.

7.5.2.1 Descriptive Statistics for the Firm-Specific Sample

The firm-specific design uses the subset of firms having sufficient data to allow estimation of equations (3) and (11) with a minimum of 10 annual observations. Imposing the additional data requirements gives a reduced sample of 1,649 firm-year

[32] Consistent with equation (3) operating accruals are deflated by beginning market value of equity.

observations and 126 firms. The average number of observations per firm is 13 with the maximum being 20. The reduced sample appears to be larger firms; the average market value (book value) of equity is 773.22 (390.35) compared to 587.89 (286.92) for the sample of 3,825 firm-years. The mean and median conservatism score is 0.496 and 0.423, slightly different from the mean and median of 0.536 and 0.392 for the full sample. The reduced sample spans the twenty-year period of 1975 through 1994 whereas the full sample represents 22 years. Industries with SIC codes between 0-999, 6000-6999 and 8000-8999 comprising 0.7, 1.5 and 1.7 percent of the original sample are not represented in the reduced sample. Thus, the reader is cautioned that contradictory evidence from firm-specific versus cross-sectional analyses may be partially due to sample differences.

7.5.2.2 Results From the Firm-Specific Analyses

Panel A of table 10 shows the mean coefficients from equation (3) for the sample of 126 firms. The mean coefficient on earnings, θ_1, is neither different from zero nor is it different from '1,' at the 0.10 level of significance. Thus Feltham and Ohlson's (1995) prediction that θ_1 is equal to one cannot be rejected. The mean coefficient on earnings in general, $(\theta_1 + \theta_2 + \theta_3)$ is 3.612 and significantly positive at 0.01. Consistent with cross-sectional estimation, the coefficient on operating accruals is not reliably different from zero at 0.10, indicating that on average there is no differential return response to operating accruals versus cash flows.

I first test hypotheses 2 and 3 by ranking firms on my conservatism score and forming 10 groups where group 10 (1) represents the firms with the highest (lowest) median score. The median firm-specific θ_4 coefficients are then compared between the

high and low partitions.[33] Testing is done in this manner to facilitate comparison between firm-specific and cross-sectional analyses. Tests of differences in θ_4 between the upper and lower conservatism partitions are shown in table 9, panel B. None of the tests provide evidence of a greater differential return response to operating accruals for the upper partitions at the 0.10 level of significance. In Panel C of table 9, both the Spearman and Pearson coefficients indicate that the correlation between the median conservatism score and the median coefficient on operating accruals is not reliably different from zero. The evidence in table 9, panels B and C suggests that the null of zero or no association between differential response to operating accruals and conservatism cannot be rejected.

Results from partitioning on the firm-specific estimate of γ_0 from equation (11) are shown in table 9 as well. Wilcoxon rank sums, medians and means tests all indicate that the differential response to operating accruals is not significantly different between the upper and lower partitions. However panel C of table 9 shows that the Pearson (Spearman) correlation between the median θ_4 and median γ_0 is positive and significant at the 0.01 (0.05) level when the middle 4 partitions are excluded. This evidence suggests that there is an association between γ_0 and the differential information content of operating accruals. However, the difference in θ_4 between the upper and lower

[33] Medians are used to reduce the potential for noise caused by extreme observations. However, results are consistent when firms are sorted on their mean conservatism score and when tests incorporate the means for the conservatism score and θ_4.

conservatism partitions is not reliably different from zero. Thus, evidence is mixed when firms are sorted on γ_0.[34]

When using my conservatism score, firm-specific estimation of equation (3) does not provide results consistent with those using cross-sectional estimations. There are several factors that may contribute to the inconsistencies between cross-sectional and firm-specific results. Firm-specific estimation requires a median conservatism score for each firm in order to test its association with the firm-specific estimate of θ_4. Table 5 shows that my score tends to increase over the years. Since firms are required to have at least 10 years of data, a portion of the variation in conservatism scores may be eliminated through this process.

To examine this, I rank the 1,649 firm-years on their annual conservatism scores and create three groups. Group 3 (1) represents observations with the highest (lowest) conservatism scores. When allowing firms to move between categories over years, I find that of the 126 firms, only 23 remain in a single category while 56 firms are present in two categories and 47 firms appear in all three categories. For firm-specific analysis, firms are assigned to a single relative level of conservatism. This creates a potential loss of meaningful within-firm variation, which may result in a loss of statistical power. To preserve the within-firm variation, I perform a cross-sectional analysis on these firms. Findings from the cross-sectional analysis are consistent with those from the firm-specific analysis. Evidence does not provide a basis to conclude that a relation between conservatism and the differential information content of operating accruals exists. A

[34] Pearson and Spearman correlations between the 126 firm-specific conservatism scores and the firm-specific coefficients on operating accruals, θ_4 indicate that these correlations are not reliably different from zero at 0.10 under either conservatism specification, my score or γ_0.

separate cross-sectional examination of the remaining 2,176 firm years, not included in the firm-specific sample, gives results consistent with the analyses in section 6. Hence, I infer that the different implications drawn from firm-specific versus cross-sectional analysis may be related to sample differences as opposed to analysis methods.

Teets and Wasley (1996) find that systematic between-partition differences in the variance of an independent variable may create a systematic bias in its coefficient.[35] Thus I examine the samples of 2,176 and 1,649 firm-year observations to ascertain whether the variance for operating accruals is systematically different across conservatism partitions. The Spearman rank correlation, medians test and Wilcoxon rank sums tests all indicate that the variance of operating accruals is higher for the lower conservatism partitions at the 0.01 level of significance. This occurs for both samples, and the cross-sectional analyses for the 1,649 firm-year observations did not show a higher θ_4 coefficient for the higher conservatism partitions. Thus I conclude that the difference between firm-specific and cross-sectional results may be more likely due to other sample differences such as the survivorship bias imposed by firm-specific estimation, than the systematic difference in the variance of operating accruals across partitions.

