

**Bangor University**

## **DOCTOR OF PHILOSOPHY**

**The interaction between earnings and cash flow : the consistency of signals and the effect of accruals volatility.**

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**THE INTERACTION BETWEEN EARNINGS AND CASH  
FLOW:**

**THE CONSISTENCY OF SIGNALS**

**AND**

**THE EFFECT OF ACCRUALS VOLATILITY**

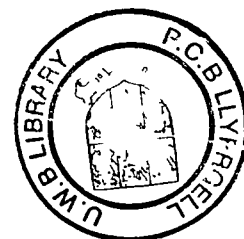
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**A Thesis Submitted to the University of Wales  
In Fulfilment of the Requirement for the Degree of Doctor of Philosophy**

By

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2001



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## **DEDICATION**

† THIS THESIS IS DEDICATED TO THE MEMORY OF MY LATE †  
MOTHER. MAY HER SOUL REST IN PERFECT PEACE



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# CHAPTER ONE

## AN OVERVIEW OF THE STUDY

### 1.1 Background and Conclusions from Previous Findings

Among the various possible and theoretically predicted relationships between capital market variables and accounting information, the issue of the relationship between returns and earnings has remained at the forefront of accounting research since the remarkable seminal works of Ball and Brown (1968) and Beaver (1968). Both were event studies; the former study related earnings information to abnormal returns from 12 months before to 6 months after an earnings announcement, while the latter related earnings information to share price volatility and trading volume in the weeks surrounding an announcement. Ball and Brown popularized the event study approach by examining whether abnormal returns in the share market are associated with the release of the preliminary annual earnings per share numbers, but they also considered other measures such as cash flow, defined in their study as earnings before deferred tax plus depreciation and amortization, and earnings before non-recurring items. Their results suggest that abnormal returns are mainly related to earnings innovations and that the other performance measures do not perform as well as earnings measures. Beaver and Dukes (1972) found that cash flow had the lowest association with abnormal returns when compared with other accounting variables investigated in their study. Later, Patell and Kaplan (1977) provided evidence that cash flow does not have significant information content beyond earnings. Generally, these earlier studies failed to detect any information content for cash flow, perhaps because they had not developed sufficiently refined measures. In particular, they all used cash flow measures that were highly



## ABSTRACT

This thesis examines whether the valuation relevance of earnings and/or cash flow is moderated by the consistency or the various combinations of signals provided by their unexpected surprises. This prediction is motivated by the expectation that consistent signaling of surprises in both measures will improve the perceived reliability of each. Another prediction is that the volatility of accruals determines the extent to which the consistency between earnings and cash flow surprises affects stock prices.

The informativeness of the accounting measures of performance is evaluated by ascertaining whether they cause investors to change their evaluation of its fair value and adjust the share price accordingly. The existence of the predicted interaction effects is then examined by including interaction terms in the model specification as regressors. The tests are applied to a unique data set that addresses the issue of survivorship bias.

Our results confirm that earnings and cash flow are not evaluated in isolation of each other in the market place. In particular, investors are seen to relate cash flow to earnings to assess the reliability of cash flow data. The extent to which this occurs, however, depends on the volatility of accruals. Finally, it should be emphasised that the more supportive results are provided after controlling for survivorship bias, which constrains the generalisability of prior research findings in this area.

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correlated with accruals measures of earnings and closer to the concept of funds flow.

More recently, in the 1980s and 1990s, a number of valuation relevance studies have concentrated on examining the usefulness of earnings in conjunction with cash flow, using more refined measures of cash flow and introducing methodological improvements. These recent studies have concentrated either on investigating the incremental, or relative, information content of earnings and cash flow (Rayburn, 1986; Board and Day, 1986; Bowen et al, 1987; Board, Day and Walker, 1989; Ali and Pope, 1995; and McLeay et al, 1997; among others), or on exploring the determinants of information content beyond earnings (Dechow, 1994; Cheng, 1996; Charitou, 1997; Green, 1999; among others), or on examining the valuation relevance of the components of cash flow (Livnat and Zarowin, 1990; Charitou, 1993; Clubb, 1995; Garrod and Hadi, 1999).

Overall, these more recent studies provide more supportive evidence on the incremental information content of cash flow beyond earnings, although the results are mixed. That is, Rayburn (1986), Schaefer and Kennelly (1986), Wilson (1986, 1987), Bowen et al (1987), Ali and Pope (1995) and Clubb (1995) provide weak evidence that cash flow disclosure provides valuation-relevant information over and above that contained in disclosed earnings; Charitou (1997), McLeay, Kassab and Helan (1997), Cheng et al. (1997), Garrod and Hadi (1998) and Green (1999) provide stronger evidence on the existence of incremental information content of the cash flow information over earnings; and Board and Day (1986), Bernard and Stober (1989) and Board, Day and Walker (1989) suggest that cash flow disclosure does not provide valuation relevant information

beyond earnings.

However, when cash flow is disaggregated into its operating, financing and investment components, its incremental content beyond earnings is more readily confirmed. Charitou and Ketz (1991), who employ a cross-sectional equity valuation model under which the market value of the firm is a function of cash flow constructs, obtain results that indicate that the accrual and cash flow components of earnings are given significant value in the marketplace and that there exists a strong association between the various cash flow components and the market value of the firm. Livnat and Zarowin (1990) indicate that the individual components of financing and operating cash flows are differentially associated with security returns, although no evidence was provided of differential association across the components of investing cash flows. Furthermore, they also show that there is incremental information content in the components of cash flows from financing, investing, and operating activities, as compared to the information content of earnings alone. Findings by Clubb (1995) also indicate that disaggregated cash flow data possess information content beyond earnings, although in this case the share price does not respond differentially across the operating, investment and financing flows. Garrod and Hadi (1998) extend previous research by reporting significant information content of cash flow disclosures as defined under the most recent UK regulations. Using recent innovations in earnings-price modeling which improve the explanatory power, they also provide evidence of the incremental information content of each cash flow component.

Another important development has been the consideration of the circumstances under

which the incremental information content of earnings and/ or cash flow can be predicted to increase (Dechow (1994), Charitou (1997), Cheng et al (1996) and Green (1999)). Cheng et al (1996) use a contextual model in which the informativeness of earnings and cash flows from operations is conditional on the absolute magnitude of the earnings surprise as a measure of earnings permanence (Persistence measures the degree to which an earnings innovation in the current period persists, giving rise to permanent earnings increases/ decreases) . Their results suggest that the incremental information content of accounting earnings decreases, and the incremental information content of cash flows from operations increases, with a decrease in the permanence of earnings. Dechow (1994) and Charitou (1997) provide evidence on the association of earnings and cash flows with security returns by considering the magnitude of the aggregate accruals, the length of the measurement interval, and the length of the firm's operating cycle. Using a UK sample, Charitou provides evidence that cash flows have information content beyond earnings and that the role of cash flow becomes more important in the marketplace: (i) the smaller the absolute magnitude of accruals; (ii) the longer the measurement interval; and (iii) the shorter the firm's operating cycle. Dechow (1994) employed U.S data, and showed that the importance of accruals increases under circumstances in which cash flows are predicted to suffer more severely from timing and matching problems that reduce their ability to reflect firm performance. Green (1999) investigates whether the 'quality of earnings' as measured by the firm-specific relationship between profit-generating ability and cash-generating ability impacts upon the valuation-relevance of cash flow disclosure. The rationale for such an expectation is that, to the extent that earnings numbers (levels and changes) and cash flow numbers (levels and changes) are highly correlated with each other, then no differential valuation

of whether investors evaluate earnings and cash flow announcements in relation to each other. As mentioned by Charitou (1997), all performance measures are subjective and suppliers of capital have difficulties in assessing the reliability of the signals produced by management. Earnings can be criticized because they are affected by arbitrary allocations. Although cash flow is less likely to be manipulated by management in this way, it is influenced nevertheless by timing and matching problems through the accrual process (Dechow, 1994). Due to these inherent limitations, neither earnings nor cash flow are expected to be perceived as reliable measures in isolation of each other.

Elsewhere, there is evidence to support this view. The findings of Bernstein (1993) indicate that analysts prefer to relate operating cash flows to earnings as a check on the quality of earnings. A questionnaire survey by Jones and Ratnatunga (1997), and an earlier investigation by Jones et al (1995), confirmed that cash flow data is used in this way to assess the quality of earnings. The role of accruals in this context, that is in mitigating temporary matching problems in cash flow, is demonstrated in Dechow (1994). Indeed, given that the timing and matching problems inherent in cash flow are mitigated by the accruals adjustment in earnings, and, on the other hand, cash flow is not affected by arbitrary allocation and income management problems inherent in earnings, each measure diminishes the shortcomings of the other. It is plausible therefore to predict that consistent signaling of surprises in both measures will improve the perceived reliability of each, leading to the expectation that investors would relate earnings and cash flow to each other in order to attest their reliability. Indeed, the consistency effect may be criticised in that it assumes an identical signalling effect in the worst-news scenario (negative surprises of both earnings and cash flow) to that in the

the quality of earnings. Firstly, when the existence of transitory components in earnings is accounted for, it would seem that the explanatory power of cash flow is further improved. Secondly, the more earnings measurement is influenced by issues of timing and matching resulting in increased volatility in accruals, the higher the informativeness of cash flow with respect to earnings. Finally, when the correlation between cash flow and earnings is low, cash flow and accruals are likely to have greater incremental information content beyond earnings.

## **1.2 The Motivation and Contribution of the Study:**

This section discusses the motivation and contribution of the present study regarding the importance of ‘consistency’ in earnings and cash flow surprises, leading to the prediction that the market effect of signaling consistency is moderated by accruals volatility as a firm-specific factor. Section 1.2.1 discusses the importance of the consistency of signals and Section 1.2.2 discusses the role of accruals volatility in moderating the effect of consistency on the valuation relevance of earnings and cash flow.

### **Section 1.2.1: The Importance of Consistency between Signals and of Different Combinations of Signals**

As summarised above, previous empirical evidence concerning the usefulness of earnings and cash flow in the capital markets has focused on assessing their informativeness either in terms of information content or incremental information content, and the contextual considerations that may affect this. Much of this research has been carried out under the implied assumption that these two accounting measures are evaluated in isolation from each other, and consequently leaves unanswered the question

of whether investors evaluate earnings and cash flow announcements in relation to each other. As mentioned by Charitou (1997), all performance measures are subjective and suppliers of capital have difficulties in assessing the reliability of the signals produced by management. Earnings can be criticized because they are affected by arbitrary allocations. Although cash flow is less likely to be manipulated by management in this way, it is influenced nevertheless by timing and matching problems through the accrual process (Dechow, 1994). Due to these inherent limitations, neither earnings nor cash flow are expected to be perceived as reliable measures in isolation of each other.

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best-news scenario (positive surprises of both earnings and cash flow). It also assumes an identical signalling effect among the two combinations of contradictory signals (positive earnings surprise and negative cash flow surprise, or vice-versa). As a result, we also consider the signalling effect in terms of the various combinations. It is this prediction that motivates the present study which explores at the theoretical, analytical and empirical levels, whether or not the valuation relevance of earnings or cash flow is moderated by the consistency of their signals in the form of unexpected surprises. The following table illustrates the different combinations of signals that may occur, and the consistency or inconsistency between signals that will arise:

**Table 1.1:** Consistency between Signals, and the Different Combinations of Signals

	<b>Positive Surprise in Earnings</b>	<b>Negative Surprise In Earnings</b>
<b>Positive Surprise in Cash Flow</b>	Unexpected Earnings + Unexpected Cash Flow +	Unexpected Earnings - Unexpected Cash Flow +
<b>Negative Surprise in Cash Flow</b>	Unexpected Earnings + Unexpected Cash Flow -	Unexpected Earnings - Unexpected Cash Flow -

**Note:** There are four different combinations of signals. Amongst these, there is consistency between signals in the cells that are shaded.

A further goal of this study is to demonstrate whether firm-specific determinants of accruals volatility moderate the expected effect of the signaling consistency described above. The following section discusses our second prediction regarding the role of accruals volatility in moderating the signaling consistency effect on the valuation

relevance of earnings and cash flow.

### **Section 1.2.2: The Importance of Accruals Volatility in Moderating the Signaling Effects**

Our prediction that firm-specific determinants of accruals volatility influence the extent to which investors are expected to assess the quality of earnings and cash flow by relating them to each other is motivated by the theoretical and analytical suggestions put forward by Dechow (1994) and Charitou (1997). Both authors demonstrate that, with high volatility of accruals, the reported figures for earnings and cash flow are not expected to be highly correlated with each other, and hence, they are not expected to converge as measures of firm performance. Given these findings, we predict that, for firms with low (high) accruals volatility, investors are (are not) expected to relate earnings and cash flow to each other, and hence, we can predict that the volatility of accruals determines the extent to which the consistency between earnings and cash flow surprises affects stock prices.

In summary, the present study extends the literature by answering the following new research questions concerning the valuation relevance of earnings and cash flow:

- 1- Is valuation relevance affected by the consistency/ various combinations of signals conveyed by surprises in earnings and cash flow.
- 2- Is the consistency/ various combinations effect moderated by firm-specific determinants of accruals volatility.

### **1.3 The Research Questions and Methodology**

As stated in the previous section, the aim of the present study is to contribute to the earnings and cash flow valuation-relevance studies by establishing whether or not earnings and cash flow are used to check the quality of each other, and hence, whether they convey information to the market that could not be conveyed by either of them in isolation of the other. In addition, this study investigates whether firm-specific determinants of accruals volatility (namely, the magnitude of aggregate accruals, the length of the operating cycle and the coefficient of variation of the cash flow to earnings ratio) moderates the consistency effect.

In our methodology, the informativeness of the accounting measures of performance in the market place is empirically evaluated by ascertaining whether they provide valuation-relevant information and thus cause investors to revise their expectations regarding the future prospects of the firm, which leads them in turn to change their evaluation of its fair value and adjust the share price. Therefore, we examine whether the unexpected components of earnings and cash flow are systematically correlated with the company's market return.

The existence of the predicted interaction effects is then examined by including interaction terms in the model specification as regressors to capture any interaction relationship between earnings and cash flow. The tests are applied to a unique data set

that addresses the issue of survivorship bias that is present in previous studies. The sample consists of 773 companies (515 surviving and 258 non-surviving companies) with 1843 firm-year observations over the three-year sampling period 1996-1998. Comparative results are reported for both the survivor sample and the pooled sample.

Finally, the empirical analysis in this thesis takes account of the recent innovations in modelling the relationship between returns and accounting measures of performance to capture the effect of the existence of transitory components in earnings and cash flow surprises: the first is the employment of both change and level to proxy for the unexpected component of earnings or cash flow and the second technique is the utilization of a non-linear relationship between returns and earnings or cash flow.

#### **1.4 Main Findings and the Structure of the Study**

The empirical results of this study suggest that cash flow conveys incremental information content beyond earnings when the effects of accruals volatility and signaling are taken into consideration. Our results show that when signals are consistent, this moderates the information content of cash flow but not of earnings, nor incremental information content in either case. Also, accruals volatility moderate this consistency effect on the valuation relevance of cash flow. Interestingly, these results are obtained with the pooled sample but not the more restricted survivor sample.

When we distinguish between the various combinations of signals, this is seen to moderate not only the valuation relevance of cash flow but also of earnings and the incremental information content of cash flow and earnings beyond each other. In

addition, accruals volatility moderates the effect of the various combinations of signals on the valuation relevance of earnings and cash flow. Again, the results are stronger in the case of the pooled sample.

In brief, our results imply that earnings and cash flow are not evaluated in isolation of each other in the market place. In particular, investors are seen to relate cash flow to earnings to assess the reliability of cash flow data. The extent to which this occurs, however, depends on the volatility of accruals. Finally, it should be emphasised that the more supportive results are provided after controlling for survivorship bias, which constrains the generalisability of prior research findings in this area.

This thesis is presented in seven chapters. In Chapter Two the relevant literature is reviewed. In this review, we first analyze the empirical studies that have examined the information content and incremental information content of earnings, funds flow, cash flow and accruals by relating earnings, funds flow, cash flow and accruals to stock returns. Then we look at studies which have examined the valuation relevance of the components of cash flow (operating, investing and financing components and their individual components) and studies that considered the determinants and the contextual factors that affect the valuation relevance of earnings and cash flow.

In our review of the literature, we discussed the prediction of each study, the methodological approach and the main findings, providing tabulated results as appropriate. A critical summary and discussion of the previous empirical evidence on the valuation relevance of earnings and cash flow is provided and the motivation and contributions of the present study are discussed in detail and its aims are stated.

Chapter Three presents the methodology which is utilised in this thesis. In this chapter, the research hypotheses are addressed, the sample selection criteria and procedures are stated, variables are defined, estimation models are specified and preliminary analysis and diagnostic tests are performed.

Chapter Four provides preliminary and descriptive analysis of the variables beside presenting and discussing the diagnostic tests.

Chapter Five presents and discusses the empirical results concerning the valuation relevance of earnings and cash flow.

Chapter Six extends the investigation of the valuation relevance of earnings and cash flow by employing recent innovations in modeling the relationship between returns and the accounting measures of performance. And finally, Chapter Seven summaries and concludes this thesis.

# CHAPTER TWO

## LITERATURE REVIEW AND MOTIVATION

### 2.1 Introduction

In this chapter, the relationship between earnings and cash flow is explained, the related literature is reviewed, analyzed and discussed in order to establish the main conclusions that can be drawn from previous studies and also to highlight the contributions of the present study to the current accounting literature on the assessment of the usefulness of earnings and cash flow for security valuation purposes.

#### 2.1.1 Accounting Measures of Performance: Earnings Versus Cash Flow

In this section, the relationship between the two accounting measures of performance (earnings and cash flow from operations) is explained and the main types of accruals are discussed.

Operating cash flow is the overall balance between how much cash the company is generating and how much it is absorbing over the accounting period. A fundamental reason for the difference between reported profit and cash relates to the concept of accruals. Preparing accounts on the basis of accruals means that revenue and costs are shown in the P&L account as they are earned or incurred, and not when cash is received or paid out. Profit, for example, may be reported before cash has been received.