---

[35] These samples differ on size. The mean (median) market value of equity is 773.22 (110.59) for the sample used in firm-specific estimation versus 447.44 (42.97) for the remaining 2176 observations. To examine the relation between size and conservatism, I use the original 300 partitions and assess the correlation between the partition-specific median market value of equity and the median conservatism score. The Pearson and Spearman correlations are 0.155 and 0.594 respectively, and both are significant at the 0.01. I also assess the relation between market value of equity and my findings of the differential information content of operating accruals (θ_4), given conservatism by estimating the following model by partition:

$$\theta_{4,p} = b_0 + b_1 \text{CONSERVATISM SCORE}_p + b_2 \text{ MARKET VALUE OF EQUITY}_p$$

The coefficient on the median conservatism score is 0.151 and significant at 0.01 while the coefficient on the median market value of equity is 0.0001 and not significant at the 0.10 level. Overall this indicates that given conservatism, market value of equity is not associated with the differential information content of operating accruals.

CHAPTER 8
CONCLUSIONS

The objective of this study is to test the implication from Feltham and Ohlson's (1995) theory that the differential response to operating accruals, relative to cash flows, is increasing in accounting conservatism. Since Feltham and Ohlson (1995) define conservatism as the understatement in the book values for operating assets, I create a conservatism score to estimate a firm's unrecorded operating assets. I also employ the existing proxies of market-to-book, an estimate from Feltham and Ohlson's (1995) model for abnormal earnings and a reduced version of my score. A consistently significant and positive correlation between my score and the existing alternatives suggests that my score is capturing a similar construct.

To assess the differential return response to operating accruals, both a cross-sectional and a firm-specific design are used. When observations are not partitioned on conservatism, the null hypothesis of a zero or negative differential response to operating accruals cannot be rejected. Yet in general, analyses indicate that when firm years are sorted on my score, the differential return response on operating accruals is greater for firm years exhibiting higher degrees of conservatism. Evidence is mixed for market-to-book and for the reduced version of my score; overall, the null of a zero or negative differential response to operating accruals cannot be rejected. These findings suggest that my score sorts firm years in a manner that makes the differential response to operating accruals more readily observed. Yet because of the data constraints imposed, the reader is cautioned about generalizing these findings to the entire population of firms.

Teets and Wasley (1996) assert that a systematic difference in the variance of an independent variable across groups will create a systematic bias in the value of its coefficient across those groups. They suggest a firm-specific design to alleviate this difficulty. Since tests indicate a systematic difference in the variance of operating accruals across conservatism partitions, I use a firm-specific design for the subset of firms having sufficient data. Overall, these results show that the null hypothesis of a zero or negative association between the differential return response to operating accruals and conservatism cannot be rejected. The exception being a marginal differential response when firms are sorted on a proxy for conservatism derived from Feltham and Ohlson's (1995) abnormal earnings specification. A separate cross-sectional analysis using just the observations used in the firm-specific design also fails to reject the null. Overall, it appears more likely that the discrepancies between the firm-specific and cross-sectional designs are from other sample differences.

I also examine the behavior of the return response to abnormal operating earnings and to earnings in general. Evidence supports Feltham and Ohlson's (1995) implications that the response to earnings in general and abnormal operating earnings will not vary with conservatism.

This study contributes to the existing literature by providing and testing an alternative measure of conservatism. This measure differs from previous measures in that it estimates a firm's unrecorded assets as a continuous versus a dichotomous variable (Hagerman and Zmijewski, 1981; Pincus, 1991; Salamon and Kopel, 1993). My findings also contribute to the literature addressing the differential response of cash flows versus accruals by examining the contextual factor of conservatism. Evidence is also provided

on the consistency of coefficients in a return earnings relation with Feltham and Ohlson's (1995) model.

BIBLIOGRAPHY

Aboody, David and Lev, Baruch, "The Value-Relevance of Intangibles: The Case of Software Capitalization," (1998) Working Paper, New York University.

Ahmed, Anwer S., Morton, Richard M. and Schaefer, Thomas F., "Accounting Conservatism and the Valuation of Accounting Numbers: Evidence of the Feltham - Ohlson (1996) model," (1998) Working Paper, University of Notre Dame.

Ali, Ashiq, "The Incremental Information Content of Earnings, Working Capital from Operations, and Cash Flows," *Journal of Accounting Research,* (Spring, 1994) 61-73.

Bandyopadhyay, S.P., "Market Reaction to Earnings Announcements of Successful Efforts and Full Cost Firms in the Oil and Gas Industry," *The Accounting Review,* (October 1994) 657-74.

Barth, Mary E., Michael Clement, George Foster, and Ron Kasznik, "Brand Values and Capital Market Valuation," (1998) Working Paper, Stanford University.

Basu, Sudipta, "The Conservatism Principle and the Asymmetric Timeliness of Earnings" *Journal of Accounting and Economics,* (24) 3-37.

Bernard, V.L., "Cross Sectional Dependence and Problems in Inference in Market-Based Accounting Research," *Journal of Accounting Research* (25, 1987) 1-48.

Bernard, V.L., and Stober, Thomas, "The Nature and Amount of Information in Cash Flows and Accruals," *The Accounting Review,* (October 1989) 624-53.

Biddle, Gary C., Seow, Gim S., and Siegel, Andrew F., "Relative versus Incremental Information Content," *Contemporary Accounting Research* (12, 1995) 1-23.

Black, Ervin L., "Which is More Value Relevant: Earnings or Cash Flows? A Life Cycle Examination," (1998) Working Paper, University of Arkansas.

Bowen, Robert M., Burgstahler, David and Daley, Lane A., "The Incremental Information Content of Accrual versus Cash Flows," *The Accounting Review* (October 1987) 723-47.

Brennan, M. J., "Conservatism in Accounting: An Outsider's Perspective," *American Accounting Association Meetings* (San Francisco, 1993).

Bryant, Lisa "Value-Relevance of Capitalizing Successful Exploration Activities: Implications for R&D Accounting," Ph.D. Dissertation, University of Colorado (1999).

Bublitz, Bruce and Ettredge, Michael, "The Information in Discretionary Outlays: Advertising, Research, and Development." *The Accounting Review* (January 1989) 108-24.

Chan, Louis K.C., Lakonishok, Josef and Sougiannis, Theodore, "The Stock Market Valuation of Research and Development Expenditures," Working Paper, (June 1999) University of Illinois at Urbana-Champaign.

Cheng, Agnes C., Liu, Chao-Shin, and Schaefer, Thomas F., "Earnings Permanence and the Incremental Information Content of Cash Flows from Operations," *Journal of Accounting Research* (34, 1996) 173-81.

Cheng, Agnes C., Liu, Chao-Shin, and Schaefer, Thomas F., "The Value-Relevance of SFAS No. 95 Cash Flows from Operations as Assessed by Security Market Effects," *Accounting Horizons* (11, 1997) 1-15.

Christie, Andrew A., "On Cross-Sectional Analysis in Accounting Research," *Journal of Accounting Research* (December 1987) 231-58.

Collins, Daniel W., and Kothari, S.P., "An Analysis of Intertemporal and Cross-sectional Determinants of Earnings Response Coefficients," *Journal of Accounting and Economics* (1989) 143-81.

Collins, Daniel W., Pincus, Morton and Xie, Hong, "Equity Valuation and Negative Earnings: The Role of Book Value of Equity," (1997) Working Paper, University of Iowa.

Dechow, Patricia M., "Accounting Earnings and Cash Flows as Measures of Firm Performance: The Role of Accounting Accruals," *Journal of Accounting and Economics* (18, 1994) 3-42.

Demski, Joel, "Endogenous Systematic Bias in Accounting Valuation," *American Accounting Association Meetings* (San Francisco, 1993).

Deng, Zhen and Lev, Baruch, "The Valuation of Acquired R&D," (1998) Working Paper. New York University.

Feltham G. and Ohlson, J., "Valuation and Clean Surplus Accounting for Operating and Financial Activities," *Contemporary Accounting Research* (11, 1995) 689-731.

Financial Accounting Standards Board (FASB), "Statement of Concepts Number 1." *FASB Original Pronouncements.*,(Boston: Irwin, 1994) Vol. II:1030-1.

Freeman, R.N., and Tse, S.Y., "A Nonlinear Model of Security Price Responses to Unexpected Earnings," *Journal of Accounting Research* 30, 185-209.

Givoly D. and Hayn, C., "The Changing Time-Series Properties of Earnings, Cash Flows and Accruals: Has Financial Reporting Become more Conservative?" *Journal of Accounting and Economics* (29, 2000) 287-320.

Gujarati, Damodar N., "Basic Econometrics," *Third Edition.* McGraw-Hill, New York (1995).

Hagerman R. and Zmijewski, M., "Some Economic Determinants of Accounting Policy Choice," *Journal of Accounting and Economics* (1, 1979) 142-61.

Hand, John R.M., and Landsman, Wayne R., "Testing the Ohlson model: v or not v, that is the question," 1998 Working Paper, UNC Chapel Hill.

Harris, Trevor S., and Ohlson, James A., "Accounting Disclosures and the Market's Valuation of Oil and Gas Properties," *The Accounting Review* (1987), October 651-70.

Henning, Steven L., and Martin Ann L., "Firm Characteristics as Determinants of the Choice to Expense or Capitalize Software Development Costs," (1998) Working Paper, Southern Methodist University.

Hirschey, Mark and Weygandt, Jerry J., "Amortization Policy for Advertising and Research and Development Expenditures." *Journal of Accounting Research* 1985 (23,1) 326-35.

Kinney, William R., "Are Disclosure Rules for Gain and Loss Uncertainty Sufficiently Conservative?" *American Accounting Association Meetings* (San Francisco, 1993).

Lev, Baruch and Sougiannis, Theodore, "The Capitalization, Amortization, and Value-Relevance of R&D," *Journal of Accounting and Economics* (21, 1996) 107-37.

Lundholm, Russell, J., "A Tutorial on the Ohlson and Feltham/Ohlson Models: Answers to Some Frequently Asked Questions," *Contemporary Accounting Research* (1995) 749-61.

Neill, John D., Schaefer, Thomas F., Bahnson, Paul R., and Bradbury, Michael E., " The Usefulness of Cash Flow Data: A Review and Synthesis," *Journal of Accounting Literature* (10, 1991) 117-50.

Myers, James N., "Implementing Residual Income Valuation With Linear Information Dymanics," *The Accounting Review* (October 1999), 1-28.

Ohlson, James A., "Earnings, Book Values, and Dividends in Equity Valuation," *Contemporary Accounting Research* (1995) 661-87.

Patell, J. M., and Kaplan, R., "The Information Content of Cash Flow Data Relative to Annual Earnings," (1977) Working Paper, Stanford University.