According to the International Accounting Standards Committee (IASC), 1996:

“In order to meet their objectives, financial statements are prepared on the accrual basis of accounting. Under this basis, the effects of transactions and other events are recognised when

they occur (and not as cash or its equivalent is received or paid) and they are recorded in the accounting records and reported in the financial statements of the periods to which they relate. Financial statement prepared on the accrual basis inform users not only of past transactions involving the payment and receipt of cash but also of obligations to pay cash in the future and resources that represent cash to be received in the future. Hence, they provide the type of information about past transactions and other events that is most useful to users in making economic decisions.”

The difference between annual cash inflow and cash outflow is a simple and perhaps an obvious measure of a company’s financial performance. However, accountants have traditionally regarded this cash flow figure as suffering from severe matching and timing problems. Mismatching problems in cash flow appear when a cash outflow is made in one measurement interval (financial year) whereas the cash inflow associated with this cash outflow is received in another measurement interval. Thus, they prefer to adjust cash flow for so-called accounting accruals to give an earnings figure, which is supposedly a better measure of a company’s financial performance.

The main aim of the following discussion is to explain the accrual adjustments to earnings (E) to obtain cash flow from operations (CFO).

Reconciliation of the operating profit and cash inflow from operations, requires the company to provide information on, for example, the amount of depreciation it has charged, changes in its working capital requirements, and the use of provisions. Depreciation needs to be added back to the operating profit for, whilst it is a charge against profits, no cash is actually paid out by the company. The company became indebted to its creditors who have supplied it with goods and services for which it has yet to pay. As the company has yet to make payment, but



has effectively had use of this money, this sum needs to be added to the cash flow. Alternatively, the company has to fund the increase in debtors, thereby reducing cash available with the same amount of increase in debtors. Putting these three items together-stocks, creditors and debtors- allows the analyst to judge the extent to which the company's working capital requirements changed over the accounting period. The remaining major item is expenditure against provisions. This item relates to the extent to which provisions previously made in the P&L account have been utilized in the current accounting period. where this occurs cash flow is affected, whilst the reported profit for the accounting period is unchanged. The division of accruals into noncurrent (depreciation and provisions) and current (changes in working capital) categories provides working capital from operations (funds from operations) as an intermediate calculation that adjusts earnings for the noncurrent accruals. Further, cash flow from operations abstracts from earnings by excluding both current and noncurrent accruals.

Two methods are used to express the operating cash flow, the direct method shows as its principal components operating cash receipts and payments, such as cash received from customers and cash paid to suppliers and employees, the sum of which is net cash flow from operating activities. The indirect method starts with net income and adjusts it for revenue and expense items that were not a result of operating cash transactions in the current period to reconcile it to net cash flow from operating activities.

This chapter consists of four sections. The next section reviews the previous empirical evidence on the usefulness of earnings, funds flow, accruals and cash flow. Section 2.3 concentrates on other relevant literature, A summary, conclusions, discussion of the previous work and the motivation of the present study are provided in Section 2.4.

## **2.2 Earnings, Funds Flow and Cash Flow Studies:**

Among all the possible relationships between capital market variables and accounting information, the relationship between returns and earnings has been subject to the greatest scrutiny. This relationship has been at the forefront of accounting research over the last three decades since the remarkable seminal works of Ball and Brown (1968) and Beaver (1968). Both of these studies were event studies, and made a big impact on the subsequent literature of empirical accounting information usefulness. Ball and Brown (1968) related earnings information to abnormal returns while Beaver (1968) related earnings information to share price volatility and trading volume in the weeks surrounding an accounting announcement. Ball and Brown (1968) popularized the event study approach in accounting literature by investigating whether or not abnormal returns on the share are associated with the release of the preliminary annual earnings per share figures. They tested for the statistical significance of the association between earnings news and abnormal returns and found that the earnings numbers are useful in that the earnings forecast error, or earnings surprise, were significantly related to abnormal returns. Unlike Ball and Brown(1968) , Beaver (1986) avoided assessing whether an earnings report was good or bad news, in other words, he made no prediction either about the direction of the price change or by how much it would change in response to an earnings signal. Instead, he simply predicted that price changes were likely to be greater around the time of an earnings announcement, than when no information was released. Thus, whereas Ball and Brown predicted the direction of the price change conditional upon whether an earnings report was deemed good or bad news, Beaver predicted that the absolute value of the price change would be greater than at other times. One similarity between Ball and Brown (1968) and Beaver (1968) is that both of them introduce the notion that the informativeness

of accounting numbers could be assessed by ascertaining whether they induce a change in the behavior of stock prices. Following the work of Ball and Brown(1968) and Beaver(1968), empirical evidence on the association between accounting earnings and market returns has been gathered and the initial work of Ball and Brown (1986) and beaver (1986) has been further refined and extended. As a result, more powerful tests have been developed and more sophisticated methodological approaches have been utilized to test the relationship which has typically been estimated by the slope coefficient from the regression of abnormal stock returns on unexpected earnings deflated by a measure of a company's size, usually, the stock price at the beginning of the event period. The methodological improvements in assessing the relationship between earnings and returns were later utilized in assessing the usefulness of earnings in conjunction with cash flows.

As stated earlier, during the 1980s and 1990s, studies on the usefulness of accounting variables concentrated on examining the usefulness of earnings in conjunction with cash flow, funds flow, and accruals. These recent studies concentrated on investigating the information content of earnings and cash flow and the incremental information content of earnings and cash flow beyond each other (Rayburn, 1986; Ali and Pope, 1995; and Bowen et al, 1987 ;among others). Some studies explore the determinants of the informativeness of earnings and cash flow (Dechow, 1994; Charitou, 1997; Cheng et al, 1996; among others), and other studies have examined the valuation relevance of the cash flow components (Charitou,1993; Clubb, 1995; Livnat and Zarowin,1990; among others).

The earliest studies on the valuation relevance of cash flow go back to Ball and Brown (1968) and Beaver and Dukes (1972) who found a lower correlation between return and accrual income measures than between return and primitive definitions of funds from operations.

In these studies, funds were defined simply as net income plus depreciation and amortization. These earlier studies focused only on the part of the accrual process that tended to be highly correlated with accrual earnings. Later studies have employed more refined measures of cash flow and have introduced more sophisticated methodological aspects.

Brown (1993) stated that the earlier studies (Ball and Brown, 1968; Beaver and Dukes, 1972; among others) failed to detect a role for, what they called, cash flow maybe because they had not developed sufficiently refined measures. In particular they had used cash flow measures which were highly correlated with accrual earnings. In other words, they employed cash flow measures that were closer to the concept of funds flow rather than cash flow. That is they measured -what they called- cash flow by adjusting earnings to only the non-current part of the accrual process without adjusting for the movements in working capital, for example, Ball and Brown (1968) considered cash flow as earnings before deferred tax plus depreciation and amortization.

The more recent studies of the 1980s and 1990s that examine the usefulness of earnings in conjunction with cash flow use more refined measures of cash flow and employ more sophisticated methodological improvements to establish the usefulness of cash flow from operations and accruals beyond earnings. Some representative studies are summarized below.

### **2.2.1 Main- Effect Studies**

The purpose of this section is to review and summarize the recent empirical evidence on the information content and incremental information content of earnings, funds flow, cash flow

and accruals. A representative sample of these studies follows;

**Rayburn (1986)** focuses on the potential information provided to the market by the accrual adjustment process. Her study is motivated by the prediction that an equity share should be the discounted expected future cash flow stream of the firm and thus the rate of return on an equity investment is a function of (1) information about unexpected cash flow for the period and (2) information that leads to a revision in expectations of the amount or timing of the discounted future cash flow stream of the firm.

In this study, an operating cash flow variable is used as a surrogate for the information about unexpected cash flow that becomes public during the period. If the discounted cash flow model captures the salient variables of the valuation process, then unexpected cash flows will be associated with security returns. If accrual adjustments provide information which is useful in assessing the amount or timing of future cash flows, unexpected accrual adjustments will also be associated with security returns. The sample employed by Rayburn consists of 175 U.S. industrial firms with December 31<sup>st</sup> year-end. The test period is from 1963 to 1982 inclusive.

Two models are used to estimate the surrogate for expectations of explanatory variables. The first model is a time-series model which is referred to as the hold-out model which regresses each variable against the lagged values of all the financial statement variables, and the second is a random-walk model. Explanatory variables are then deflated by the beginning of year equity market value prior to time-series analysis.

The residuals from the estimated market model are used to measure unsystematic security returns. Sixty months of data prior to the test year are used in the market model estimation. Two cumulation periods for the abnormal returns are compared. The first period ends three

months after the fiscal year-end, the second period assumes an ending date that coincides with the fiscal year-end.

The following two models are then performed cross-sectionally for each year:

$$\text{M1: } \text{CAR} = \alpha_0 + \alpha_1 \text{CF} + \alpha_2 \text{AA} + e_{it}$$

$$\text{M2: } \text{CAR} = \beta_0 + \beta_1 \text{CF} + \beta_2 \text{DWC} + \beta_3 \text{DEPR} + \beta_4 \text{DTAX} + e_{it}$$

where, **CAR**: cumulative abnormal return using market model technique, **CF**: unexpected operating cash flow, **AA**: unexpected aggregate accrual, **DWC**: unexpected change in working capital, **DEPR**: unexpected Depreciation, **DTAX**: unexpected change in deferred tax from period t-1 to t.

The first model tests the incremental information content of cash flow and aggregate accrual beyond each other, while the second model tests for the incremental association of the components of accrual adjustments with abnormal returns. The following table summarises Rayburn's results;

**Table 2.1:** Association between Returns, Cash Flow and Accruals (Rayburn, 1986)

Variable	Model 1		Model 2	
	Time-series	Random-walk	Time-series	Random-walk
Intercept	0.025	0.036	0.005	-.009
CF	0.2268*	0.29*	0.45*	1.82*
AA	-0.007	-0.17		
DWC			0.46*	1.82*
DEPR			-0.092	-2.54*
DTAX			-0.57*	-1.77
<b>R-squared</b>	<b>0.07</b>	<b>.10</b>	<b>.1093</b>	<b>.1084</b>

\* Indicates significance at .05

The results are the mean of 20 yearly coefficients.

CF: operating cash flow, AA: aggregate accrual, DWC: change in working capital, DEPR: Depreciation, DTAX: change in deferred tax from t-1 to t

Rayburn's results support the association of both operating cash flow and aggregate accruals with abnormal returns. These results are robust across the two expectation models for the explanatory variables and the two cumulation periods for the dependent variable. The results for the components of accruals are less consistent. When the hold-out expectation model is used, only cash flow and changes in working capital have significant explanatory power, while the means of the sampling distribution of the coefficients of both depreciation and changes in deferred taxes are insignificant. However, all of the components of accrual are significant when a random-walk process is assumed to generate the time series of each component.

**Bowen et al (1987)** provide evidence on the role of accruals (i.e., earnings and working capital from operations ) and cash flow measures in an explanatory model of security prices. They first examine this issue by testing for an association between unexpected security returns and unexpected cash flows, after controlling for the relation between unexpected returns and unexpected earnings.

They also examine the reverse issue by testing for an association between unexpected security returns and unexpected earnings, after controlling for the relation between unexpected returns and unexpected cash flows.

They test these relations in two contexts; in results pooled over the entire period of the study and in year by year cross-sectional regressions.

Bowen et al's (1987) differs from the studies of Wilson (1986, 1987) in the following aspects. First, Bowen et al use an annual event window rather than using a short-event window. They chose an annual window because it is likely that new cash flow information becomes available to the market throughout the year. Second, they use different sample



selection procedures resulting in fewer firms investigated over more years (1972-1981 versus 1981-1982 in Wilson's studies.) Third, they scale the independent variables to obtain percentage changes.

Unexpected earnings and unexpected working capital from operations are defined as the percentage change in net income before extraordinary items and working capital from operations WCFO, respectively.

Unexpected cash flow from operations is calculated as follow

$$UCFO = (CFO_{it} - WCFO_{it-1}) / WCFO_{it-1}$$

$$UCFAI = (CFAI_{it} - CFAI_{it-1}) / CFAI_{it-1}$$

To measure the unexpected return, Bowen et al choose a 12-month event period that includes the four months after the fiscal year end and they use the market model to define the expected return during the event period. Parameters of the model are estimated over a period that includes 60 months prior to the first month in the event period. The parameters are re-estimated for each firm year.

Before summing the unexpected returns, each month's unexpected return is standardised by the forecast error for the particular month. Once the monthly returns have been standardised to remove a potential cause of heteroscedasticity, they are accumulated over the 12-month event period to form a cumulative standardised unexpected return (CSAR<sub>it</sub>).

The sample consists of 98 U.S firms . The testing period ranges from 1972 through 1981. The sample firms tend to be larger and more liquid than the typical firm on COMPOSTAT. Because of this, cash flow information might be expected to have relatively less incremental

importance for sample firms.

The following models were performed :

$$\text{M1 : CSUR}_{it} = B_0 + B_1 \text{UE}_{it} + B_2 \text{UWCFO}_{it} + B_3 \text{UCFO}_{it} + B_4 \text{UCFAI}_{it} + e_{it}$$

$$\text{M2 : CSUR}_{it} = B_0 + B_1 \text{UE}_{it} + e_{it}$$

$$\text{M3 : CSUR}_{it} = B_0 + B_1 \text{UE}_{it} + B_2 \text{UWCFO}_{it} + e_{it}$$

$$\text{M4 : CSUR}_{it} = B_0 + B_1 \text{UE}_{it} + B_3 \text{UCFO}_{it} + B_4 \text{UCFAI}_{it} + e_{it}$$

$$\text{M5 : CSUR}_{it} = B_0 + B_3 \text{UCFO}_{it} + B_4 \text{UCFAI}_{it} + e_{it}$$

where,

$\text{CSUR}_{it}$  is the unexpected return to common equity for firm i over the period t;

$\text{UE}_{it}$  is unexpected earnings for firm i in time period t;

$\text{UWCFO}_{it}$  is unexpected working capital from operations for firm i in period t;

$\text{UCFO}_{it}$  is unexpected cash flow from operations for firm i in period t;

$\text{UCFAI}_{it}$  is unexpected cash flow after investment for firm i in time period t.

Each of these models was performed in two ways : 1) pooled both cross-sectionally and intertemporally, and, 2) cross-sectionally by year.

The first procedure, pooling the data cross-sectionally and intertemporally assumes that an unexpected negative cash flow is accompanied by the same unexpected security return ( in both direction and magnitude ) in a prosperous year as in a recession year. To decrease the probability that this assumption is violated, the independent variables are transformed by subtracting the cross-sectional mean of each independent variable from the value of that observation in each year.

The following table shows the results of running the models on the pooled data set :

**Table 2.2:** Association between Returns, Earnings, Funds Flow and Cash Flow  
(Bowen et al, 1987)

Model	UE	UWCFO	UCFO	UCFAI	R <sup>2</sup>	F-ratio	B3=B4=0	B1=B2=0
Model 2	.016*				.02	16.6**	NA	NA
Model 3	.015*	.002			.02	8.3***	NA	NA
Model 4	.018*		.003***	.001***	.04	12.5**	10.0*	NA
Model 1	.018*	.002	.003***	.001***	.04	9.5***	11.0*	10.56
Model 5			.003***	.001*	.02	7.8***	NA	NA

\*, \*\*, \*\*\*: denotes statistically significant at .1, .05 and .01 respectively,

The return measure is the unexpected return to common equity for firm  $i$  over the period  $t$ ;

$UE_{it}$  is unexpected earnings for firm  $i$  in time period  $t$ ;

$UWCFO_{it}$  is unexpected working capital from operations for firm  $i$  in period  $t$ ;

$UCFO_{it}$  is unexpected cash flow from operations for firm  $i$  in period  $t$ ;

$UCFAI_{it}$  is unexpected cash flow after investment for firm  $i$  in time period  $t$ .

From Table 2.2, the following results were concluded:

In general, the cash flow variables (primarily cash from operations) have significant information content by themselves. The accrual-based variables (primarily earnings) frequently have significant incremental information beyond that contained in cash flow numbers. The cross-temporal t-test supports the hypothesis of the incremental information content of earnings and is generally consistent with the t-test from the pooled model.

**Wilson (1986)** investigates the information content of two accrual variables: the current accrual and the non-current accruals variables. This study investigates the relative information content of accrual and cash from operations. It also considers separately the relative information content of non-current accruals and working capital from operations and of current accruals and cash from operations.

This study differs from previous work in that the author considers the implications of various hypotheses about the information content of accruals on the joint behaviour of stock returns at the time of two information releases; the Wall Street Journal earnings announcement and

the date the annual report arrives at the SEC. A model is introduced which structures the way information about the accrual and cash components of earnings is extracted from earnings when they are published in the Wall Street Journal. This also links the association between this information component and stock returns at the time of earnings announcement to the association between stock returns and information components released at a later date when the annual report arrives at the SEC.

Wilson's study depends mainly on a two-return model which structures the way the investors can use the new information on earnings and revenues published in the Wall Street Journal to update their forecasts for the period's accrual and funds. In addition, it specifies how the market's responses to these updates are measured by using event intervals representing both the earnings announcement and the annual report release date to determine the information content of accruals and funds. In addition, this study uses a single-return, two-events model which covers both the earnings and funds announcements with a single return.

The sample was restricted to manufacturing firms, and consisted of 322 firm-year observations covering two years (1981-1982).

Each firm's accounting variables were scaled by the total asset value reported in the annual financial statements at the end of the fiscal year in which the accounting variables were reported.

Wilson's (1986) results indicate that cash and total accruals components of earnings have incremental information content beyond the earnings themselves and that the total accruals component of earnings has incremental information content beyond the cash component. In addition, there is evidence that either noncurrent accruals do not have incremental information

content beyond working capital from operations or that they are known prior to the earnings announcement.

**Wilson (1987)** investigates whether the accrual and funds components of earnings have incremental information content beyond the earnings. The hypothesis considered in this study is that, conditional on knowing earnings, investors do not change their assessment of share value when they observe funds from operations. Wilson's work was motivated by the insight that earnings and revenues are announced in the Wall Street Journal before the annual report, which contains both accrual and funds items, is released. This allows a direct measurement of the incremental information content of the accrual and funds components of earnings which is not possible when these releases are treated contemporaneously.

In this study, Wilson considers two ways to decompose earnings. Each alternative splits earnings into two parts : a fund from the operations component and a corresponding accrual component. In one case, the funds component is working capital from operations, and the accrual component is the noncurrent accruals variable, which is defined here as working capital from operations less earnings. In the other case, the funds component is cash from operations and the accrual component is the total accruals variable, which is defined here as cash from operations less earnings. Wilson hypothesises that both of these fund items are less correlated with earnings than earnings plus depreciation and are therefore more likely to have incremental information content beyond earnings.

The sample consists of 300 large U.S manufacturing firms, submitting 1981 and 1982 (test years) news releases containing information about items in their annual financial statements. All of the procedures involving estimation and inference are conducted using current year total

assets scaling.

Information content is determined here by examining the association between market model prediction errors averaged over two event periods (Three and nine days, centred on the date the annual report arrives at the SEC) and the forecast error corresponding to accounting items released during this period.

The information content is measured using the regression and portfolio approaches. Both use a two-stage procedure where accounting forecast equations are estimated cross-sectionally in the first stage, and the association between the residual from the first-stage regression and the market model prediction errors is determined in the second stage. In one case, market model prediction errors are regressed cross-sectionally against the first-stage residuals, while in the other case, portfolios are formed according to the magnitude of the first-stage residuals and then their mean returns are compared in order to test the predictions of the study.

The cross-sectional regression approach:

The following model was used to test the association between abnormal return and unexpected components of funds :

$$\mathbf{ret} = \mathbf{b}_1 (\mathbf{unexpected\ funds}) + \mathbf{v}$$

where  $\mathbf{ret}$  represents the market model prediction errors and  $\mathbf{v}$  is the residual.

The unexpected funds were estimated as the error of the following expectation model:

$$\mathbf{F} = \mathbf{B}_1 \mathbf{W} + \mathbf{e}$$

where  $\mathbf{F}$  represents fourth-quarter funds from operations;  $\mathbf{W}$  is a vector of information available at the earnings announcement and is supposed to be used by investors to make expectations about  $\mathbf{F}$ ; and  $\mathbf{e}$  is a proxy for new information about  $\mathbf{F}$  released after the earnings announcement ( the unexpected funds ).

The portfolio approach:

Two cut-off points are used to partition observations into three groups : low, medium, and high according to the magnitude of the forecast error. Forecast errors of more than .5 standard deviations above the mean are classified as 'high'. Those forecast errors of more than .5 standard deviations below the mean are labelled 'low' and the remainder are classified as 'medium'.

The market model prediction errors are averaged across all observations in the portfolio and the prediction of the study is tested by comparing the differences in means across the portfolio using a Hotelling T(squared )-test.

In this study, Wilson finds evidence of an association between stock returns, measured over a nine-day interval centred on the date the annual report arrived at the SEC, and new information about cash from operations released during this interval. This implies that the cash from operations and total accrual components of earnings, taken together, have information content beyond earnings. In contrast, there is insufficient evidence to conclude that the noncurrent accrual and working capital from operations components of earnings have incremental information content beyond earnings.

**Lobo and Song (1989)** investigate the incremental information in alternative measures of constant dollar and current cost operating income over historical cost income and its cash and accrual components.

Their study was motivated by prior research on this subject which examined the relation between stock returns computed over a 12-month period and variables measuring the

unexpected portions of historical cost income and constant dollar and current cost operating income. This study examines the contemporaneous association between unexpected stock returns and variables of interest in the week of release of the annual reports. The authors assume that the date historical cost earnings are published in *The Wall Street Journal* is a close proxy for the date on which firms release them. For the constant dollar and current cost operating measures of earnings, the authors assume that whichever date is earlier of the annual report arrival date and the 10-K arrival date at the SEC is a close proxy for the date on which these measures of earnings are first available to investors.

They assume that any market reaction to the historical cost earnings announcement will have taken place before the constant dollar and current cost earnings information becomes available. Because information about the constant dollar and current cost earnings is released together with information about cash and accrual information, the research was designed to control for the effect of cash and accrual information. Consequently, this study may be viewed as a test of the incremental information content of constant dollar and current cost operating earnings over the cash and accrual components of historical cost earnings and also as a test of the incremental information content of cash flow and accrual components of historical cost earnings over constant dollar and current cost operating earnings measures.

Their sample consisted of 409 firm-year observations over the three-year period 1980-1982. Sample firms were required to have December 31 fiscal year-ends. Firms belonging to utilities and financial companies were excluded.

To test for the incremental information content of earnings and cash flow beyond each other, cash flow from operations (CF) is defined as working capital from operations plus current



accruals, while each of the followings profitability measures was employed separately to represent earnings:

1. Historical Cost (HC)
2. Current Cost (CC)
3. Constant Dollar operating income (CD)
4. Constant dollar operating income plus purchasing power gain or loss (CDP)
5. Current cost operating income plus purchasing power gain or loss (CCP)
6. Current cost operating income plus holding gain (CCH)
7. Current cost operating income plus purchasing power gain or loss plus holding gains (CCPH).

All earnings and cash flow variables are expressed as the change in their corresponding per share values from the preceding year and are deflated by each firm's market price per share of common stock at the beginning of the period.

The following model was used to assess the incrementality of the measures of interest:

**Model 1:** This model allows the intercept and the slope coefficients to differ across industries:

$$UR_{it} = \sum B_j D_j + \sum Y_j D_j E_{it} + \sum S_j D_j CF_{it} + e_{it}$$

where,

$UR_{it}$  is the unexpected return for firm  $i$  in period  $t$ , which is the prediction error in a market model.

$E_{it}$  is the change in the earnings measure deflated by each firm's market price per share of common stock at the beginning of the period,

$CF_{it}$  is the change in cash flow deflated by each firm's market price per share of common stock at the beginning of the period,

$D_j$  is a dummy variable represents the industry.

Based on the results of this model which suggest that there are significant differences across industries in the slope of income variables and the cash flow variable, but not in the intercepts,

Lobo and Song reformulate the model as follows :

**Model 2:** This model allows the slope coefficients, but not the intercept, to vary across industries:

$$UR_{it} = B + \sum B_j D_j + \sum Y_j D_j E_{it} + \sum S_j D_j CF_{it} + e_{it}$$

where,

$UR_{it}$  is the unexpected return for firm  $i$  in period  $t$ , which is the prediction error in a market model.

$E_{it}$  is the change in the earnings measure deflated by each firm's market price per share of common stock at the beginning of the period,

$CF_{it}$  is the change in cash flow deflated by each firm's market price per share of common stock at the beginning of the period,

$D_j$  is a dummy variable represents the industry.

Their results indicate that there is incremental information conveyed to the market by the cash flow variable beyond that contained in each of the price-adjusted earnings measure.

**Ali and Pope (1995)** examine the incremental information content of earnings, funds flow from operations and cash flow from operations by incorporating the following innovations in the specification of the model :

- 1- using a nonlinear form for the relation between returns and performance measures (earnings, funds flow from operations and cash flow from operations).
- 2- using the current levels of performance measures together with the changes in these measures ( both deflated by the beginning of the period market value of equity ).
- 3- using time-varying parameters in the models.

The data set consists of large industrial and commercial firms with December fiscal year-end. A final sample of 1160 firm-years observations is included, covering 247 distinct firms, spanning a 7-year period from 1984 to 1990. An annual event window was used and the market return measure was the raw return adjusted to the respective annual holding period returns of all the UK firms.

The following models were run:

**Model 1:** Linear model without time-varying parameters.

**Model 2:** Linear model with time-varying parameters.

**Model 3:** Non-linear model without time varying parameters.

**Model 4:** Non-linear model with time-varying parameters.

the current levels of performance measures together with the changes in these measures (both deflated by the beginning of the period market value of equity).

At first, these models were used to examine the information content of each of the three alternative accounting measures of performance (earnings, funds flow and cash flow) separately. They found that by adopting these innovations, the explanatory power of both the funds flow-returns model and the cash flow-return model improved significantly as suggested by the resulting explaining power ( $R^2$ ) reported in the following table:

**Table 2.3:** Goodness of Fit of Linear and Non-linear Estimation Schemes  
(Ali and Pope, 1995)

Explanatory performance measure:	Model	$R^2$ %
Earnings	Linear model without time-varying parameters.	15.23
	Linear model with time-varying parameters.	18.53
	Non-linear model without time varying parameters.	17.06
	Non-linear model with time-varying parameters.	20.84
working Capital from Operation	Linear model without time-varying parameters.	9.92
	Linear model with time-varying parameters.	12.41
	Non-linear model without time varying parameters.	12.07
	Non-linear model with time-varying parameters.	15.77
Cash Flow from Operation	Linear model without time-varying parameters.	4.06
	Linear model with time-varying parameters.	3.95
	Non-linear model without time varying parameters.	4.68
	Non-linear model with time-varying parameters.	5.25

The sample consists of 1160 firm-years observations, covering 247 distinct firms, spanning a 7-year period from 1984 to 1990.

An annual event window was used and the market adjusted return was the return measure.

Ali and Pope re-examine the issue of incremental information content of the three measures by using multiple regression settings. which suggest that the explanatory power of the incremental information content model increased significantly by incorporating each of the three innovations. The results further suggest the existence of incremental information content of earnings, funds flow and cash flow.

**Charitou (1995)** examines the association of the accrual and cash flow measures with the market value of the firm by employing a cross-sectional valuation model, where the market value of the firm is a function of the following three components a) permanent earnings, b) risk and c) growth as follows:

$$\text{MKTV} = b_0 + b_1 \text{ OPNI} + b_1 \text{ TAC} + b_2 \text{ BETA} + b_3 \text{ G}$$

$$\text{MKTV} = b_0 + b_1 \text{ OPNI} + c_1 \text{ LTA} + c_2 \text{ STA} + b_2 \text{ BETA} + b_3 \text{ G}$$

$$\text{MKTV} = b_0 + b_1 \text{ CFFO} + c_1 \text{ LTA} + c_2 \text{ STA} + b_2 \text{ BETA} + b_3 \text{ G}$$

where,

MKTV: the market value of common equity

OPNI: operating earnings

CFFO: cash flow from operations

TAC: total accruals = CFFO-OPNI = LTA + STA

LTA: long-term accruals = WCFO-OPNI = TAC-STA

STA: short-term accruals = CFFO-WCFO = TAC-LTA

BETA: systematic risk

G: growth in book value

The dependent and independent variables ( except Beta ) were deflated by a measure of firm size to minimize the heteroscedasticity of the models' residuals. Two measures were used as

deflators : a) book value of common equity in the regulated sector, and b) book value of total assets in the non-regulated sector. The sample consisted of 403 U.S firms with December 31<sup>st</sup> fiscal year-end and the sampling period covered ten years from 1976 to 1985. Monthly stock market returns were used to calculate BETA as measure of risk.

The principle findings are, firstly, that given operating earnings, aggregate accruals explain differences in the market value of equity across firms; secondly, that given operating cash flow, both current and non-current accruals explain differences across firms in the market value of equity, and thirdly, that the market responds more favourably to operating cash flows than to current and noncurrent accruals.

**McLeay, Kassab and Helan (1997)** examine whether accruals surprises have incremental information content beyond surprises in earnings. In order to estimate the incremental effects of accruals, the analysis is based on a hierarchy of nested models as follows ;

**Model 1:**  $R_{it} = a_0 + a_1 UE_{it} + u_{1it}$

**Model 2:**  $R_{it} = a_0 + a_1 UE_{it} + a_2 UNCA_{it} + u_{it}$

**Model 3:**  $R_{it} = a_0 + a_1 UE_{it} + a_2 UNCA_{it} + a_3 UCA_{it} + u_{it}$

where,  $R_{it}$  is unexpected return;  $UE_{it}$  is unexpected earnings;  $UNCA_{it}$  is unexpected noncurrent accruals;  $UCA_{it}$  is unexpected current accruals.

Explanatory variables were deflated by the beginning of the period share price. Three expectations models were used: the random walk (RW), the integrated moving average (IMA), and the exponentially-weighted moving average (EWMA).

The authors used the following estimation schemes:

- 1- A general pooled model
- 2- A model with a time-varying constant
- 3- A model with time-varying market response
- 4- A model with company-varying market response
- 5- Homoscedastic pooling scheme after adjusting for autoregressive error.

The sample consisted of 104 UK manufacturing firms and the sampling period covered 13 accounting years ending between March 1992 and February 1993, resulting in a final pooled sample of 1352 firm-year observations. The market model was used to estimate the abnormal returns which were aggregated over 12-month event periods including the four months after the accounting year end. The following table shows the explaining power ( $R^2$ ) of the three models among each estimation scheme:

**Table 2.4:** Goodness of Fit given Alternative Earnings, Funds Flow and Cash Flow Expectations Models (McLeay, Kassab and Helan,1997)

Estimation Schemes	Model	RW <sup>1</sup>	IMA <sup>1</sup>	EWMA <sup>1</sup>
General pooled	M1	10.08	9.73	16.37
	M2	10.52	9.91	17.96
	M3	11.12	10.5	19.37
Time-varying constant	M1	10.6	9.67	17.93
	M2	11.06	9.9	19.4
	M3	11.69	10.54	20.58
Time-varying constant & slope	M1	11.36	11.92	17.81
	M2	13.62	15.6	20.18
	M3	17.99	17.63	21.86
Firm-specific regressions	M1	11.12	10.06	15.22
	M2	13.66	14.4	18.18
	M3	16.69	17.18	20.15
Homoscedastic Pooling after adjusting for autoregressive error	M1	11.56	12.47	20.02
	M2	12.76	14.95	21.51
	M3	13.79	15.46	23.36

<sup>1</sup>: RW, IMA, and EWMA are the random walk, the integrated moving average, and the exponentially-weighted moving average respectively. M1: earnings only model, M2: earnings and non-current accruals model, and M3: earnings and the non-current accruals and the current accruals model.

The sample consisted of 104 UK manufacturing firms with a 1352 firm-year observations.

A considerable increase in  $R^2$  was observed by estimating earnings surprises and accruals surprises by exponentially weighting the levels and changes in earnings, funds flow and cash flow over the estimation period.

Furthermore, the results indicate that there is little doubt about the incremental information content of current and noncurrent accruals beyond that in earnings, and hence the authors provide further evidence, in addition to Clubb (1995 ) and Ali and Pope (1995) of the incremental information in cash flow. In addition, the assumption of a random walk is found to be untenable for all three variables, and for most companies, and greater emphasis is placed in the exponentially-weighted moving average (EWMA) forecasts on prior levels of cash rather than on the current observation, whilst the weight functions for earnings levels and funds flow levels are more variable across companies. The exponentially-weighted moving average (EWMA) surprises are weighted deviations from the long term level and long term trend, and the financial market appears to value such information in both earnings and accruals.

**Pfeiffer et al (1998)** assess the impact of the implied measure of market expectations used in relating security returns to changes in earnings components. To do so, they first assess the extent of auto- and cross-correlations among earnings components (noncurrent accruals, current accruals and cash flows ) and attempt to exploit these historical relations in developing predictions of current period levels of the earnings components. The empirical results show that these historical dependencies are sufficiently stable to enable predictions of funds-based components that are significantly more accurate than random-walk predictions.

After confirming the superiority of historical auto- and cross-correlations over the random-walk assumption in predicting earnings components, the question which arises is whether

more accurate predictions of earnings components provide better representations of securities market expectations. For example, Sloan (1996) reports evidence that the market may not fully impound the differential implications of earnings components in predicting future earnings. For this reason, Pfeiffer et al (1998) employ the predicted values of earnings components to represent security market expectations in assessing the market's valuation of unexpected changes in the components.

The following two models were performed, for each year separately, using the random-walk as well as serial dependency-based predictions as a proxy for securities market expectations :

(i) The simple-linear model : this models aims at investigating the existence of incremental information content for each component of earnings, and takes the following form :

$$SAR_j = y_0 + y_1 UE_j + y_2 UWCFO_j + y_3 UCFFO_j + e_j$$

where  $UE_j$  ,  $UWCFO_j$  and  $UCFFO_j$  are unexpected earnings, working capital from operations and cash flows from operations, respectively; and SAR is the size-adjusted return.

(ii) The Peisewise-linear model : this model aims at testing the differential valuation relevance of moderate versus extreme observations of unexpected components and takes the following form:

$$SAR_j = S_0 + S_1 UE_j + S_2 D^E UE_j + S_3 UWCFO_j + S_4 D^{WC} UWCFO_j + S_5 UCFO_j + S_6 D^{CF} UCFO_j + e_j$$

where  $D_j^E$  (  $D_j^{WC}$ ,  $D_j^{CF}$  ), are ( 0,1 ) dummy variables with a value of zero when the absolute value of  $UE_j$  (  $UWCFO_j$ ,  $UCFO_j$  ) is below the cross-sectional median in a given year, and a value of one otherwise. The sample consists of US firms and the testing period covers the period 1981-1996.



The dependent variable, size-adjusted return is defined as the difference between the realized return on a firm's common stock for the 12 months ending March 31<sup>st</sup> of year t+1 and the mean return for all sample firms in the same size decile (where size is defined based on market value of equity at the start of year t ). Earnings, working capital from operations, cash from operations, current accruals and noncurrent accruals, are per share values scaled by share prices at the start of the earnings year. All firm-year with returns or scaled earnings variables exceeding 1, or -1 have been deleted.

The following table shows the results:

**Table 2.5:** Goodness of Fit of Piecewise Linear Models, with Estimated Coefficients (Pfeffer et al,1998)

Variable	Random walk model		Serial dependency model	
	Linear model	Piecewise-linear model	Linear model	Piecewise-linear model
Intercept	-0.03*	-0.03*	-0.015	-0.02*
UE <sub>j</sub>	0.31*	2.65*	0.68*	4.23*
D <sup>E</sup> UE <sub>j</sub>		-2.35*		-3.57*
UWCFO <sub>j</sub>	0.29*	1.26*	0.32*	1.46*
D <sup>WC</sup> UWCFO <sub>j</sub>		-0.99*		-1.16*
UCFO <sub>j</sub>	-0.002	0.51*	0.11*	0.67*
D <sup>CF</sup> UCFO <sub>j</sub>		-0.51*		-0.58
<b>R-squared</b>	<b>0.052</b>	<b>0.065</b>	<b>0.115</b>	<b>0.138</b>

Parameters are the means of 16 parameters estimates obtained in each year 1981-1996.