Penman Stephen H. and Zhang, Xiao-Jun, "Accounting Conservatism, the Quality of Earnings, and Stock Returns." Working Paper, Columbia University and University of California, Berkeley (December 1999).

Pincus, Morton, "Accounting Methods and Differential Stock Market Response to the Announcement of Earnings." *Journal of Accounting, Auditing and Finance* (1991) 221-46.

Rayburn, Judy, "The Association of Operating Cash Flows and Accruals with Security Returns," *Journal of Accounting Research* (Supplement 1986) 112-37.

Salamon, G.L. and Kopel, R., "Accounting Method Related Misspecification in Cross-Sectional Capital Market Research Designs," *Journal of Accounting and Public Policy* (December 1993), 217-38.

Teets, Walter R. and Wasley, Charles E., "Estimating Earnings Response Coefficients: Pooled Versus Firm-Specific Models," *Journal of Accounting and Economics* (21, 1996) 279-95.

Watts, Ross L. and Zimmerman, Jerold L., "Positive Accounting Theory." Prentice Hall, Englewood Cliffs, NJ (1986).

Wilson, G. Peter, "The Relative Information Content of Accruals and Cash Flows: Combined Evidence at the Earnings Announcement and Annual Report Release Date," *Journal of Accounting Research* (24, 1986) 165-99.

Wilson G. Peter, "The Incremental Information Content of the Accrual and Funds Components of Earnings After Controlling for Earnings," *The Accounting Review* (April 1987) 293-322.

Zhang, Xiao-Jun, "Conservative Accounting and Equity Valuation," 1998 Working Paper, University of California - Berkeley.

Zmijewski, Mark E. and Hagerman, Robert L., "An Income Strategy Approach to the Positive Theory of Accounting Standard Setting/Choice." *Journal of Accounting and Economics* (1981, 3) 129-49.

APPENDIX 1

This appendix demonstrates that the change in price with respect to accrued earnings and cash earnings is $1 + \alpha_1 + \alpha_2$ and $1 + \alpha_1$, respectively. I begin with Feltham and Ohlson's (1995) proposition 3 which expresses the market value of a firm as:

$$P_t = bv_t + \alpha_1 ox^a_t + \alpha_2 oa_t + \beta^* v_t \qquad (1)$$

where as before,

P_t = the market value of the firm's equity, date t.
bv_t = the book value of the firm's equity, date t.
ox^a_t = abnormal operating earnings for period (t-1,t).
oa_t = operating assets, net of operating liabilities, date t.
v_t = other information, date t.

Feltham and Ohlson (1995) make four assumptions regarding basic accounting relations as well as assuming a linear process for generating ox^a_t, oa_t and v_t.[36] The four accounting relations are:

(1) Clean surplus which states that all changes in book value are reported as either income or dividends, such that $bv_t = bv_{t-1} + x_t - d_t$ where x_t represents total earnings while d_t represents net dividends for time t.[37]

2) Net interest relation for financial assets stated as $i_t = (R_f - 1)fa_{t-1}$ where i_t and fa_{t-1} depict interest income and financial assets, respectively.[38] R_f is the risk-free interest rate plus one.

(3) Financial asset relation portraying current period financial assets as $fa_t = fa_{t-1} + i_t + c_t - d_t$ where c_t represents cash flows which are defined as operating and investing cash flows.

---

[36]It is also assumed that the market value of a firm's equity is equal to the present value of expected (net) dividends.

[37]The clean surplus assumption is violated when either gains or losses do not flow through the income statement and are taken directly to stockholders' equity. Some instances where accounting standards require gains or losses to be written directly to stockholders' equity are SFAS No. 52 (Foreign Currency Translation), SFAS No. 87 (the excess of any additional pension liability over unrecognized prior service cost), SFAS No. 115 (unrealized holding gains and losses on available for sale securities) and SFAS No. 133 (unrealized gains and losses on derivative instruments used to hedge cash flows).

[38]Feltham and Ohlson (1995) cite marketable securities and bonds payable as examples of financial assets and liabilities, respectively.

(4) The operating asset relation can be inferred from the clean surplus and financial asset relation. This relation is stated as
$oa_t = oa_{t-1} + ox_t - c_t$.

From relations (3) and (4) it can be seen that financial assets are increased by cash flows and that operating assets are increased by the difference between operating earnings and cash flows.

Feltham and Ohlson (1995) consider three parameters when specifying the linear process generating ox^a_t, oa_t and v_t. Those parameters are the persistence of abnormal earnings (ω_{11}), growth of operating assets (ω_{22}) and accounting conservatism (ω_{12}).[39] Feltham and Ohlson's (1995) linear information model is specified in their equations 10(a) - 10(d), p. 702 as follows:

$$
\begin{aligned}
ox^a_{t+1} &= \omega_{11} ox^a_t + \omega_{12} oa_t + v_{1t} + \varepsilon_{1t+1} \\
oa_{t+1} &= \omega_{22} oa_t + v_{2t} + \varepsilon_{2t+1} \\
v_{1t+1} &= \gamma_1 v_{1t} + \varepsilon_{3t+1} \\
v_{2t+1} &= \gamma_2 v_{2t} + \varepsilon_{4t+1}
\end{aligned}
$$

Feltham and Ohlson (1995) use the linear information model, equation (1) and the assumption that goodwill represents the present value of expected future abnormal earnings and can be expressed as the difference between market and book value to derive the following solutions for the multipliers in equation (1):

$$
\begin{aligned}
\alpha_2 &= \omega_{12} R_f / (R_f - \omega_{11})(R_f - \omega_{22}) \\
\alpha_1 &= \omega_{11} / (R_f - \omega_{11}) \\
\beta &= (\beta_1, \beta_2) = [R_f / (R_f - \omega_{11})(R_f - \gamma_1),\ \alpha_2 / (R_f - \gamma_2)]
\end{aligned}
$$

The multipliers, α_1 and α_2, are functions of the degree of the persistence of abnormal

[39] Feltham and Ohlson (1995) constrain the parameter values as follows: $|\gamma_i| < 1$, $0 \leq \omega_{11} < 1$, $1 \leq \omega_{22} < R_f$, $\omega_{12} \geq 0$.

earnings and accounting conservatism for operating assets, respectively. Hence if there is no persistence of abnormal earnings then α_1 will be equal to zero, and if there is no conservatism, α_2 will be equal to zero.