The dependent variable is the size-adjusted common stock return for the 12 months ended March 31 of year t+1; UE<sub>j</sub>, UWCFO<sub>j</sub>, UCFO<sub>j</sub> are the unexpected earnings, unexpected working capital from operations, and unexpected operating cash flow, respectively. All three variables are scaled by share price at the start of the earnings year;

D<sup>E</sup>, D<sup>WC</sup>, D<sup>CF</sup>: are indicator variables equal to 1 when the absolute values are at or above their cross sectional medians and zero otherwise;

\* indicates significant at 0.01 or less.

The results indicate that the incremental securities market valuations of cash flows over current accruals which are undetectable with a random-walk proxy for market expectations are significantly positive when expectations are proxied by predictions from historical

dependencies among the earnings components. Moreover, the differential positive valuation of cash flows is apparent for both moderate and extreme unexpected changes in cash flows.

The higher adjusted R-squared values reported when using serial dependencies predictions suggest that predictions of funds-based earnings components based on historical auto- and cross-correlations among the components are better representations of investors' expectations than random-walk predictions.

**Schaefer and Kennelley (1986)** compare different definitions of cash flow in terms of their incremental explanatory power over historical cost earnings, concerning changes in equity share prices. Their study was motivated by the suggestion of some researchers that a more refined definition of cash flow may be more meaningful than a simple cost allocation add-back to historical cost income.

They examine three definitions of cash flow from operations. The first cash flow variable is the percentage change in historical cost net income per share prior to deductions for depreciation, depletion, and amortization. The second is computed as working capital from operations plus the decrease in current assets other than cash and the increase in current liabilities less increase in current assets other than cash and decrease in current liabilities. The final cash flow variable is computed in the same manner as the second one with the exception that changes in current maturities in long-term debt are ignored in the adjustment process.

The sample consists of industrial U.S firms for the period 1972-1981. In addition, the results reported for each year are based on the companies with the absolute value of percentage

change in any earnings variable not exceeding 300 percent and with a positive historical cost and cash flow from operations in the preceding year.

The return is defined as cash dividends plus capital gains and losses divided by the security price at the beginning of the period. The returns are then adjusted for the effects of a market wide risk factor through the use of the market model. The parameters of the market model were estimated over the 60 months preceding the year of investigation.

The research design employs cross-sectional regressions where risk-adjusted security returns serve as the dependent variable while historical cost income and one of the three cash flow variables serve as the independent variables.

The following table shows the results of the regression models:

**Table 2.6:** Goodness of Fit given Alternative Definitions of Cash Flow  
(Schaefer and Kennelley, 1986)

Cash flow Definition	Explanatory power
Crude Cash Flow 1 Definition	0.1482
Refined Cash Flow 2 Definition	0.1473
Refined Cash Flow 3 Definition	0.1462

The results are pooled results over the sampling period (1977-1981).

The first cash flow variable is the percentage change in historical cost net income per share prior to deductions for depreciation, depletion, and amortization. The second is computed as working capital from operations plus the decrease in current assets other than cash and the increase in current liabilities less increase in current assets other than cash and decrease in current liabilities. The third cash flow variable is computed in the same manner as the second one with the exception that changes in current maturities in long-term debt are ignored in the adjustment process.

The results do not provide support for the assertion that refined cash flow definitions (the second and the third definitions of cash flow from operations) provide greater association with risk-adjusted security returns than that obtained by using the crude cash flow definition (the first definition).

## 2.2.2 Disaggregation Studies

Most of the studies that have been discussed focused on the incremental information content of operating cash flow, given earnings or accruals, without considering the financing and investing components of cash flow. Livnat and Zarowin (1990) were the first to extend the valuation relevance literature of earnings and cash flow by investigating the prediction of valuation relevance of the operating, investing and financing components of the firm's cash flow, followed by Charitou and Ketz (1991), Clubb (1995) and Garrod and Hadi (1998). While Clubb concentrated on the aggregate operating, investing and financing components of cash flow, Livnat and Zarowin considered further disaggregation of the operating, financing and investing components of cash flow to their individual components, predicted by theoretical models in finance, economics and accounting to be differently associated with stock returns.

These studies are summarized and discussed below :

**Livnat and Zarowin (1990)** examine whether the individual components of operating, financing, and investing cash flows are differently associated with annual security returns. Their study was motivated by the fact that theoretical models in finance, economics, and accounting imply that individual components of operating, financing, and investing cash flows should be associated with annual security returns in a manner that differs predictably in terms of both sign and magnitude of the association.

The sample consists of 434 U.S firms with December fiscal year-end during the period 1974-1986. However, not every firm is represented in the sample in every year because only 281 firms have available data for all years during the period 1974-1986. The study uses all the firms with available data for a particular year (at least 345 firms each year).

The following four regression models are performed:

$$\text{M1: CAR} = a_0 + a_1 \text{ Collection} + a_2 \text{ Payments} + a_3 \text{ Taxes} + a_4 \text{ Interest} + a_5 \text{ Other} + b_1 \text{ Debt} + b_2 \text{ Common} + b_3 \text{ Preferred} + b_4 \text{ Dividends} + c_1 \text{ PPE} + c_2 \text{ Acquisition} + c_3 \text{ Minority} + c_4 \text{ Subsidiary} + c_5 \text{ RetPPE} + d_1 \text{ Accrual} + e$$

$$\text{M2: CAR} = f_0 + f_1 \text{ CFO} + g_1 \text{ Accrual} + u$$

$$\text{M3: CAR} = h_0 + h_1 \text{ AggOP} + h_2 \text{ AggFin} + h_3 \text{ AggInv} + h_4 \text{ Accrual} + q$$

$$\text{M4: CAR} = p_0 + p_1 \text{ NetIncome} + v$$

To estimate the unexpected components of each independent variable, the authors assume a random walk expectation model deflated by the market value of the equity at the beginning of the year.

The dependent variable is the abnormal returns cumulated over the twelve months since the disclosure of the previous year's data. The abnormal returns are estimated by the market model using all available observations ( with a minimum of 30 observations ) over a 60-month period that ends in December of the preceding year.

The following table shows the goodness of fit of the employed models:

**Table 2.7:** Goodness of Fit given Alternative Disaggregations of Cash Flow (Livnat and Zarowin,1990)

Model	R-Squared <sup>1</sup>
Model 1	0.248
Model 2	0.085
Model 3	0.116
Model 4	0.081

<sup>1</sup>: Unadjusted Mean R-squared over the 13 sampling years (1974-1986).

Note: the results are based on data from all available firm-years, similar results were obtained for 281 firms that had available data in every year during 1974-1986.

The results indicate that individual components of financing and operating cash flows are differentially associated with security returns, with signs predicted by theory. In contrast, they find no evidence of differential associations across components of investing cash flows.

Furthermore, this study shows that there is incremental information content in disaggregating net income into accruals and components of cash flows from financing, investing, and operating activities, as compared to the information content of earnings alone.

**Charitou and Ketz (1991)** examine the association of cash flows from operating, financing and investing activities with security prices by employing a cross-sectional equity valuation model under which the market value of the firm is a function of cash flow constructs, beta and growth in the book value of total assets. The following model is run cross-sectionally for the period 1976 to 1985, to determine whether the results are sensitive to the year chosen.

$$MKTV = b_0 + b_1CAAI + b_2TAG + b_3EXP + b_4DIV + b_5INV + b_6RISK + b_7GROWTH + e$$

where,

MKTV is the market value of the firm; CAAI is the cash available after investment and dividends but before external financing; TAC is total accruals, EXP is the capital expenditures; DIV is the dividends; INV is the investments; RISK is the systematic risk of a firm's common stock; GROWTH is the growth in book value of total assets.

The sample consists of US firms (except financial and regulated firms) included in the COMPOSTAT and Centre for Research in Securities Prices (CRSP) databases for the period 1968 to 1985. All companies with sufficient available data were selected. There are 403 firms in the sample. The following table shows the results of running the above model:

**Table 2.8:** Estimated Coefficients on Cash Flow Components (Charitou and Ketz, 1991)

Variable							
INT	CAAI	TAC	EXP	DIV	INV	RISK	GROUTH
-.27*	1.75*	-1.7*	1.31*	21.9*	1.55*	-.06*	2.4*

\*: significant at .01, The dependent variable is the market value of the firm, INT: intercept, CAAI: cash after investment, TAC: total accruals, EXP: capital expenditure, DIV: dividends, INV: investment

The results show that the coefficient of the cash available after investment and dividends but

before external financing is statistically significant and positive in all years. Moreover, the coefficient of total accruals, capital expenditures, dividends and investments are significant in all years. In general, these results indicate that the accrual and cash flow components of earnings are valued in the marketplace and that there exists a strong association between the various cash flow components included in the cash flow statements and the market value of the firm.

**Clubb (1995)** criticised prior information content studies of cash and funds flow data because of their focus on operating flow rather than on a broader set of cash or funds flow data including investment and financing flows; he also criticised their failure to incorporate insights from valuation theory. The MM valuation model implies that dividends or net dividends are the appropriate measures of aggregate cash flow for equity valuation purposes. This study extends the linear earnings valuation model of Lipe (1986) into a linear dividend valuation model for testing the information content and the relative information content of earnings, fund flow, and cash flow.

Clubb's study is based on the standard MM equity valuation model (Modigliani and Miller, 1961; and Fama and Miller, 1972). The exclusion of the earnings capitalisation assumption in his model provides the basis for testing the information content of cash and funds flow data and the relative information content of cash, funds, and earnings data.

The sample consists of 48 UK companies with continuous data available between 1955 and 1984 and which maintained either December 31<sup>st</sup> or March 31<sup>st</sup> accounting year end throughout the sample period. All the variables used in the estimation of the prediction models were converted into real terms using the Retail Price Index (RPI) and expressed on a per share basis.

Unexpected returns are measured as residuals from an annual market model estimated for each company. A four month lag in the annual return cumulation period is utilized.

A set of six returns equations of the following form are estimated for each company in the sample using OLS :

$$M1: URR_t = B_0(1/P_t) + B_1(UW_t/P_t) + B_2(UX_t/P_t) + u_t$$

$$M2: URR_t = B_0(1/P_t) + B_1(UE_t/P_t) + u_t$$

$$M3: URR_t = B_0(1/P_t) + B_1(UO_t/P_t) + B_2(UI_t/P_t) + B_3(UF_t/P_t) + u_t$$

$$M4: URR_t = B_0(1/P_t) + B_1(UD_t/P_t) + u_t$$

$$M5: URR_t = B_0(1/P_t) + B_1(UW_t/P_t) + B_2(UX_t/P_t) + B_3(UO_t/P_t) + B_4(UI_t/P_t) + B_5(UF_t/P_t) + u_t$$

$$M6: URR_t = B_0(1/P_t) + B_1(UE_t/P_t) + B_2(UD_t/P_t) + u_t$$

where for the year t,

URR is the unexpected returns using the market model, UW is the unexpected working capital from operations; UX is the long term accrual; UO is the operating cash flow; UI is the unexpected investment; UF is the unexpected financing; P is the share price at the beginning of the year; UD is the unexpected dividends.

The following table shows the results of running the above models for each of the 48 companies included in the sample:

**Table 2.9:** Estimated Coefficients<sup>1</sup> on Cash Flow Components given Alternative Disaggregations (Clubb, 1995)

Variable	M1	M2	M3	M4	M5	M6
UE		1.1 (28)				0.90 (22)
UW	1.08 (26)				0.90 (17)	
UX	-1.05 (18)				-0.86 (15)	
UO			8.57 (23)		7.24 (18)	
UI			8.70 (21)		7.32 (18)	
UF			8.38 (22)		7.22 (18)	
UD				7.8 (21)		6.15 (16)

<sup>1</sup> Reported coefficients are means of 48 firms results.

Figures in brackets are the number of individual regressions (out of 48-firm-regression) for which the coefficient was statistically significant at .05 or less.

The sample consists of 48 UK companies with continuous data available between 1955 and 1984

The dependent variable is the unexpected returns using the market model,

UW is the unexpected working capital from operations; UX is the long-term accrual; UO is the operating cash flow; UI is the unexpected investment; UF is the unexpected financing; P is the share price at the beginning of the year; UD is the unexpected dividends.



The following conclusions were drawn by Clubb depending on the number of individual regressions (out of 48-firm-regression) for which the coefficient was statistically significant at .05 or less

1. Accounting earnings data possesses information content beyond cash flow data, indicating that unexpected working capital from operations and unexpected long term accruals both have information content beyond operating, investment and financing cash flows.
2. The results provide weak support for the existence of incremental information content of cash flow data beyond accrual accounting data.
3. While the findings confirm the information content of dividends beyond accounting earnings and further suggest that operating, investing and financing flows are valuation-relevant components of dividends, they do not provide evidence that share prices respond differentially to unexpected operating, investment and financing flows after controlling for unexpected earnings data.

**Garrod and Hadi (1998)** extend previous research by reporting the information content of cash flow disclosures as defined under the UK regulations along with supporting evidence using recent innovations in earnings-return models.

The usefulness of cash flow per share data is also investigated. Such an investigation is motivated by the work of Sommerville (1991). Using U.S data, Sommerville found that operating cash flow and operating cash flow per share (OCFPS) are separate statistical measures, and that there might be information content in OCFPS not found in operating cash flow.

Garrad and Hadi's sample consists of 156 industrial UK companies with available data over

the period 1977 to 1991, drawn from the 1000 largest industrial companies quoted on the London Stock Exchange. Clearly, there is a survival bias and a preponderance of large companies.

The information content is tested by the use of the standard abnormal return model. The commutative abnormal return is estimated as the residual of the market model for the twelve months period utilising a lagged return window of four months in an attempt to best match the security returns with the period during which the accounting information relating to earnings is potentially in the public domain.

First difference variables are used to proxy unexpected cash flow components and are scaled by market value (except cash flow per share).

The authors employ the following three models to test the prediction:

$$M1 : CAR_{it} = g_0 + g_1 OCF_{it} + g_2 RIF_{it} + g_3 TCF_{it} + g_4 ICF_{it} + g_5 FCE_{it} + g_6 CC_{it} + g_7 Accruals_{it} + e_{it}$$

$$M2 : CAR_{it} = h_0 + h_1 Collect_{it} + h_2 Net\ Interest_{it} + h_3 Dividends_{it} + h_4 Taxes_{it} + h_5 P.Investment_{it} + h_6 Sales\ Fixed_{it} + h_7 Debt_{it} + h_8 Stock_{it} + h_9 Accrual_{it}$$

$$M3 : CAR_{it} = j_0 + j_1 OCFPS_{it} + j_2 RIFPS_{it} + j_3 TCFPS_{it} + j_4 ICFPS_{it} + j_5 FCFPS_{it} + j_6 CCPS_{it} + j_7 AccrualsPS_{it} + e_{it}$$

where, for company i and year t:

**CAR**: cumulative abnormal return; **OCF**: net cash inflow from operations; **RIF**: net cash outflow from return on investment and serving of finance; **TCF**: cash outflow from taxation; **ICF**: net cash outflow from investments; **FCE**, net cash inflow from financing; **CC**: net increase in cash; **Accruals**, (Earnings - cash inflow from operations); **Collect**: collected cash resulting from operations; **Net Interest**: net cash outflow as interest from lending and borrowing activities; **Dividends**: net cash outflow from dividends paid or received; **Taxes**: cash outflow to taxes; **P.Investment**: cash outflow for the acquisition of assets;

**Sales Fixed**: cash inflow from the sales of tangible fixed assets; **Debt**: net cash inflow from the issuance and retirements of debt; **Stock**: net cash received from the issuance and retirement of stock;

**OCFPS**, net cash inflow per share from operations ; **RIFPS**: net cash outflow per share from return on investment and serving of finance; **TCFPS**, cash outflow per share from taxation, **ICFPS**: net cash outflow per share from investments; **FCFPS**: net cash inflow per share from financing;

**CCPS**: net increase in cash per share; **AccrualsPS**: (Earnings - cash inflow from operations) per share.

The results indicate that cash flow per share numbers do not reveal any incremental information content beyond the cash flow variables; nor do cash flow variables exhibit any

incremental information content beyond cash flow per share variables. Furthermore, the use of recent innovations from earnings-price models improves the explanatory power of the models but does not change the underlying conclusions regarding evidence of the incremental information content. The following table compares the explanatory power of the different versions of the first model.

**Table 2.10:** Goodness of Fit Given Various Estimation Schemes for the Disaggregation of Cash Flow using ASB Definitions (Garrod and Hadi, 1998)

Estimation Scheme	adjusted R <sup>2</sup> (%)
Change only variables	4.8
Level only variables	8.18
Both change and level variables	10.0
Both change and level variables with time varying intercept	16.85
Both change and levels variables with time varying slope	25.19
Both change and level variables with time varying slope and intercept	27.18

Sample consists of 156 industrial UK companies with available data over the period 1977 to 1991

The model is  $CAR_{it} = \beta_0 + \beta_1 OCF_{it} + \beta_2 RIF_{it} + \beta_3 TCF_{it} + \beta_4 ICF_{it} + \beta_5 FCE_{it} + \beta_6 CC_{it} + \beta_7 Accruals_{it} + e_{it}$

### 2.2.3 Contextual and Interaction Effect Studies

Bernard and Stober (1989), Board and Day (1989), Ali (1994), Dechow (1994), Cheng et al (1996), Ingram and Lee (1997), Charitou (1997) and Green (1999) provide evidence of the usefulness of earnings and cash flow by considering and investigating circumstances that are theoretically predicted to influence the information content or the incremental information content of earnings and cash flow. While Bernard and Stober (1989) and Board and Day (1989) consider the influence of macroeconomic conditions on the relationship between abnormal returns and various measures of earnings and cash flow, Dechow (1994) and Charitou (1997) provide evidence on the influence of firm-specific factors on the valuation relevance of earnings and cash flow. On the other hand, Ali (1994) considers the influence of

the absolute magnitude of changes in earnings, working capital from operations and cash flow from operations on the incremental information content of these measures. Cheng et al (1996) conditions the informativeness of earnings and cash flow from operations on earnings permanence, while Green (1999) investigates whether the 'quality of earnings' as measured by the firm-specific relationship between profit-generating ability and cash-generating ability impacts upon the valuation-relevance of cash flow disclosures. A detailed review of these studies is provided below

**Bernard and Stober (1989)** aim at assessing the extent to which we can generalise Wilson's 1986 and 1987 findings that for a given amount of earnings, the market reacts more favourably the larger the cash flows are (or the smaller the current accruals), they also evaluate alternative economic arguments that are manifested, as a 'preference' for cash flows over current accruals.

They investigate two alternative explanations for possible differences in the security price implications of cash flows and accruals:

1) Unconditional explanations which predict that the reaction to unexpected cash flows will always be larger than the reaction to accruals, or vice versa. Such explanations include the quality of earnings explanation and the link between earnings components and future cash flows explanations.

Under these explanations, accruals have a smaller impact on prices than cash flows since accruals are either subject to manipulation or represent only very indirect links to future cash flows. Such an explanation leads to a simple prediction : that market prices will react more to a given amount of unexpected cash flows than to the same amount of unexpected accruals.

This logic is much less compelling with current accruals than with noncurrent accruals because the link to future cash flows is much more direct for current accruals than for noncurrent accruals and it seems doubtful that systematic manipulations of current accruals are widespread.

2) Conditional explanations that permit the sign of the difference to vary across time, or across firms. Such explanations include the macroeconomic conditions explanation and the mix of components of unexpected current accruals explanation.

Under the macroeconomic conditions explanation, as the economy contracts, the market will react favourably when management liquidates non-cash working capital. In contrast, during an expansion, the market will react favourably when management uses cash to increase non-cash working capital.

Under the mix of components of unexpected current accruals explanation, the relative security price impact of cash flows versus accruals is generally indeterminate.

The sample consists of 170 US corporations that filed reports from 1976 through 1985. While Wilson's sample was restricted to industrial firms, 20 percent of the Bernard and Stober sample includes firms from wholesaling, retailing and services.

In choosing expectation models, the authors modified the Wilson (1987) approach by estimating the same models not only in a single pooled cross-sectional approach but also in industry based pools, which permit the model parameters to vary industry by industry.

The expectation models estimated on an industry by industry basis exhibited a greater degree

of explanatory power, on average, than those estimated in the pooled cross-section. The unexpected components of cash flow or accruals for firm  $j$ , quarter  $t$ , were scaled by total assets at the end of quarter  $t-1$ .

The empirical tests replicate and extend the work of Wilson (1987) assume that any difference between the stock price implications of cash flows and current accruals is the same for all firm-periods. Thus, the tests can be viewed as emanating from the unconditional explanations discussed earlier in which the sign of the difference is unconditional. Following Wilson, the event period is the nine-day interval surrounding the release date of reports to shareholders. The primary difference between the studies is that while Wilson's tests were based only on fourth quarter data taken from the annual reports to shareholders, Bernard and Stober tests were based on data from all fiscal quarters, taken from both interim and annual reports. The following equation was used to test the unconditional explanation :

$$R_{jt} = c_0 + c_1 UCF_{jt} + z_{jt}$$

where  $R_{jt}$  is the accumulated market model prediction error for firm  $j$  during the nine-day window surrounding the release of financial statements for quarter  $t$ .

Market model parameters were estimated during a 120-day estimation period, where  $t$  denotes the last trading day in the quarter for which earnings and fund flow information is reported, and  $UCF_{jt}$  is the unexpected cash flow from operations for firm  $j$ , quarter  $t$ .

On the other hand, Bernard and Stober allow for the possibility that there is some uncertainty about WCFO after earnings have been announced. Thus they are motivated to use unexpected WCFO in an equation like Wilson's. This equation takes the following form :

$$R_{jt} = d_0 + d_1 UWCFO_{jt} + z_{jt}$$

where,  $UWCFO_{jt}$  : unexpected working capital from operations for firm  $j$ , quarter  $t$ .

The coefficient  $d_1$  should be interpreted as the difference between the price response coefficients on WCFO and its complement, noncurrent accruals.

The following table shows the results of running the two models:

**Table 2.11:** Goodness of Fit of Unconditional Models, with Estimated Coefficients (Bernard and Stober, 1989)

Funds Flow Variable:	Coefficient (t-statistics)	R-squared
Cash Flow from Operations	0.13 (.89)	0.005
Working Capital from Operations	0.10 (.22)	0.0001

The sample consists of 170 US corporations that filed reports from 1976 through 1985. The dependent return variable is the accumulated market model prediction error for firm  $j$  during the nine-day window surrounding the release of financial statements for quarter  $t$ .

From the table, it can be noticed that the coefficient is not significant. To ascertain whether restricting the sample to industrial firms would alter the results, Bernard and Stober conducted supplemental analysis on only those firms from industries with SIC codes 1000-4800. The coefficients and the degree of explanatory power in these regressions were similar to those of the unrestricted sample and the t-statistics declined in accordance with the reduction in sample size.

The tests were modified in several ways by the deletion of outliers, the use of market-adjusted returns instead of market model predictions error, and by centring the event window around the earlier of the 10-k or the AR/S release dates, instead of around the AR/S release dates. None of these modifications altered the conclusions that there is, in general, no systematic evidence that unexpected funds flows or accruals explain price behaviour in short windows surrounding the release of financial statements outside of the fourth quarters of 1981 and 1982.

Given the failure to confirm the simple relation observed by Wilson for the overall period, 1977-1984, Bernard and Stober examine more contextual models of the implications of cash

flows and accruals to test whether valuation implications vary according to macroeconomic conditions or according to the specific mix of current accrual components.

The 1977-1982 period was partitioned into three regimes, using each of two proxies for unexpected changes in the state of the economy. The proxies used were the unexpected components of real GNP and of short-term interest rates (on 90-day treasury bills). The prediction was that when GNP growth is unexpectedly low, or interest rates are unexpectedly high for the quarter just ended, the market would respond favourably around report release dates to those firms that contemporaneously liquidated current working capital accounts and, thus, generated more cash from operations. Thus, during such a regime, a positive coefficient on unexpected cash flow from operations was expected. In contrast, when GNP was unexpectedly high, or interest rates were unexpectedly low, we would expect that same coefficient to take on a negative sign.

The same previous models were used, except that both the expectations for cash from operations and the final regressions were estimated within regimes. Bernard and Stober found that there is clearly no support for their predictions. The coefficients are never statistically significant and the R-squared are all less than .01. Similar conclusions are reached when market-adjusted returns are substituted for market model prediction errors.

The third explanation to be considered is that the stock price implications of cash flows and current accruals vary across firms according to their specific mix of current accrual components.

This explanation was motivated by the prediction that the components of current accruals



(accounts receivables, inventory, accounts payables, etc) may convey information about future sales, and that by holding working capital from operations constant, aggregate current accruals may have ambiguous implications for valuation. The following model was used to derive the final version to be run :

$$R_{jt} = b_0 + b_1 (UCF_{jt}) + b_{2i} (UINV_{jt}) + b_{2r} (UREC_{jt}) + b_{2p} (UPAY_{jt}) + b_3 (UNCA_{jt}) + W_{jt}$$

Just prior to the release of financial statements, net earnings are already known. Thus, the unexpected components of cash flows and accruals which become known at the financial statement release date must sum to zero. Their tests were based on the following modified version after dropping  $UNCA_{jt}$  as a regressor :

$$R_{jt} = b_0 + (b_{2i}-b_1) UINV_{jt} + (b_{2r}-b_1)UREC_{jt} + (b_{2p}-b_1) UPAY_{jt} + W_{jt}$$

The results provide little support for the predictions and there is no support for predictions concerning UINV and UREC. In contrast, UPAY takes on significant coefficients using data from the fourth quarter only.

Bernard and Stober conclude that either (1) the security price reactions to the release of cash flow and accrual data in financial statements are too highly contextual to be modelled parsimoniously, or (2) important uncertainties about the contents of detailed financial statements are resolved prior to their public release.

**Board and Day (1989)** investigate the link between share prices and three measures of earnings : the traditional historical cost accounting return and two others which are closer to cash flow measures. The strength of the link between earnings measures and cumulative abnormal returns is investigated relative to the level of inflation.

This study was motivated by the prediction that information which is to be used to form expectations about the future pattern of cash flows is useful as far as the price of a share

reflects the present value of a stream of expected future dividends, and the dividend stream is based on the pattern of expected future cash flows.

The role of earnings rather than cash flows in such a valuation process can be justified by the fact that accounting earnings might be used as a surrogate for future cash flows, as discussed in Walts and Zimmerman (1986). A simple justification for this is that historical cost accounting earnings is the standard reported earnings measure and is the most common variable to be analysed in the accounting literature. This suggests that in a rational market there should be an observable link between earnings and share prices.

Another justification for the use of accounting earnings as a surrogate for cash flows comes from the findings of studies that suggest that accounting earnings are a better predictor of future cash flows than are current cash flows. If this is the case, the relationship between accounting earnings and share price will be expected to be stronger than the comparable relationship involving actual cash flows.

The counter argument is that given the role of cash flow rather than earnings in valuation theories and the imperfect correlation between accounting earnings and cash flow, it is possible that direct revelation of cash flow will provide clearer information than would earnings. If this is true, the results will show that cash flow dominates earnings in terms of information content.

One test of the usefulness of the alternatives to historical cost is to examine the nature of the link between alternative earnings measures and share prices during periods of varying inflation. A measure whose information content is greater than that of historical cost will

(a) convey more information than historical cost in any period, and (b) be such that the strength of any link between the measure and share prices will be affected by the rate of inflation to a lesser extent than the comparable relationship using historical cost.

The market is hypothesised to expect the firm to earn the same this year as it did last year. Unexpected earnings are then the difference between this year and last year's earnings and last. This definition of unexpected earnings is essentially that of a random walk. This was motivated by the results of a related study (Board, Day and Walker, 1988) where two alternative models of predicted income were used : the average of that company's income over the last six years, and the value predicted from a time series regression of this company's income on the average income for the companies in the sample.

The sample consists of 39 large UK manufacturing non-oil companies which traded over the 18 years sample period, with Dec 31<sup>st</sup> year-end date, and which have a full set of accounting data for the years 1961-1977. The sample is both small and biased in that only manufacturing companies which traded over the 18 year sample period are considered.

Three measures of earnings are used :

(a) ROI = (Net Income / net book value).

(b) WCAP = (( net income +depreciation +deferred taxation )/ net book value).

(c) NETQ = (WCAP + change in stock and work in progress / net book value).

where the net book value is the opening net book value of shareholders' funds.

To test the information content for each of the three measures individually, the test used is a cross-sectional regression of the form :

$$CAR_{it} = a_t + b_t E_{it}$$

There will be one equation of this form for each of the three measures of earnings, and the market model was used to assess the unexpected return for each firm-year observation, with parameters estimated over six years.

The results suggest that there is a substantial information content to the ROI measure in 9 of the 16 years and the WCAP measure produces a significant result in 7 years. However, NETQ contains very little information to help investors in their evaluation of companies.

To examine the incremental information content of, for example, NETQ over ROI, the following models are used :

$$\begin{aligned} \text{CAR}_{it} &= a_t + b_t \text{ROI}_{it} + w_{it} \\ \text{NETQ}_{it} &= a_t + b_t \text{ROI}_{it} + z_{it} \\ w_{it} &= a_t + b_t z_{it} + x_{it} \end{aligned}$$

The first regression removes all influence of ROI from CAR, while the second removes any influence of ROI from NETQ earnings. If NETQ is to be judged superior to ROI, it should be able to explain at least part of the variation in CAR which is unexpected by ROI.

The results suggest that both ROI and WCAP contain substantial information content over NETQ, and that ROI has incremental information content over WCAP in 5 of the 16 years, while WCAP conveys incremental information in 2 years only.

In the light of the widespread view that historical cost measures, and hence ROI, become unreliable during periods of inflation, it is to be expected that its information content would decline during such times. This study looks for such a decline by a regression of the form :

$$\mathbf{R\text{-squared}_{Et} = a + b \text{RPI}}$$

where  $\text{R-squared}_{Et}$  represents the appropriate R-squared value resulting from the information content test for a particular earnings figure in a particular year.

The following table shows the results of such tests:

**Table 2.12:** The Effect of Inflation on the Informativeness of Various Earnings Measures (Board and Day, 1989)

Dependent	Constant	Slope	R <sup>2</sup>
ROI	.154*	-0.3	0.025
WCAP	.093*	0.0	0.0001
NETC	0.046	-0.1	0.021
WCRO	0.046	0.57	0.0001
NQRO	0.047	-0.2	0.077
ROWC	0.108	-0.2	0.013
NQWC	0.051	-0.2	0.048
RONQ	0.157	-0.3	0.043
WCNQ	0.097	0.0	0.0001

The sample consists of 39 large UK manufacturing non-oil companies,

\* Indicates statistically significant at .05

WCRO: is information content of WCAP over ROI;

NQRO: is information content of NETQ over ROI;

ROWC: is information content of ROI over WCAP;

NQWC: is information content of NETC over WCAP;

RONQ: is information content of ROI over NETC;

WCNQ: is information content of WCAP over NETQ.

Board and Day found that there is no formal support for the hypothesis that inflation has a material effect on the information content or incremental information content of the various tested income measures.

**Ali (1994)** extends prior research by allowing for nonlinear relations between returns and each of three performance variables (earnings, working capital from operations and cash flow).

He shows that the persistence of both working capital from operations and cash flow declines

as the absolute value of changes in these numbers increases. He estimates the following multivariate linear and non-linear models both separately for each of the sample years and also for the pooled sample in order to examine the incremental information content of earnings, working capital from operations, and cash flows. The non-linear model allows the marginal price response to the unexpected component in each of the three explanatory variables to decline with the absolute value of that component. The two models used are the linear model and the non-linear model.

The linear model is:

$$RET_{it} = a_{0t} + a_{1t} \Delta E_{it} + a_{2t} \Delta WCFO_{it} + a_{3t} \Delta CFO_{it} + e_{it}$$

and the nonlinear model is:

$$RET_{it} = a_{0t} + a_{11t} \Delta E_{it} + a_{12t} DE_{it} * \Delta E_{it} + a_{21t} \Delta WCFO_{it} + a_{22t} DWCF_{it} * \Delta WCFO_{it} + a_{31t} \Delta CFO_{it} + a_{32t} DCFO_{it} * \Delta CFO_{it} + e_{it}$$

where,  $RET_{it}$  is the annual stock return from April to March;  $DE_{it}$  ( $DWCF_{it}$ ,  $DCFO_{it}$ ) is 1 when  $E_{it}$  ( $WCFO_{it}$ ,  $CFO_{it}$ ) belongs to the high absolute change group and zero otherwise.

The following table shows the results of running the above two models;

**Table 2.13:** Goodness of Fit of Models Conditioned on the Permanence of Earnings, Funds Flow and Cash Flow Changes, with Estimated Coefficients (Ali,1994)

Variable	Linear Model	Nonlinear Model
Intercept	0.09	0.08
$\Delta E_{it}$	0.26***	2.63***
$\Delta WCFO_{it}$	0.1***	0.90***
$\Delta CFO_{it}$	0.01	0.24***
$D1 * \Delta E_{it}$		-2.38***
$D2 * \Delta WCFO_{it}$		-0.80***
$D3 * \Delta CFO_{it}$		-0.23***
<b>R-squared</b>	<b>8.01</b>	<b>9.72</b>

Results represent the mean of the 15 yearly coefficient,  
The dependent variable is the annual stock returns,  
\*\*\*; indicates statistically significant at conventional levels,  
 $E_{it}$ ,  $WCFO_{it}$ , and  $CFO_{it}$  are earnings, working capital from operations and cash flow, all explanatory variables are deflated by the market value of equity at the beginning of the year,  
 $D1$  ( $D2$  and  $D3$ ) is one when  $E_{it}$  ( $WCFO_{it}$ ,  $CFO_{it}$ ) belongs to the high absolute change group and zero otherwise.

The sample consists of 8820 U.S firm-year observations covering the period 1974 to 1988, including only December fiscal year-end firms. The results suggest that the marginal price response to the unexpected component for the high-magnitude group is significantly smaller than that for the lower-magnitude group for each of the variables examined. Moreover, the mean adjusted r-squared increases to 9.72 %, compared to 8.01 for the linear model . These results suggest that the nonlinear model is better specified than the linear model.

The results are consistent with earnings having incremental information content for firm-years in the low earnings' changes group as well as high earnings' changes group. The same results could be concluded for working capital from operations, while for cash flow, the results are consistent with cash flow having incremental information content for firm-years in the low cash flow changes group but having no incremental information content for firm-years in the high cash flow changes group. Furthermore, the linear model results are not consistent with cash flows having incremental information content beyond earnings and working capital from operations.

**Dechow (1994)** investigates circumstances under which accruals are predicted to improve the earning's ability to measure firm performance as reflected in stock returns. The importance of accruals is hypothesised to increase under each of the following conditions:

- 1- as the performance measurement intervals become shorter,
- 2- as the volatility of the firm's working capital requirements

and investment and financing activities becomes greater,

3- as the firm's operating cycle becomes longer.

Under each of these circumstances, cash flows are predicted to suffer more severely from timing and matching problems that reduce their ability to reflect firm performance.

The sample consists of industrial U.S. firms. A sample of 19733 firm-quarter observations, 27308 firm year observations, and 5175 firm-four-year observations was collected.

Three pooled regressions were performed by regressing returns on each of the following independent variables: (1) earnings (2) cash from operations, and (3) net cash flow, using quarterly, annual, and four years observations.

All explanatory variables were scaled by the beginning of the period share price. The return was the buy-and-hold stock return for the contemporaneous quarter, year, or four year period, minus the value-weighted market index.

To examine the cross-sectional predictions, all the observations were ranked to form quintiles and separate regressions of returns on earnings and returns on net cash flow were performed for each of the quintiles.

The results confirm the predictions. First, over shorter measurement intervals, earnings are more strongly associated with stock returns than are realised cash flows, and the ability of cash flows to measure firm performance improves relative to earnings as the measurement interval is lengthened. Second, earnings have a higher association with stock returns than do realised



cash flows in firms which experienced large changes in their working capital requirements and their investment and financing activities. Moreover, evidence is presented indicating that long-term operating accruals play a less important role in mitigating timing and matching problems in realised cash flows.