Recall that according to the operating and financial asset relations, cash earnings affect financial assets but not operating assets while accrued earnings affect operating assets but not financial assets. Also recall that a firm's book value is the sum of its financial and operating assets. To see the implications that cash and accrued earnings have for a firm's market value (ignoring v, other information), Feltham and Ohlson (1995) take the partial derivative of equation (1):[40]

$$\delta P_t / \delta \text{Accrued Earnings} = 1 + \alpha_1 + \alpha_2$$
$$\delta P_t / \delta \text{Cash Earnings} = 1 + \alpha_1$$

Feltham and Ohlson (1995) interpret this as meaning that a firm's market value will change by $1 + \alpha_1 + \alpha_2$ for an incremental dollar of accrued earnings and by $1 + \alpha_1$ for an incremental dollar of cash earnings. The differential effect of accrued earnings for market

[40]The assumption that v is equal to 0 is an empirical issue. Hand and Landsman (1998) examine the role of other information in the context of dividend signaling. They provide empirical evidence that dividends have differential valuation implications for loss firms. Hand and Landsman (1998) also note that within some of the more recent literature v is assumed either to be 0 or to be captured in the intercept term.

value is attributed to α_2 which by definition is greater than (equal to) zero if the accounting practices are (not) conservative.

TABLE 1
DESCRIPTIVE STATISTICS

3825 Firm-Year Observations Years 1975 through 1996	Mean	Standard Deviation	Minimum	Maximum	Median
Market Value of Equity	587.89	1953.92	0.23	38192.5	61.87
Book Value of Equity	286.92	807.0	0.043	9015.0	41.86
Market-to-Book Ratio	2.20	7.16	0.139	288.0	1.45
Net Operating Assets	389.81	1160.54	0.032	22879	56.93
Earnings	48.35	149.17	0.013	2295.0	6.096
Abnormal Operating Earnings	25.09	105.94	-542.82	2037.75	2.06
Raw Returns	0.282	0.613	-0.829	12.27	0.161
Conservatism Score	0.536	1.471	-0.515	77.64	0.392

*In Millions of Dollars

Market Value of Equity, beginning of period is defined as common shares outstanding x price, compustat data items #25 and #199, respectively.

Book Value of Equity, beginning of period is defined is compustat data item #60.

Net Operating Assets are defined as (total assets - cash and short-term investments - investments and advances, equity method and other) - (total liabilities –short-term debt in current assets – long-term debt) compustat data items (#6- #1 - #31 - #32) – (#181 - #34 - #9).

Earnings are defined as earnings before extraordinary items and discontinued operations, compustat data item #18.

Abnormal Operating Earnings are defined as earnings before extraordinary items and discontinued operations (compustat data item #18) less normal earnings computed as book value (data item #60) multiplied by the risk-free rate. The risk-free rate is proxied for by the one-year treasury-bill rate.

Raw Returns are cumulated over the 12-month period ending three months after the fiscal year end.

Conservatism Score is defined as the sum of the unrecorded R&D asset, advertising asset, inventory asset, accounts receivable asset, depreciation asset and unrecognized gains and losses on pension assets divided by net operating assets.

TABLE 2
ALTERNATIVE MEASURES FOR R&D AND ADVERTISING ASSETS

	All Firms with Non Missing Current-Period and Lagged Data		All Firms with Non Missing Current-Period Data	
	R&D Asset	***Advertising Asset***	***R&D Asset***	***Advertising Asset***
Firm -Year Observations	7,504	1,684	11,942	9,434
Number of 2-Digit SIC Codes Represented	42	36	53	62
Unrecorded Asset Measures Using:				
Current-Period Expenditures	0.100	0.137	0.105	0.098
Expenditures for All Available Periods	0.267	0.461	0.260	0.258
Current-Period Expenditures Considering Growth	0.258	0.429	0.267	0.273
Current-Period Expenditures NOT Considering Growth	0.306	0.523	0.318	0.326

Current-Period Expenditures represent the measure for the R&D and Advertising assets whereby ONLY current-period expenditures are included in the computation

Expenditures for all available periods represents the measure for the R&D and Advertising assets whereby firms are constrained to having nonmissing current-period data and only available data is used for prior-period lags. Missing lags are replaced with a value of zero.

Current-Period Expenditures Considering Growth represents the measure for the R&D and Advertising assets whereby firms are only constrained to having nonmissing current-period data. Current-period expenditures and the industry growth rate are used to estimate prior-period expenditures.

Current-Period Expenditures NOT Considering Growth represents the measure for the R&D and Advertising assets whereby firms are only constrained to having nonmissing current-period data. However, all prior-period expenditures are assumed to equal current-period expenditures.

TABLE 3
Conservatism Score Components
Descriptive Statistics

Item	*Firm-Year Observations*	*Mean*	*Std Deviation*	*Minimum*	*Maximum*	*Median*
R&D	2711	0.136	0.003	0.000	2.570	0.066
ADV	2247	0.148	0.018	0.000	55.470	0.021
INV	1448	0.035	0.001	-0.04	1.030	0.000
UGL	333	-0.013	0.001	-1.624	0.041	0.000
AR	3679	0.015	0.000	0.000	8.125	0.009
DEP	3716	0.214	0.000	0.000	14.050	0.166
SCORE	3825	0.536	0.024	-0.515	77.640	0.392

R&D is defined as the unrecorded R&D asset requiring no missing data for the current period.
ADV0 is defined as the unrecorded advertising asset requiring no missing data for the current period.
INV is the unrecorded inventory asset.
UGL is the unrecorded gains or losses from pension plan assets.
AR is the unrecorded accounts receivable asset
DEPR is the unrecorded depreciation asset.
SCORE is the sum of the unrecorded assets, R&D+ADV+INV+UGL+AR+DEPR. ***All items are deflated by net operating assets*

TABLE 4

Conservatism Score Components

By One-Digit SIC Codes

SIC Codes (Firm-Years) Major Industry Class	R&D Mean (Median)	ADV Mean (Median)	INV Mean (Median)	UGL Mean (Median)	AR Mean (Median)	DEPR Mean (Median)	SCORE Mean (Median)
0-999 (16) Agriculture & Forestry	0.100 (0.120)	0.063 (0.073)	0.000 (0.000)	-0.035 (0.000)	0.005 (0.005)	0.003 (0.109)	0.245 (0.243)
1000-1999 (48) Mining & Construction	0.196 (0.178)	0.028 (0.000)	0.013 (0.000)	-0.020 (0.000)	0.020 (0.012)	0.363 (0.233)	0.600 (0.489)
2000-2999 (991) Food, Apparel, Lumber & Paper	0.106 (0.048)	0.212 (0.015)	0.035 (0.014)	-0.016 (0.000)	0.012 (0.008)	0.197 (0.168)	0.545 (0.392)
3000-3999 (1955) Manufacturing	0.180 (0.115)	0.033 (0.015)	0.042 (0.000)	-0.015 (0.000)	0.0126 (0.009)	0.215 (0.173)	0.467 (0.390)
4000-4999 (57) Transportation & Communication	0.023 (0.000)	0.046 (0.000)	0.000 (0.000)	-0.004 (0.000)	0.017 (0.006)	0.313 (0.265)	0.396 (0.360)
5000-5999 (444) Wholesale & Retail	0.004 (0.000)	0.257 (0.195)	0.040 (0.000)	-0.002 (0.000)	0.011 (0.005)	0.147 (0.101)	0.457 (0.366)
6000-6999 (32) Insurance, Real Estate & Investment Brokers	0.237 (0.000)	0.262 (0.322)	0.011 (0.000)	0.000 (0.000)	0.023 (0.011)	0.192 (0.173)	0.726 (0.515)
7000-7999 (245) Personal & Business Services	0.161 (0.005)	0.671 (0.049)	0.0003 (0.000)	-0.005 (0.000)	0.048 (0.010)	0.361 (0.254)	1.235 (0.444)
8000-8999 (37) Educ., Social & Gov't. Services	0.104 (0.050)	0.012 (0.000)	0.014 (0.000)	0.000 (0.000)	0.021 (0.010)	0.192 (0.149)	0.342 (0.270)

R&D is defined as the unrecorded R&D asset requiring no missing data for the current period.
ADV is defined as the unrecorded advertising asset requiring no missing data for the current period.
INV is the unrecorded inventory asset.
UGL is the unrecorded gains or losses from pension plan assets.
AR is the unrecorded accounts receivable asset
DEPR is the unrecorded depreciation asset.
SCORE is the sum of the unrecorded assets, R&D+ADV+INV+UGL+AR+DEPR. ***All items are deflated by net operating assets*

Table 5

Conservatism Score Components

By Year

Year N=	R&D	ADV	INV	UGL	AR	DEP	SCORE
1975 (135)	0.077	0.093	0.027	-	0.01	0.133	0.34
1976 (145)	0.087	0.497	0.027	-	0.067	0.234	0.913
1977 (197)	0.081	0.129	0.031	-	0.014	0.141	0.397
1978 (207)	0.085	0.123	0.033	-	0.012	0.143	0.397
1979 (233)	0.091	0.114	0.043	-	0.013	0.143	0.404
1980 (201)	0.091	0.094	0.047	-	0.012	0.142	0.386
1981 (166)	0.114	0.076	0.065	-	0.011	0.183	0.45
1982 (143)	0.122	0.097	0.056	-	0.011	0.184	0.471
1983 (155)	0.137	0.106	0.051	-	0.012	0.183	0.49
1984 (193)	0.142	0.089	0.04	-	0.011	0.206	0.488
1985 (171)	0.148	0.113	0.036	-	0.012	0.195	0.503
1986 (186)	0.151	0.083	0.029	-	0.012	0.239	0.515
1987 (203)	0.149	0.137	0.03	-	0.013	0.263	0.591
1988 (244)	0.158	0.166	0.032	-	0.011	0.218	0.585
1989 (238)	0.149	0.169	0.03	-	0.011	0.261	0.62
1990 (225)	0.163	0.202	0.032	-	0.014	0.244	0.654
1991 (233)	0.189	0.183	0.025	-0.033	0.015	0.283	0.662
1992 (234)	0.188	0.174	0.026	-0.06	0.014	0.299	0.642
1993 (238)	0.181	0.176	0.029	-0.095	0.014	0.280	0.586
1994 (72)	0.172	0.171	0.030	-0.060	0.020	0.266	0.599
1995 (5)	0.214	0.034	0.000	-0.112	0.016	0.141	0.292
1996 (1)	0.000	0.000	0.000	0.000	0.008	0.000	0.008