**Cheng et al (1996)** investigates whether the incremental information content of cash flows from operations increases when earnings are transitory. When the valuation implications of earnings are limited by the presence of transitory items, cash flows from operations disclosures may play a larger role as an additional value signal.

The sample consists of 1479 U.S firms with 5120 firm-year observations covering the period 1989-1992 and is not restricted to any industry or fiscal year-end. Observations for which either the absolute value of the earnings change variable (scaled by price ) or the cash flow variable (scaled by price ) exceeded 1.5 were deleted.

Annual abnormal security returns were measured as the differences between actual returns and expected returns based on parameters from individual firm time-series market models. The market models were estimated over the 60-month period preceding the cumulation period for each firm's annual abnormal returns. Abnormal security returns were cumulated over the 12 months extending from 9 months prior to through 3 months after each firm's respective fiscal year-end.

Two models were used to test the predictions of the study : the first model is a cross-sectional linear model with two versions ; the first version uses only change variables to proxy for unexpected components of the explanatory variables as follows:

$$AR_{jt} = a_{0t} + a_{1t} \Delta E_{jt} + a_{2t} \Delta CF_{jt} + e_{jt}$$

The second version of the linear model utilises both change and level variables to characterise the unexpected components of earnings and cash flows from operations :

$$AR_{jt} = a_{0t} + a_{1t} \Delta E_{jt} + a_{2t} \Delta CF_{jt} + a_{3t} E_{jt} + a_{4t} CF_{jt} + e_{jt}$$

where;  $AR_{jt}$  is the annual abnormal return obtained from the market model,  $E_{jt}$  ( $\Delta E_{jt}$ )  $CF_{jt}$  ( $\Delta CF_{jt}$ ) are the level (change) in earnings and cash flow from operations.

The following table shows the results of running the above models:

**Table 2.14:** Explanatory Power of Transitory and Permanent Components of Earnings and Cash Flow (Cheng et al,1996)

Variable	Change only model	Change and level model
Intercept	-0.02 (-2.06)	-0.07 (-4.29)
$\Delta E_{jt}$	0.62 (7.33)	0.69 (15.01)
$\Delta CF_{jt}$	0.14 (8.00)	-0.02 (-2.31)
$E_{jt}$		-0.18 (-2.49)
$CF_{jt}$		0.39 (7.16)
<b>R-Squared</b>	<b>0.09</b>	<b>0.12</b>

**Notes:**

$E_{jt}$  ( $\Delta E_{jt}$ )  $CF_{jt}$  ( $\Delta CF_{jt}$ ) are the level (change) in earnings and cash flow from operations.

Results are the mean results of the four yearly coefficients, and figures in brackets are the t-statistics, Number of observations = 5120 firm-years,

The dependent variable is the annual abnormal security returns measured as the differences between actual returns and expected returns based on parameters from individual firm time-series market models

The results of the change only model indicate that both earnings and cash flow from operations have incremental information content beyond each other. This result contrasts with Ali (1994) where change in cash flows from operations fails to show incremental information content in a linear model. Ali presents results based on a sample with no outlier deletions. The deletion of extreme values removes observations with highly transitory earnings and cash flows, making it more likely to observe the incremental information content of cash flows.

The results of the linear model that employs both the change and level specifications indicates that both earnings and cash flow from operations have incremental information content beyond each other. Moreover, the adjusted r-squared in the second version of the linear model in each year and the pooled analysis, show greater explanatory power relative to the changes only model.

The second model is the contextual model which conditions the informativeness of earnings and cash flows from operations on measures of earnings permanence as follows:

$$AR_{jt} = a_{0t} + a_{1t}\Delta E_{jt} + a_{2t}\Delta_t CF_{jt} + a_{3t}E_{jt} + a_{4t}CF_{jt} + a_{5t}\Delta E_{jt} * D_{jt} + a_{6t}\Delta CF_{jt} * D_{jt} + a_{7t}E_{jt} * D_{jt} + a_{8t}CF_{jt} * D_{jt} + w_{jt}$$

where, D is a dummy variable equal to 0 (1) when the absolute magnitude of earnings surprise is less (greater) than its yearly cross-sectional median. The magnitude of change in earnings deflated by the beginning of the period price and current earnings deflated by the year-end price are used to measure the degree of permanence of earnings.

The specification of this model is motivated by the expectation that transitory elements with limited valuation implications reduce earnings implications for security returns and elevate the importance of other measures such as cash flow from operations.

The results of this model suggest that the incremental information content of accounting earnings decreases, and the incremental information content of cash flows from operations increases, with a decrease in the permanence of earnings.

**Sloan (1996)** hypothesised that accrual and cash flow components of current earnings have different implications for the assessment of future earnings. While both components

contribute to current earnings, current earnings performance is less likely to persist in the future if it is attributable primarily to the accrual components of earnings as opposed to the cash flow component. A number of recent studies present evidence that investors do not correctly use available information in forecasting future earnings performance, and these have motivated the second prediction that earnings expectations embedded in stock prices fail to reflect fully the higher earnings persistence attributable to the cash flow component of earnings and the lower earnings persistence attributable to the accrual component of earnings.

Sloan's sample consists of U.S firms. Banks, life insurance and property and casualty companies were excluded. Statement data for the 30 year period from 1962 to 1991 were collected, resulting in 40679 firm-year observations.

The cash flow component of earnings is measured as the difference between earnings and the accrual component of earnings. Earnings and its accrual and cash flow components measures were standardized by the average of the beginning and end of year book value of total assets.

To test the first prediction, Sloan expressed the relation between current earnings performance and future earnings performance as :

$$\mathbf{M1 : Earnings}_{t+1} = a_0 + a_1 \mathbf{Earnings}_t + v_{t+1}$$

However, the first prediction implies that this model is miss-specified because it constrains the coefficients on the cash and accrual components of earnings to be equal. The specification implied by the first prediction is :

$$M2 : \text{Earnings}_{t+1} = y_0 + y_1 \text{Accruals}_t + y_2 \text{Cash flows}_t + v_{t+1}$$

The smaller coefficient on accruals relative to cash flows reflects the lower persistence of earnings performance attributable to the accrual components of earnings.

To investigate the robustness of the results with respect to the fact that they are attributable to a small number of outlying observations, regressions are also estimated using the decile rankings of the variables in place of their actual values, The decile ranks are assigned annually for each of the 30 fiscal years in the sample and range from 1 (lowest values ) to 10 ( highest values ).

The results first confirm previous evidence that accounting rates of returns (earnings scaled by average assets) are mean reverting, with average persistence parameters of approximately .8 .

The results also show that for pooled data, the coefficient on the accrual component of earnings is significantly lower than the coefficient on the cash components of earnings. The industry results confirm the pooled results that earnings performance attributable to the accrual component of earnings is less persistent than earnings performance attributable to the cash component of earnings.

Given that the first prediction has been confirmed, such findings motivate the investigation of the second prediction whether stock prices reflect the different properties of the accrual and cash flow component of earnings. Sloan date employs the framework developed by Mishkin (1983) which starts from the implication of market efficiency that abnormal returns are zero in expectation and that only the unexpected changes in a variable relevant to the pricing of the

security can be correlated with the unexpected returns, and which leads to the following rational pricing system:

Given the relationship between current earnings and future earnings in model 1 is expressed as:

$$\text{Earnings}_{t+1} = a_0 + a_1 \text{Earnings}_t + v_{t+1}, \quad \text{Then}$$

$$\text{Earnings}_{t+1} - a_0 - a_1 \text{Earnings}_t = 0, \text{ and hence}$$

$$\text{abnormal return}_{t+1} = B (\text{Earnings}_{t+1} - a_0 - a_1^* \text{Earnings}_t) + w_{t+1}$$

Market efficiency imposes the constraint that  $a_1 = a_1^*$ ,

and by combining the previous expanded earnings forecasting model 2 with this system:

$$\text{Earnings}_{t+1} = y_0 + y_1 \text{Accruals}_t + y_2 \text{Cash flow}_t + v_{t+1}, \text{ then}$$

$$\text{Earnings}_{t+1} - y_0 - y_1 \text{Accrual}_t - y_2 \text{Cash flow}_t = 0$$

$$\text{abnormal return}_{t+1} = B (\text{Earnings}_{t+1} - y_0 - y_1^* \text{Accrual}_t - y_2^* \text{Cash flow}_t) + e_{t+1}$$

As mentioned earlier, the test of the first prediction indicates that  $y_1 < y_2$ , so market efficiency requires  $y_1^* < y_2^*$ . Alternatively, if the security price acts as if investors do not distinguish between these two components of earnings, then the coefficient on the two components will be equal (i.e.,  $y_1^* = y_2^*$ ).

The results from these estimations indicate that stock prices correctly reflect the implications of current annual earnings for future annual earnings, that is ( $a_1 = a_1^*$ ). However, stock prices do not appear to anticipate rationally the higher persistence of earnings performance attributable to the cash flow component of earnings rather than accruals components, that is ( $y_1^* < y_2^*$ ).

**Ingram and Lee (1997)** address the information provided jointly by income and operating cash flow. This study is motivated by the expectation that income is meaningfully related to

operating cash flow, with a difference between the two measures signalling the direction and magnitude of changes in financing, investing and operating activities that create company value. They hypothesise that companies reporting incomes in excess of operating cash flow will exhibit higher growth in accounting measures of financing, investing and operating activities than those reporting cashflow in excess of income, assuming the incomes of both groups of companies are equal.

The sample consists of 1000 U.S industrial companies over the period 1983-1992. Companies for which data were available for the period examined were included in the sample. Both income and cash flow were scaled by the beginning of period book value of ordinary shareholders equity.

The market returns variable was included in a regression model in which income and the income/cash flow difference ratio were included as independent variables as follows:

$$\text{Market-return} = b_0 + b_1 (\text{Income/cash flow}) + b_2 \text{Income}$$

Thus the regression tests whether income and operating cash flow jointly provide information beyond that provided by income alone with respect to each of these variables.

The results imply that income and operating cash flow can jointly provide information about growth and growth opportunities in addition to that provided by income alone.

In general, this study addresses the information provided jointly by income and operating cash flow, and reveals that information provided by these accounting measures is dependent on their relative magnitudes.

**Charitou (1997)** predicts that the association of cash flows with security returns improves:

1) the smaller the absolute magnitude of aggregate accruals, 2) the longer the measurement interval and 3) the shorter the firm's operating cycle. Under each of these conditions, the

timing and matching problems in cash flows are minimized.

To test these hypotheses, he regresses returns on the level and changes of earnings and cash flow measures, using the following models:

Univariate model :

$$\text{RET}_{it} = b_0 + b_1 X_i + e_i$$

Multivariate model :

$$\text{RET}_{it} = b_0 + b_1 E + b_2 \Delta E + b_3 \text{CFO} + b_4 \Delta \text{CFO} + e$$

where,  $X_i$  in the univariate model is replaced by :

E: operating earnings

$\Delta E$ : change in operating earnings

CFO: operating cash flows

$\Delta \text{CFO}$ : change in operating cash flows.

$\text{RET}_{it}$  is the security return for firm  $i$  measured over a 15-month return interval ending three-months after the fiscal-year-end.

Firm-observations have been grouped into quintiles subject to the magnitude of aggregate accruals to test the first prediction and subject to the length of the operating cycle to test the third prediction. The above models were applied to each of the quintiles to test the predictions.

Charitou's sample consists of industrial UK firms selected using the criteria of availability of data to calculate the explanatory variables as well as returns for the period 1985-1992. This selection procedure resulted in 2894 firm-year observations. All variables were deflated by the beginning of the year security price.



The following table compares the association of cash flow and earnings with security returns across quintiles, where quintiles are formed based on the absolute value of aggregate accruals;

**Table 2.15: The Market Response to Earnings and Cash Flow, Moderated by Accruals Volatility (Charitou, 1997)**

quintile	Earnings		Cash Flow	
	ERC	R-Squared	CFRC	R-Squared
1	2.52***	17.5	2.45***	17.2
2	3.07***	26.2	2.50***	20.6
3	2.22***	18.9	1.65***	12.9
4	1.80***	15.5	0.84***	06.6
5	0.99***	11.5	0.16**	01.0

The security return for firm  $i$  is measured over a 15-month return interval ending three-months after the fiscal-year-end.

ERC is earnings response coefficient, CFRC is cash flow response coefficient,

Quintiles are formed based on the absolute value of aggregate accruals; quintile 1 contains firm-observations with the smallest absolute value of aggregate accruals ( $N = 2984$ ).

\*\*\*, \*\*, \*: statistically significant at 1%, 5%, 10%, respectively.

The results confirmed the prediction and indicate that cash flows play a more important role in the marketplace: (i) the smaller the absolute magnitude of accruals, (ii) the longer the measurement interval and (iii) the shorter the firm's operating cycle. These results suggest that the response coefficient of earnings and cash flow are affected significantly by firm-specific factors. Moreover, the results indicate that earnings is the dominant explanatory variable in the marketplace.

Charitou suggests that future research should examine firm-specific and industry-specific factors, such as firm size, industry classification, capital structure, capital intensiveness, growth, earnings permanence and the quality of various earnings and cash flow measures.

**Green (1999)** investigates whether the ‘quality of earnings’ as measured by the firm-specific relationship between profit-generating ability and cash-generating ability impacts upon the valuation-relevance of cash flow disclosure. Such expectation is motivated by that the definition of earnings persistence employed by Ali (1994) and Cheng et al. (1996) does not appear to comply with either the ASB’s notion of the quality of profit being a function of the relationship between profits generating ability and cash generating ability, or Lip’s (1986) notion of the relationship between ‘surprises’ in earnings components. A concept of the ‘quality of earnings’ which is consistent with both the ASB’s notion and that of Lipe (1986) may be developed by considering firm-specific time-series correlation between earnings and cash flows. The rationale for such expectation is that to the extent that earnings numbers (levels and changes) and cash flow numbers (levels and changes) are highly correlated with each other then, no differential valuation impact may be expected. On the other hand, to the extent that the firm-specific time-series correlation is low, then a differential valuation impact may be observed. Green’s sample consists of 197 UK companies with 4531 firm-years observations (197 firms with 23 years of data). Green employed both OLS regression and Kmenta’s (1986) estimation procedures to estimate whether the ‘quality of earnings’ does impact upon the valuation relevance of cash flow disclosure.

The following models were employed:

$$\text{Model I: } \Delta MV_{it} = \beta_0 + \beta_1 \Delta OCF_{it} + \beta_2 \Delta E_{it} + \beta_3 \Delta PI_{it} + \beta_{10} D_{it} + e_{it}$$

$$\text{Model II: } \Delta MV_{it} = \beta_0 + \beta_1 \Delta OCF_{it} + \beta_2 \Delta E_{it} + \beta_3 OCF_{it} + \beta_4 E_{it} + \beta_5 \Delta PI_{it} + \beta_{10} D_{it} + e_{it}$$

$$\text{Model III: } \Delta MV_{it} = \beta_0 + \beta_3 OCF_{it} + \beta_4 E_{it} + \beta_5 OCF_{it-1} + \beta_6 E_{it-1} + \beta_7 \Delta PI_{it} + \beta_{10} D_{it} + e_{it}$$

$$\text{Model IV: } \Delta MV_{it} = \beta_0 + \beta_3 OCF_{it} + \beta_5 OCF_{it-1} + \beta_7 A_{it} + \beta_8 A_{it-1} + \beta_9 \Delta PI_{it} + \beta_{10} D_{it} + e_{it}$$

where, for firm *i* and year *t*:

$\Delta MV_{it}$ : change in market capitalization;

$\Delta OCF_{it}$ : change in operating cash flow;

$\Delta E_{it}$ : change in earnings;

$A_{it}$  : the level of current accruals;  
 $\Delta PI_{it}$ : the change in the total market price index;  
 $D_{it}$  : is the paid dividends;

all variables are scaled by the beginning of period market capitalization (except the change in the price index which is scaled by the beginning of period price index).

In model IV, the test for the incremental valuation relevance of decomposing the earnings surprise into cash flow and accruals components is performed by testing for the equality of the estimated coefficients on the current period cash flow and accruals variables.

The results of this test are reported in the following table where firms are assigned into four quartiles according to the firm-specific contemporaneous time-series correlations between levels and changes in earnings and in cash flows:

**Table 2.16: Results of Testing for the Equality of the Estimated Coefficients on Cash Flow and Accruals;**

Quartile	F-test	P-value
First	1.097	0.295
Second	0.026	0.872
Third	2.567	0.109
Fourth	8.653***	0.003

*Note:* firms are assigned into quartiles according to the firm-specific contemporaneous time-series correlations between levels and changes in earnings and in cash flows (from highest to lowest),  
 \*\*\*: statistically significant at conventional level.

The above results indicate that the decomposition of an ‘earnings surprise’ into its cash flow and accruals components, provide incremental information content to earnings only in the fourth quartile (when the firm-specific time-series correlation between earnings and cash flows is low) implying that cash flows convey valuation relevant information beyond earnings. Furthermore, the cash flow surprise is valued more than the accruals surprise in the fourth quartile. Such results are consistent with the ASB’s notion that cash flow disclosure attest to the quality of earnings.

### 2.3 Other Relevant Studies

Ali and Zarowin (1992a) test the prediction that in the presence of transitory components of earnings, the previous period's earnings are a poor proxy for the current period's expected earnings and the change in earnings is a poor proxy for unexpected earnings. Therefore, using earnings change as a proxy for unexpected earnings causes the earnings response coefficients to be understated. They use the integrated moving average (IMA (1,1)) model to capture the transitory components of annual earnings.

Their sample consists of 374 firms having a complete time-series of annual earnings per share and annual stock returns data during the period 1970-1988. They conduct a time-series analysis for each firm in order to capture the widely documented result that earning response coefficients and persistence vary across firms.

Each of the following models is estimated for each of the sample firms:

Model 1: estimation utilizing the SAS procedure NLIN which estimates both the ERC, b, and the persistence parameter ( $\phi$ )

$$RET_{it} = a_i + b_i \Delta X_{it}/P_{it-1} + b_i \phi_i \Delta X_{it-1}/P_{it-1} + b_i \phi_i^2 \Delta X_{it-2}/P_{it-1} + c_i RET_{MKT_t} + d_i RETRF_t + e_{it}$$

Model 2: estimation with the current and two lagged earnings changes using OLS,

$$RET_{it} = a_i + b_{1i} \Delta X_{it}/P_{it-1} + b_{2i} \phi_i \Delta X_{it-1}/P_{it-1} + b_{3i} \Delta X_{it-2}/P_{it-1} + c_i RET_{MKT_t} + d_i RETRF_t + e_{it}$$

Model 3: estimation with unexpected earnings proxied by the change in earnings,

$$RET_{it} = a_i + b_i \Delta X_{it}/P_{it-1} + c_i RET_{MKT_t} + d_i RETRF_t + e_{it}$$

where, **RET** is the firms' annual raw returns (April of year t through March of year t+1)

excluding dividends (capital gains only);

**RETMKT** is the annual return on the value-weighted market portfolio;

**RETRF** is the risk free rate measured as the yield on a one-year Treasury bill;

**X** is the annual earnings per share;

If annual earnings follow an integrated moving average (IMA(1,1)) process, the NLIN estimation of model 1 provides more efficient estimates of the earnings response coefficient than for model 2.

By assuming that annual earnings follow an integrated moving average (IMA(1,1)) process to allow firms' annual earnings to be less persistent than a random walk, Ali and Zarowin found that the ERCs estimated from their model are 53% greater, on average, than ERCs, estimated from the random walk model and that the difference between the two estimates is negatively correlated with the persistence of earnings, which confirms their prediction that in the presence of transitory components of earnings, the change in earnings may be a poor proxy for unexpected earnings, causing ERCs to be biased toward zero.

**Ali and Zarowin (1992b)** contribute to the literature on the relation between annual returns and earnings by illustrating a context in which the earnings level variable is most important.

They hypothesize that the incremental explanatory power and the increase in the earnings response coefficient (ERC) from including the earnings level variable depend on the permanence of the previous period's earnings, where the ERC is the sum of the coefficient on all the proxies for unexpected earnings. Specifically, they predict that if the previous period's earnings are predominantly permanent, then including the earnings level variable is not expected to increase the ERC and the explanatory power of the model, while the opposite

effect is expected, if the previous period's earnings are predominantly transitory.

They use the beginning of period earnings-price ratio to measure the relative permanent versus transitory nature of a firm's previous period's earnings based on Beaver and Morse (1978) and Ou and Penman (1989) who show that an extremely high (low) earnings-price ratio indicates that earnings are transitorily high (low), and a non-extreme earnings-price ratio indicates that earnings are predominantly permanent. Ali and Zarowin rank firms into ten groups for each year by their beginning-of-year earnings-price ratio. They divide all firms with positive earnings into the first nine groups with an approximately equal number of firms per group. All the firms with negative earnings are in the tenth group. They then classify firms in the middle six groups as predominantly permanent and firms in the bottom and top two groups as predominantly transitory.

To test their predictions, Ali and Zarowin performed the following three models separately for firms with the predominantly permanent components in the previous period's earnings and firms with predominantly transitory component in previous period's earnings:

M1: is the earnings-returns model with both the earnings change and level variables

M2: is the earnings-returns model with the earnings change variable alone

M3: is the earnings-returns model with the earnings level variable alone

The sample consists of U.S firms over the period from 1969 to 1985.

Ali and Zarowin reported their results for the three models from both the cross-sectional regressions for each of the years, 1969 to 1985, and from pooled time-series cross-sectional regressions.

In general, by assuming that annual earnings follow an IMA (1,1) process, Ali and Zarowin show that the earnings level variable can improve the goodness of fit of the earnings-returns model because of the existence of transitory components in the previous period's earnings. Moreover, the more transitory the previous period's earnings are, the greater the expected incremental explanatory power and the increase in the earnings response coefficient (ERC) from inclusion of the level variable.

**Strong and Walker (1993)** show that a considerable improvement in statistical performance can be achieved by working with a more general specification of the return-earnings relation. They use a panel regression approach to combine several recent advances in market-based accounting research design which produces a specification of the relation between earnings and price changes that subsumes the following key features:

- 1- Contemporaneous earnings yield is included in addition to the deflated first difference in earnings.
- 2- Regression parameters are allowed to vary both cross-sectionally and over time.
- 3- Parameter values are allowed to vary across components of earnings to accommodate differences in the degree of persistence.

The authors introduce these features in a general model in such a way that they can assess the incremental explanatory power of each feature individually, as well as the joint effects of two or more features combined.

The sample consists of 146 UK industrial companies and 2036 observations. The sample is, however, biased toward the larger companies, and is restricted to companies with December to April year-ends.

The sample also suffers from survivorship bias because it is restricted to companies that have at least 10 consecutive years of available accounting data within the period 1971 through 1986 and a complete set of 16 years of returns data corresponding to the 10 years for which the accounting data was available, plus five years preceding the first year of accounting data ( used to estimate the market model for the first year of the study ) as well as one year following the last year of accounting data.

The value of two return metrics were computed for each company year: the first is the cumulative monthly market model abnormal return (MMCAR) from May of year  $t$  through April of year  $t+1$ , where the market model parameters were estimated using 5 years of monthly returns, and the second, RETURN, is the cumulative raw monthly stock return from May of year  $t$  through April of year  $t+1$ .

The earnings were disaggregated as follows :

$E^1$  : Earnings before exceptional items.

$E^2$  : Exceptional items.

$E^3$  : Extraordinary items.

$E^1 + E^2$  : Ordinary earnings.

$E^1 + E^2 + E^3$  : All-inclusive earnings.

For each of these earnings components, the deflated first difference was calculated as the value



of the component in year  $t$  minus the value in year  $t-1$  divided by the market capitalization on April 30 of year  $t$  ( May 31 for January year-end companies, etc). The earnings yield variable for each component was calculated as the value of the component reported for year  $t$  divided by the market capitalisation on April 30 of year  $t$ .

Their results suggest that a significant improvement in the statistical performance of models of earnings and returns can be achieved by allowing for time-series and cross-sectional variation in the regression parameters, by including an earnings yield variable, and by partitioning all-inclusive earnings into pre-exceptional, exceptional, and extraordinary components. The best fit is achieved by incorporating all three features in a single general model. The evidence that the pre-exceptional earnings yield variable is statistically significant on average suggests that pre-exceptional earnings exhibit both permanent and transitory features and that models of the relation between earnings and returns that focus exclusively on the deflated first difference of earnings are mis-specified.

## **2.4 Summary, Discussion, Motivation and Aims:**

### **2.4.1 Summary and Discussion of Previous Studies**

From our review of the empirical work on the usefulness of earnings, cash flow, funds flow and accruals the following conclusions can be drawn.

Firstly, the earlier and more recent empirical work concerning the information content and the incremental information content of earnings and cash flow provides evidence that earnings

information dominates cash flow information in the marketplace in terms of information content and incremental information content. Earlier empirical evidence on the information content and the incremental information content of cash flow, funds flow and accruals ( Ball and Brown, 1968; Beaver, and Dukes, 1972; and Patell and Kaplan, 1977) failed to detect an information content for cash flow, perhaps because they had not developed sufficiently refined measures. In particular, they used cash flow measures that were highly correlated with accruals measures of earnings and closer in definition to the concept of funds flow. Later, in the 1980s and 1990s the accounting information valuation relevance studies concentrated mainly on examining the usefulness of earnings in conjunction with cash flow, they used more refined measures of cash flow and introduced more sophisticated methodological improvements, nevertheless they still provide inconclusive evidence on the incremental information content of cash flows beyond earnings. Board and Day (1986), Board et al (1989) and Bernard and Stober (1989), among others, suggest that cash flow information does not have significant incremental information content beyond that contained in earnings. On the other hand, Ali and Pope (1995), Clubb (1995), and McLeay et al (1997), among others, provide evidence on the existence of incremental information content for cash flows.

Despite the fact that the standard setting bodies ascertain that earnings and cash flow should not be regarded as substitutes, that is not the way they have been treated in most of the empirical accounting literature when the informativeness of earnings and cash flow was being assessed.

Another conclusion which can be drawn from reviewing the empirical work on the informativeness of earnings and cash flow is that, as far as we are aware, none of the previous studies have considered the survival bias but have sampled from the existing companies list

only, without considering the delisted companies. This motivates us to contribute to the literature by providing empirical evidence on the informativeness of earnings and cash flow before and after controlling for the survivorship bias, so that we can assess the effect of the survivorship bias by comparing the results of the sample of existing companies only with the full sample. Another conclusion which can be drawn is that the model specification can be improved by applying the recent innovations in earnings-return models - the inclusion of the levels of the explanatory variables as well as changes, and the non-linear specification to the cash flow-return models. Garrod and Hadi (1998) show that consideration of both level and change of the independent variables enhances the explanatory power of the models considerably.

#### **2.4.2 Motivation and Aims of the Present Study**

Although the accounting literature on the usefulness of accounting variables has recently concentrated on investigating the incremental information content or the relative information content of earnings and cash flow (i.e., Rayburn, 1968; Board et al, 1989; Ali and Pope, 1995; Bowen et al, 1987; McLeay et al, 1997; among others) or on the informativeness of the components of cash flow (i.e., Charitou, 1993; Livnat and Zarowin, 1990) or on the determinants of the information content of earnings and cash flow and the effect of earnings permanence on the informativeness of earnings and cash flow (i.e., Charitou, 1997; Dechow, 1994, Cheng, 1996, and Green, 1999), these studies nonetheless leave unanswered the question of whether investors evaluate earnings and cash flow announcements in relation to each other.

The following section (Section 2.4.2.1) discusses the importance of the consistency between signals and of different combinations of signals while Section 2.4.2.2 discusses the importance

of accruals volatility in moderating such signaling effects.

#### **2.4.2.1: The Importance of Consistency between Signals and of Different Combinations of Signals**

As summarised above, previous empirical evidence concerning the usefulness of earnings and cash flow in the capital markets has focused on assessing their informativeness either in terms of information content or incremental information content, and the contextual considerations that may affect this. Much of this research has been carried out under the implied assumption that these two accounting measures are evaluated in isolation from each other, and consequently leaves unanswered the question of whether investors evaluate earnings and cash flow announcements in relation to each other. As mentioned by Charitou (1997), all performance measures are subjective and suppliers of capital have difficulties in assessing the reliability of the signals produced by management. Earnings can be criticized because they are affected by arbitrary allocations. Although cash flow is less likely to be manipulated by management in this way, it is influenced nevertheless by timing and matching problems through the accrual process (Dechow, 1994). Due to these inherent limitations, neither earnings nor cash flow are expected to be perceived as reliable measures in isolation of each other.

Elsewhere, there is evidence to support this view. The findings of Bernstein (1993) indicate that analysts prefer to relate operating cash flows to earnings as a check on the quality of earnings. A questionnaire survey by Jones and Ratnatunga (1997), and an earlier investigation by Jones et al (1995), confirmed that cash flow data is used in this way to assess the quality of earnings. The role of accruals in this context, that is in mitigating temporary matching problems in cash flow, is demonstrated in Dechow (1994). Indeed, given that the timing and matching problems inherent in cash flow are mitigated by the accruals adjustment in earnings,

and, on the other hand, cash flow is not affected by arbitrary allocation and income management problems inherent in earnings, each measure diminishes the shortcomings of the other. It is plausible therefore to predict that consistent signaling of surprises in both measures will improve the perceived reliability of each, leading to the expectation that investors would relate earnings and cash flow to each other in order to attest their reliability. Indeed, the consistency effect may be criticised in that it assumes an identical signalling effect in the worst-news scenario (negative surprises of both earnings and cash flow) to that in the best-news scenario (positive surprises of both earnings and cash flow). It also assumes an identical signalling effect among the two combinations of contradictory signals (positive earnings surprise and negative cash flow surprise, or vice-versa). As a result, we also consider the signalling effect in terms of the various combinations. It is this prediction that motivates the present study which explores at the theoretical, analytical and empirical levels, whether or not the valuation relevance of earnings or cash flow is moderated by the consistency of their signals in the form of unexpected surprises.

A further goal of this study is to demonstrate whether firm-specific determinants of accruals volatility moderate the expected effect of the signaling consistency described above. The following section discusses our second prediction regarding the role of accruals volatility in moderating the signaling consistency effect on the valuation relevance of earnings and cash flow.

### **Section 1.2.2: The Importance of Accruals Volatility in Moderating the Signaling Effects**

Our prediction that firm-specific determinants of accruals volatility influence the extent to which investors are expected to assess the quality of earnings and cash flow by relating them to each other, is motivated by the theoretical and analytical suggestions put forward by

Dechow (1994) and Charitou (1997). Both authors demonstrate that, with high volatility of accruals, the reported figures for earnings and cash flow are not expected to be highly correlated with each other, and hence, they are not expected to converge as measures of firm performance. Given these findings, we predict that, for firms with low (high) accruals volatility, investors are (are not) expected to relate earnings and cash flow to each other, and hence, we can predict that the volatility of accruals determines the extent to which the consistency between earnings and cash flow surprises affects stock prices.

In summary, the present study extends the literature by answering the following new research questions concerning the valuation relevance of earnings and cash flow:

1. Is valuation relevance affected by the consistency of signals conveyed by surprises in earnings and cash flow?
2. Is the consistency effect moderated by firm-specific determinants of accruals volatility?

Another contribution concerns the adjusting for survivorship bias in previous empirical evidence by employing a unique sample that appears to be one of the most representative samples within the earnings vs operating cash flow informativeness literature. a sample that includes existing, dead and taken over companies instead of employing an existing sample only.

In the context of the present study, the survivorship bias seems to be of vital importance and there is a theoretical reason to suspect that survivorship bias will invalidate the results of the study. Given that our study is concerning the perceived reliability of earnings and cash flow, hence, the investors are predicted to be more interested in questioning the reliability of earnings and cash flow in the financially distressed firms.

Survivorship bias is a property of the sample selection method, in other words and in a capital market research context, it is a sort of sampling bias results when the sample includes only companies that have been existed continuously over a period of time called the sampling period and those that failed and ceased to exist are omitted, when -in theory- the result could be predict to vary if the non-surviving companies were considered in the analysis. such a sampling scheme produces ,so called, survivorship bias that restricts the generalisability of the study findings and conclusions because companies that disappear tend to do so due either to poor performance and financial distress or being taken over due to high performance.

**Table A.1: Summary of Previous Empirical Research Relevant to the Present Study**

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
<b>R a y b u r n</b> (1986)	An equity share should be the discounted expected future cash flow stream of the firm and thus the rate of return on an equity investment is a function of (1) information about unexpected cash flow for the period and (2) information that leads to a revision in expectations of the amount or timing of the discounted future cash flow stream of the firm.	The sample employed consists of 175 U.S industrial firms with December 31 ' year-end. The test period is from 1963 to 1982 inclusive.	Cash flow and changes in working capital have significant explanatory power However, all of the components of accrual are significant when a random-walk process is assumed to generate the time series of each component.
<b>Lobo and Song</b> (1989)	Their study was motivated by prior research on this subject which examined the relation between stock returns and variables measuring the unexpected portions of historical cost income and constant dollar and current cost operating income.	The sample consisted of 409 firm-year observations over the three-year period 1980-1982. Sample firms were required to have December 31 fiscal year-ends. Firms belonging to utilities and financial companies were excluded. This study examines the contemporaneous association between unexpected stock returns and variables of interest in the week of release of the annual reports.	Is incremental information conveyed to the market by the cash flow variable beyond that contained in each of the price-adjusted earnings measure.
<b>Ali and Pope</b> (1995)		The data set consists of large industrial and commercial firms with December fiscal year-end. A final sample of 1160 firm-years observations is included, covering 247 distinct firms, spanning a 7-year period from 1984 to 1990. The following models were run: <b>M1:</b> Linear model without time-varying parameters. <b>M2:</b> Linear model with time-varying parameters. <b>M3:</b> Non-linear model without time varying parameters. <b>M4:</b> Non-linear model with time-varying parameters.	The explanatory power of the incremental information content model increased significantly by incorporating each of the three innovations. The results further suggest the existence of incremental information content of earnings, funds flow and cash flow.



Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
Charitou (1995)	He examines the association of the accrual and cash flow measures with the market value of the firm by employing a cross-sectional valuation model, where the market value of the firm is a function of the following three components a) permanent earnings, b) risk and c) growth	The sample consisted of 403 U.S. firms with December 31 ' fiscal year-end and the sampling period covered ten years from 1976 to 1985.	The principle findings are, firstly, that given operating earnings, aggregate accruals explain differences in the market value of equity across firms; secondly, that given operating cash flow, both current and non-current accruals explain differences across firms in the market value of equity, and thirdly, that the market responds more favourably to operating cash flows than to current and noncurrent accruals.
McLeay, Kassab and Helan (1997)	Three expectations models were used to estimate the unexpected components of the accounting variables: the random walk (RW), the integrated moving average (IMA), and the exponentially-weighted moving average (EWMA).	The sample consisted of 104 UK manufacturing firms and the sampling period covered 13 accounting years ending between March 1992 and February 1993, resulting in a final pooled sample of 1352 firm-year observations. The following estimation schemes were employed: 1- A general pooled model 2- A model with a time-varying constant 3- A model with time-varying market response 4- A model with company-varying market response 5- Homoscedastic pooling scheme after adjusting for autoregressive error.	The results indicate that there is little doubt about the incremental information content of current and noncurrent accruals beyond that in earnings.

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
<b>Livnat and Zarowin (1990)</b>	Theoretical models in finance, economics, and accounting imply that individual components of operating, financing, and investing cash flows should be associated with annual security returns in a manner that differs predictably in terms of both sign and magnitude of the association.	The sample consists of 434 U.S firms with December fiscal year-end during the period 1974-1986. However, not every firm is represented in the sample in every year because only 281 firms have available data for all years during the period 1974-1986.	There is no evidence of differential associations across components of investing cash flows. Furthermore, this study shows that there is incremental information content in disaggregating net income into accruals and components of cash flows from financing, investing, and operating activities, as compared to the information content of earnings alone.
<b>Charitou and Ketz (1991)</b>	The market value of the firm is a function of cash flow constructs, beta and growth in the book value of total assets	The sample consists of US firms (except financial and regulated firms) included in the COMPOSTAT and Centre for Research in Securities Prices (CRSP) databases for the period 1968 to 1985. All companies with sufficient available data were selected. There are 403 firms in the sample. They employing a cross-sectional equity valuation model under which the market value of the firm is a function of cash flow constructs, beta and growth in the book value of total assets	In general, these results indicate that the accrual and cash flow components of earnings are valued in the marketplace and that there exists a strong association between the various cash flow components included in the cash flow statements and the market value of the firm.
<b>Clubb (1995)</b>	criticised prior information content studies of cash and funds flow data because of their focus on operating flow rather than on a broader set of cash or funds flow data including investment and financing flows	The sample consists of 48 UK companies with continuous data available between 1955 and 1984 and which maintained either December 31 <sup>st</sup> or March 31 <sup>st</sup> accounting year end throughout the sample period.	The results provide weak support for the existence of incremental information content of cash flow data beyond accrual accounting data.