TABLE 5 *CONTINUED:*

R&D is defined as the unrecorded R&D asset requiring no missing data for the current period.
ADV is defined as the unrecorded advertising asset requiring no missing data for the current period.
INV is the unrecorded inventory asset.
UGL is the unrecorded gains or losses from pension plan assets.
AR is the unrecorded accounts receivable asset
DEPR is the unrecorded depreciation asset.
SCORE is the sum of the unrecorded assets, R&D+ADV+INV+UGL+AR+DEPR. ***All items are deflated by net operating assets*

TABLE 6

Tests of Hypotheses

Panel A

Parameter Estimates from Equation (3)

$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$

N=	θ_0	θ_1	θ_2	θ_3	θ_4
			POOLED FOR ALL FIRM YEARS		
N=3825	-0.107***	1.16***	0.980***	-0.283***	-0.016
			PARTITIONED ON CONSERVATISM SCORE		
N=300					
Mean	-0.098***	0.683***	2.719***	-0.378**	0.054
Median	-0.123	0.617	1.786	-0.090	0.025
Minimum	-1.663	-12.329	-18.074	-13.882	-3.996
Maximum	1.137	24.019	32.670	-9.682	4.959

Panel B

Tests of Differences between Conservatism Partitions for θ_4

$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$

	Upper (Lower) 150 Partitions	*Upper (Lower) 100 Partitions*
Wilcoxon Rank Sums (θ_4)	20755 (24395)***	11041 (9059)***
Test of Medians (θ_4)	87 (63)***	62 (38)***
Test of Means (θ_4)	0.192 (-0.084)**	0.269 (-0.004)**

Panel C

Tests of Association with the Conservatism Score

$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$

	Upper (Lower) 150 Partitions	*Upper (Lower) 100 Partitions*
Pearson Correlation	0.119**	0.129**
Spearman Correlation	0.153***	0.174***

*indicates significance at .1 **indicates significance at .05 ***indicates significance at .01. All tests for θ_4 are one-tailed.
CONSERVATISM SCORE is the sum of the unrecorded assets, deflated by net operating assets.
$Ret_{i,t}$ is defined as the market-adjusted returns cumulated over the 12-month period ending three months after the fiscal year end for firm i, period t.
$x_{i,t}$ is defined as earnings before extraordinary items and discontinued operations for firm i, period t; compustat data item #18.
$bv_{i,t}$ is defined as end-of-period book value for firm i; compustat data item #60.
$oac_{i,t}$ represents current-period operating accruals for firm i, period t and is defined as [Δ total assets - Δ cash and short- term securities - Δ investments and advances, equity method and other] - [Δ total liabilities - Δ short-term debt in current liabilities - Δ long-term debt]; compustat data items [Δ #6 - Δ #1 - Δ #31 - Δ #32] - [Δ #181 -Δ #34 - Δ #9].
All independent variables are scaled by beginning-of-period price, P_{t-1}.

TABLE 7

Correlations Among Conservatism Score Components γ_0, and Market-to-Book; By Partition

Pearson (Upper) Spearman (Lower) Diagonal

N=300 Partitions 3281 Firm-years	*SCORE*	*R&D*	*ADV*	*INV*	*UGL*	*AR*	*DEP*	*MKBK*	γ_0
SCORE	**1.000**	0.405***	0.929***	-0.029	0.079	0.334***	0.359***	0.258***	0.292***
R&D	0.824***	**1.000**	0.109**	-0.042	0.054	0.367**	0.730***	0.499***	0.227***
ADV	0.677***	0.477***	**1.000**	-0.051	0.010	0.179***	0.031	0.093	0.234***
INV	0.037	0.033	-0.095*	**1.000**	0.037	0.062	0.056	-0.179***	-0.037
UGL	0.141**	0.081	0.092	0.051	**1.000**	0.034	0.128**	-0.060	-0.012
AR	0.373***	0.294***	0.242**	0.026	0.028	**1.000**	0.461***	0.177***	0.225***
DEP	0.901***	0.750***	0.531***	0.031	0.122*	0.373***	**1.000**	0.416***	0.192***
MKBK	0.471***	0.429***	0.377***	-0.209***	-0.013	0.109*	0.382***	**1.000**	0.204**
γ_0	0.174***	0.096*	0.098*	-0.013	-0.043	0.192***	0.180***	0.143**	**1.000**

*indicates significance at .1 **indicates significance at .05 ***indicates significance at .01

R&D is defined as the unrecorded R&D asset requiring no missing data for the current period.

ADV is defined as the unrecorded advertising asset requiring no missing data for the current period.

INV is the unrecorded inventory asset.

UGL is the unrecorded gains or losses from pension plan assets.

AR is the unrecorded accounts receivable asset

DEPR is the unrecorded depreciation asset.

SCORE is the sum of the unrecorded assets, R&D+ADV+INV+UGL+AR+DEPR, all conservatism score items are deflated by net operating assets.

MKT to BOOK is the beginning of period market-to-book ratio, compustat data items (#199 * #25)/ #60.

γ_0 is from equation (11) $ox^a_{i,t} = \gamma_0 oa_{i,t-1} + \gamma_1 ox^a_{i,t-1} + e_{i,t}$

TABLE 8

Panel A

Hypothesis Tests for Alternative Conservatism Measures

Tests of Differences between Partitions for θ_4

$$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$$

N=300	*Upper (Lower) 150 Partitions*			*Upper (Lower) 100 Partitions*		
	Wilcoxon Rank Sums	*Medians Test*	*Means Test*	*Wilcoxon Rank Sums*	*Medians Test*	*Means Test*
			TOTAL SCORE			
θ_4	20755 (24395)***	87 (63)***	0.192 (-0.084)**	11041 (9059)***	62 (38)***	0.269 (-0.004)**
			SCORE: R&D + ADV + INV			
θ_4	22401 (22749)	75 (75)	-0.049 (-0.052)	9794 (10306)	48 (52)	-0.054 (0.014)
			SCORE: MARKET TO BOOK			
θ_4	22722 (22428)	80 (70)	0.049 (-0.007)	9992 (10108)	53 (47)	0.021 (-0.011)

TABLE 8 (Continued)
Panel B

Tests of Association with the Conservatism Score
Equation (3) $Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$

	All 300 Partitions		*Upper and Lower 100 Partitions*	
	Pearson Correlation	***Spearman Correlation***	***Pearson Correlation***	***Spearman Correlation***
		TOTAL SCORE		
θ_4	0.119**	0.153***	0.129**	0.174**
		SCORE: R&D + ADV + INV		
θ_4	0.031	-0.043	0.026	-0.076
		SCORE: MARKET TO BOOK		
θ_4	0.209***	0.049	0.235***	0.075

*indicates significance at .1 **indicates significance at .05 ***indicates significance at .01 *Tests are one-tailed*
TOTAL SCORE is the sum of the unrecorded assets, R&D+ADV+INV+UGL+AR+DEPR, all conservatism score items are deflated by net operating assets plus the sum of unrecorded operating assets.
MKT to BOOK is the end of period market-to-book ratio, compustat data items (#199 * #25)/ #60.
$Ret_{i,t}$ is defined as the market-adjusted returns cumulated over the 12-month period ending three months after the fiscal year end for firm i, period t.
$x_{i,t}$ is defined as earnings before extraordinary items and discontinued operations for firm i, period t; compustat data item #18.
$bv_{i,t}$ is defined as end-of-period book value for firm i; compustat data item #60.
$oac_{i,t}$ represents current-period operating accruals for firm i, period t and is defined as [Δ total assets - Δ cash and short- term securities - Δ investments and advances, equity method and other] - [Δ total liabilities - Δ short-term debt in current liabilities - Δ long-term debt]; compustat data items [Δ #6 - Δ #1 - Δ #31 - Δ #32] - [Δ #181 -Δ #34 - Δ #9].
All independent variables are scaled by beginning-of-period price, $P_{i,t}$.

TABLE 9

Firm-Specific Analysis

Panel A

Parameter Estimates from Equation (3)

$$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$$

N=126	θ_0	θ_1	θ_2	θ_3	θ_4	$\theta_1+\theta_2+\theta_3$
	-0.140***	0.720	3.754***	-0.861	0.096	3.612***

Panel B

Tests of Differences between Partitions for θ_4; Firm-Specific Analysis

$$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$$

N=10	*Upper (Lower) 5 Partitions*			*Upper (Lower) 3 Partitions*		
	Wilcoxon Rank Sums	*Medians Test*	*Means Test*	*Wilcoxon Rank Sums*	*Medians Test*	*Means Test*
			TOTAL SCORE			
θ_4	30 (25)	3 (2)	-0.037 (-0.044)	12 (9)	2 (1)	0.071 (0.033)
			SCORE: γ_0			
θ_4	32 (23)	3 (2)	-0.020 (0.077)	18 (3)	2 (1)	0.173 (0.038)

Panel C

Tests of Association with the Conservatism Score

$$Ret_{i,t} = \theta_0 + \theta_1 x_{i,t} + \theta_2 \Delta x_{i,t} - \theta_3(\Delta bv_{i,t-1}) + \theta_4 oac_{i,t} + e_{i,t}$$

N=10	*All 10 Partitions*		*Upper and Lower 3 Partitions*	
	Pearson Correlation	*Spearman Correlation*	*Pearson Correlation*	*Spearman Correlation*
		TOTAL SCORE		
θ_4	0.255	0.164	0.324	0.371
		SCORE: γ_0		
θ_4	0.693**	0.370	0.901***	0.771**

*indicates significance at .1 **indicates significance at .05 ***indicates significance at .01

TOTAL SCORE is the sum of the unrecorded assets, RD+ADV+INV+UGL+AR+DEPR.

MKT to BOOK is the end of period market-to-book ratio, compustat data items (#199 * #25)/ #60.

$Ret_{i,t}$ is defined as the market-adjusted returns cumulated over the 12-month period ending three months after the fiscal year end for firm i, period t.

$x_{i,t}$ is defined as earnings before extraordinary items and discontinued operations for firm i, period t; compustat data item #18.

$bv_{i,t}$ is defined as end-of-period book value for firm i; compustat data item #60.

$oac_{i,t}$ represents current-period operating accruals for firm i, period t and is defined as [Δ total assets - Δ cash and short- term securities - Δ investments and advances, equity method and other] - [Δ total liabilities - Δ short-term debt in current liabilities - Δ long-term debt]; compustat data items [Δ #6 - Δ #1 - Δ #31 - Δ #32] - [Δ #181 -Δ #34 - Δ #9].

All independent variables are scaled by beginning-of-period price, P_{t-1}.

γ_0 is the intercept from equation (11) $ox^a_{i,t} = \gamma_0 + \gamma_1 ox^a_{i,t-1} + e_{i,t}$

****All conservatism score items are deflated by net operating assets*