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
Garrod and Hadi (1998)	<p>extend previous research by reporting the information content of cash flow disclosures as defined under the UK regulations along with supporting evidence using recent innovations in earnings-return models.</p>	<p>sample consists of 156 industrial UK companies with available data over the period 1977 to 1991, drawn from the 1000 largest industrial companies quoted on the London Stock Exchange. Clearly, there is a survival bias and a preponderance of large companies. The information content is tested by the use of the standard abnormal return model</p>	<p>The results indicate that cash flow per share numbers do not reveal any incremental information content beyond the cash flow variables; nor do cash flow variables exhibit any incremental information content beyond cash flow per share variables.</p>
Bernard and Stober (1989)	<p>They investigate two alternative explanations for possible differences in the security price implications of cash flows and accruals: Conditional explanations that permit the sign of the difference to vary across time, or across firms. Such explanations include the macroeconomic conditions explanation and the mix of components of unexpected current accruals explanation.</p> <p>Under the macroeconomic conditions explanation, as the economy contracts, the market will react favourably when management liquidates non-cash working capital. In contrast, during an expansion, the market will react favourably when management uses cash to increase non-cash working capital.</p>	<p>The sample consists of 170 US corporations that filed reports from 1976 through 1985.</p>	<p>Bernard and Stober conclude that either (1) the security price reactions to the release of cash flow and accrual data in financial statements are too highly contextual to be modelled parsimoniously, or (2) important uncertainties about the contents of detailed financial statements are resolved prior to their public release.</p>

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
<p><b>Board and Day (1989)</b></p>	<p>The prediction that information which is to be used to form expectations about the future pattern of cash flows is useful as far as the price of a share reflects the present value of a stream of expected future dividends, and the dividend stream is based on the pattern of expected future cash flows.</p>	<p>The sample consists of 39 large UK manufacturing non-oil companies which traded over the 18 years sample period, with Dec 31 ' year-end date, and which have a full set of accounting data for the years 1961-1977. The sample is both small and biased in that only manufacturing companies which traded over the 18 year sample period are considered. One test of the usefulness of the alternatives to historical cost is to examine the nature of the link between alternative earnings measures and share prices during periods of varying inflation</p>	<p>Board and Day found that there is no formal support for the hypothesis that inflation has a material effect on the information content of incremental information content of the various tested income measures.</p>

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
Ali (1994)	<p>The persistence of both working capital from operations and cash flow declines as the absolute value of changes in these numbers increases which motivates him to allow for nonlinear relations between returns and each of three performance variables (earnings, working capital from operations and cash flow).</p>	<p>The sample consists of 8820 U.S. firm-year observations covering the period 1974 to 1988, including only December fiscal year-end firms. He estimates the multivariate linear and non-linear models both separately for each of the sample years and also for the pooled sample in order to examine the incremental information content of earnings, working capital from operations, and cash flows. The non-linear model allows the marginal price response to the unexpected component in each of the three explanatory variables to decline with the absolute value of that component</p>	<p>These results suggest that the nonlinear model is better specified than the linear model. The results are consistent with earnings having incremental information content for firm-years in the low earnings' changes group as well as high earnings' changes group. The same results could be concluded for working capital from operations, while for cash flow, the results are consistent with cash flow having incremental information content for firm-years in the low cash flow changes group but having no incremental information content for firm-years in the high cash flow changes group. Furthermore, the linear model results are not consistent with cash flows having incremental information content beyond earnings and working capital from operations.</p>

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
<p><b>Dechow (1994)</b></p>	<p>The importance of accruals is hypothesised to increase under each of the following conditions:</p> <ul style="list-style-type: none"> <li>1- as the performance measurement intervals become shorter,</li> <li>2- as the volatility of the firm's working capital requirements and investment and financing activities becomes greater,</li> <li>3- as the firm's operating cycle becomes longer.</li> </ul> <p>Under each of these circumstances, cash flows are predicted to suffer more severely from timing and matching problems that reduce their ability to reflect firm performance.</p>	<p>The sample consists of industrial U.S firms. A sample of 19733 firm-quarter observations, 27308 firm year observations, and 5175 firm-four-year observations was collected.</p> <p>Three pooled regressions were performed by regressing returns on each of the following independent variables: (1) earnings (2) cash from operations, and (3) net cash flow, using quarterly, annual, and four years observations.</p>	<p>The results confirm the predictions. First, over shorter measurement intervals, earnings are more strongly associated with stock returns than are realised cash flows, and the ability of cash flows to measure firm performance improves relative to earnings as the measurement interval is lengthened. Second, earnings have a higher association with stock returns than do realised cash flows in firms which experienced large changes in their working capital requirements and their investment and financing activities. Moreover, evidence is presented indicating that long-term operating accruals play a less important role in mitigating timing and matching problems in realised cash flows.</p>
<p><b>Cheng et al (1996)</b></p>	<p>When the valuation implications of earnings are limited by the presence of transitory items, cash flows from operations disclosures may play a larger role as an additional value signal.</p>	<p>The sample consists of 1479 U.S firms with 5120 firm-year observations covering the period 1989-1992 and is not restricted to any industry or fiscal year-end. Observations for which either the absolute value of the earnings change variable (scaled by price ) or the cash flow variable (scaled by price ) exceeded 1.5 were deleted.</p>	<p>The results of this model suggest that the incremental information content of accounting earnings decreases, and the incremental information content of cash flows from operations increases, with a decrease in the permanence of earnings.</p>

Author(s)	Theory and Hypotheses	Data & Methods	Main Findings
<p><b>Charitou (1997)</b></p>	<p>The association of cash flows with security returns improves 1) the smaller the absolute magnitude of aggregate accruals, 2) the longer the measurement interval and 3) the shorter the firm's operating cycle. Under each of these conditions, the timing and matching problems in cash flows are minimized</p>	<p>The sample consists of industrial UK firms selected using the criteria of availability of data to calculate the explanatory variables as well as returns for the period 1985-1992. This selection procedure resulted in 2894 firm-year observations. To test these hypotheses, he regresses returns on the level and changes of earnings and cash flow measures, using Univariate model and Multivariate model</p>	<p>The results confirmed the prediction and indicate that cash flows play a more important role in the marketplace: (i) the smaller the absolute magnitude of accruals, (ii) the longer the measurement interval and (iii) the shorter the firm's operating cycle. These results suggest that the response coefficient of earnings and cash flow are affected significantly by firm-specific factors.</p>
<p><b>Green (1999)</b></p>	<p>The 'quality of earnings' does impact upon the valuation relevance of cash flow disclosure. The rationale for such expectation is that to the extent that earnings numbers (levels and changes) and cash flow numbers (levels and changes) are highly correlated with each other then, no differential valuation impact may be expected. On the other hand, to the extent that the firm-specific time-series correlation is low, then a differential valuation impact may be observed</p>	<p>The sample consists of 197 UK companies with 4531 firm-years observations (197 firms with 23 years of data) Green employed both OLS regression and Kmenta's (1986) estimation procedures.</p>	<p>The above results indicate that the decomposition of an 'earnings surprise' into its cash flow and accruals components, provide incremental information content to earnings only when the firm-specific time-series correlation between earnings and cash flows is low, implying that cash flows convey valuation relevant information beyond earnings. Furthermore, the cash flow surprise is valued more than the accruals surprise when the firm-specific time-series correlation between earnings and cash flows is low. Such results are consistent with the ASB's notion that cash flow disclosure attest to the quality of earnings.</p>

# **CHAPTER THREE**

## **RESEARCH DESIGN**

### **3.1.1 Introduction**

This chapter addresses the methodological aspects that were adopted to achieve the aims of the study. and it is organized as follows: Section 3.2 addresses the hypotheses to be tested, Section 3.3 reports the sampling and data collection procedures, Section 3.4 defines and measures the accounting variables, Section 3.5 defines and measures the accrual volatility determinants, the market return variable is described and discussed in Section 3.6, Section 3.7 presents the specifications of estimation models used and the statistical inferences necessary to test the research hypotheses and, finally, the alternative functional forms are introduced and discussed in Section 3.8.

### **3.1.2 Informativeness of Accounting Data and Valuation Models**

Measurement of the information content of accounting variables in relation to returns is one of the most controversial issues in accounting literature. Researchers often refer to studies of the relationship between the distribution of annual return and annual accounting variables as information content studies. Beaver (1989; quoted in Collins and Kothari, 1993) explains the logic behind these information content studies by stating that, if an action reflected by a change in the return can be attributed to specific information, there is a statistical dependency. The statistical dependency between the return measures and a particular accounting variable is referred as the information content of that variable.

the traditional assumption of accounting variables informativeness studies has been that



a variable contains information if its unexpected realization is systematically correlated with a measure of return on the company's share over the period pertaining to the release of relevant financial data, assuming the extent to which the market can be deemed to have a prior expectation of the firm's performance. It is only the unexpected component that is expected to influence the behavior of the investors. Such a relationship has been described in the previous accounting variables informativeness studies in a simple way by a multiple linear regression equation where the unexpected components of the accounting variable are the explanatory variables and the dependent variable is a measure of a company share's returns, and hence, The accounting variable response coefficient (AVRC), as considered in the accounting literature, is the dollar amount of the change in a stock's price in response to a change of one dollar in accounting variable of respect per share, typically and empirically it has been estimated by the slope coefficient from the regression of stock return on unexpected component of the accounting variable deflated by the stock price shortly before the return window was opened.

However, shareholder will have an interest in assessing the firm's future cash flows to the extent that these provide an indication of the firm's ability to pay dividends. Collins and Kothari (1989) outline an equity valuation model in which price is the discounted present value of future expected dividends. By specifying a positive relation between current earnings and future expected dividends. They demonstrate that the price of a security is a function of future dividends and the expected rate of return to discount them to their present value. These assumptions, together with the other assumptions underlying the Sharpe Lintner Capital Assets Pricing Model (CAPM), are sufficient for calculating the present value of the future flow of cash dividends which represent the

fair value of the company. In valuation terms, the higher the systematic risk the smaller the present value of a given increase in expected future dividends caused by unexpected earnings.

The interest of analysts and investors in 'shareholders value' naturally led to increased interest in the type of financial and economic data useful for determining the fundamental value of a company's equity capital.

Given the recent support for accrual accounting from developments in capital market research and the increasing importance of accruals data vis-a-vis cash flow data in practical valuation models based on neoclassical valuation theory, it can be argued that the need for research to consider the relevance of 'the cash flow alternative' to accrual accounting is as great as ever. Because if the superiority of accruals data for valuation purposes is accepted, there remains the potentially important issue of the incremental information content of cash flow beyond the dominant accruals accounting based information.

A substantial literature has developed from the idea that if security prices are related to the present value of future earnings, then earnings response coefficient (in relation to security returns) should be related to the persistence of earnings implied by earnings time series process (Collins and Kothari, 1989)

Therefore, although enterprise performance ultimately is assessed relative to future cash flow, it has been the position of the accounting profession that accrual-based income best provides a basis for assessing those future cash flows. As a result, although the

presentation of cash flow data is currently required under generally accepted accounting principles, accrual-based numbers are considered the dominant performance measure in financial statements.

### **3.1.3 Event study and Association Study**

According to Collins and Kothari (1989) the literature regarding the information content of accounting variable can be characterized by the methods used in the studies. These fall into two primary groups: association studies and event studies. Generally, association studies use a long time-period (usually annual). In an association study, returns over relatively long periods (typically, 12-months) are regressed on unexpected earnings or other performance measures such as cash flows estimated over a forecast horizon that corresponds roughly with the fiscal period of interest. Returns are measured over this period. The unexpected component of an accounting measure for the same period is measured. The two are compared. Researchers applying this method argue association studies recognize that the market participants learn about earnings and valuation relevant events from many non-accounting information sources throughout the period. Thus, they investigate whether accounting item measurements are consistent with the underlying events and whether the information set is reflected in stock prices (Helan, 1996).

Event studies rely on a more precise identification of the moment of the information announcement, after which abnormal returns in a short window around the announcement are then examined. The event studies infer whether the earnings announcement, per se, causes investors to revise their expectations as revealed by security price changes measured over a short time period (typically, 2-3 days) around the

earnings announcement. The objective is to minimize return movements which are unrelated to the information announcement being studied.

A wider window increases the probability that the return captures the price effect we wish to measure, and reduces the possibility that failure to collect actual announcement dates that could result in some announcements occurring after the assumed announcement date.

According to Neill et al (1991), A strength of these studies is that an annual holding period allows for high degree of confidence that the revealed accounting data were captured by the research design. Importantly, no assumption regarding the precise release date of accounting information are necessary. The tradeoff for such a wide event window is that correlated omitted variables may be responsible for the reported associations since numerous information release occur over a yearly holding period. on the other hand, the use of daily, as opposed to annual, returns has the advantage of limiting the number of contemporaneous information events captured by the event window. This allows for a stronger basis for assessing whether the cash flow data conveyed relevant information to the market. However, a crucial unrealistic assumption made is that the period around the financial statement release date is the first time this information is publicly available. Moreover, the reliance on the market response during the annual report release period partially responsible for the observed results.

### **3.1.4 The Design of the Present Study**

Most previous market-based accounting research concerning the informativeness of accounting variables has been built on the underlying assumption that an accounting variable has information content if its unexpected components are systematically correlated with a measure of the unexpected change in returns on the company's stock over the period surrounding the release of information about the respective accounting variable, also such a relationship between accounting and market variables could be presented by a single or multiple regression model. In the present study, as discussed earlier, we will investigate the informativeness of earnings and cash flow measures of performance in a corroborative context by regressing a market return measure on the unexpected components of earnings, cash flow and interaction terms.

This chapter is organized as follows: Section 3.2 addresses the hypotheses to be tested, Section 3.3 reports the sampling and data collection procedures, Section 3.4 defines and measures the accounting variables, Section 3.5 defines and measures the accrual volatility determinants, the market return variable is described and discussed in Section 3.6, Section 3.7 presents the specifications of estimation models used and the statistical inferences necessary to test the research hypotheses and, finally, the alternative functional forms are introduced and discussed in Section 3.8.

### **3.2 Research Hypotheses**

The following hypotheses are tested to provide answers to the questions of this study:

**H1:** The valuation relevance of earnings (in terms of information content and incremental information content beyond cash flow) is affected by the consistency of signals of earnings and cash flow surprises.

**H2:** The valuation relevance of earnings is affected by the various combinations of signals of earnings and cash flow surprises.

**H3:** Firm-specific determinants of accruals volatility (namely, the magnitude of aggregate accruals, the length of the operating cycle and the coefficient of variation of cash flow to earnings ratio) determine the extent to which the valuation relevance of earnings is moderated by the consistency/ various combinations of signals.

**H4:** The valuation relevance of cash flow is affected by the consistency of signals of earnings and cash flow surprises.

**H5:** The valuation relevance of cash flow is affected by the various combinations of signals of earnings and cash flow surprises.

**H6:** Firm-specific determinants of accruals volatility (namely, the magnitude of aggregate accruals, the length of operating cycle and the coefficient of variation of cash flow to earnings ratio) determine the extent to which the valuation relevance of cash flow is moderated by the consistency/ various combinations of signals.

### **3.3 Sampling and Adjusting for Survivorship Bias**

#### **3.3.1 Survivorship Bias: Concept and Implications;**

Survivorship bias is a property of the sample selection method, in other words and in a capital market research context, it is potential of sampling bias that results when the sample includes only companies that have existed continuously over a period of time called the sampling period and those that failed and ceased to exist are omitted, when -in theory- the result could be predict to vary if the non-surviving companies were considered in the analysis. such a sampling scheme produces ,so called, survivorship bias that restricts the generalisability of the study findings and conclusions because companies that disappear tend to do so due either to poor performance and financial distress or being taken over due to high performance. Clearly, the longer the sample period the greater the survivorship bias.

Such sampling schemes were adopted in the previous studies either because their research design requires the companies to exist over the sampling period or because the most commonly used databases do not allow the user to either assess or correct for survivorship bias.

In the context of the present study, the survivorship bias seems to be of vital importance and there is a theoretical reason to suspect that survivorship bias will invalidate the results of the study if only surviving firms are considered. Given that our study concerns the perceived reliability of earnings and cash flow, the investors are predicted to be more interested in questioning the reliability of earnings and cash flow in the financially distressed firms, likely to be a high proportion of the delisted firms.

In the area of the valuation relevance of earnings and cash flow, the previous studies considered companies that survived the sampling period and ignore companies that did not subsequently cease to exist, and hence, their conclusions are subject to survivorship bias. Some prior studies (i.e., Garrod and Hadi, 1998; Green, 1999), whilst recognising and mentioning the problem of survivorship bias and the possibility that the generalizability of their results is restricted by the survivor bias, have not taken any sampling or analytical procedure to capture its effect on their empirical findings and conclusions.

Given that a precise estimate of survivorship bias is not possible because the disappeared companies tend to do so, not necessarily, due to financial and liquidity distress and poor performance, but may be for being taken over despite good performance and high profitability and that the most commonly used database does not distinguish between companies those been delisted for being distressed and those been taken-over despite good performance and high profitability.

### **3.3.2 Sampling and Data**

The companies included in this study are UK non-financial companies drawn from all firms listed on the London International Stock Exchange List that had been available in the Datastream database on the 1<sup>st</sup> of January 2000, and from the list of the companies being classified by Datastream as dead or taken-over. The data is not restricted to any firm size or financial year-end date. Restricting the sample to a December year end, as in Ali and Pope (1995) results in that the sample being biased toward larger firms as indicated by Strong and Walker (1993). As far as we are aware, our sample is the first in the UK that considers not only existing companies but also those which were

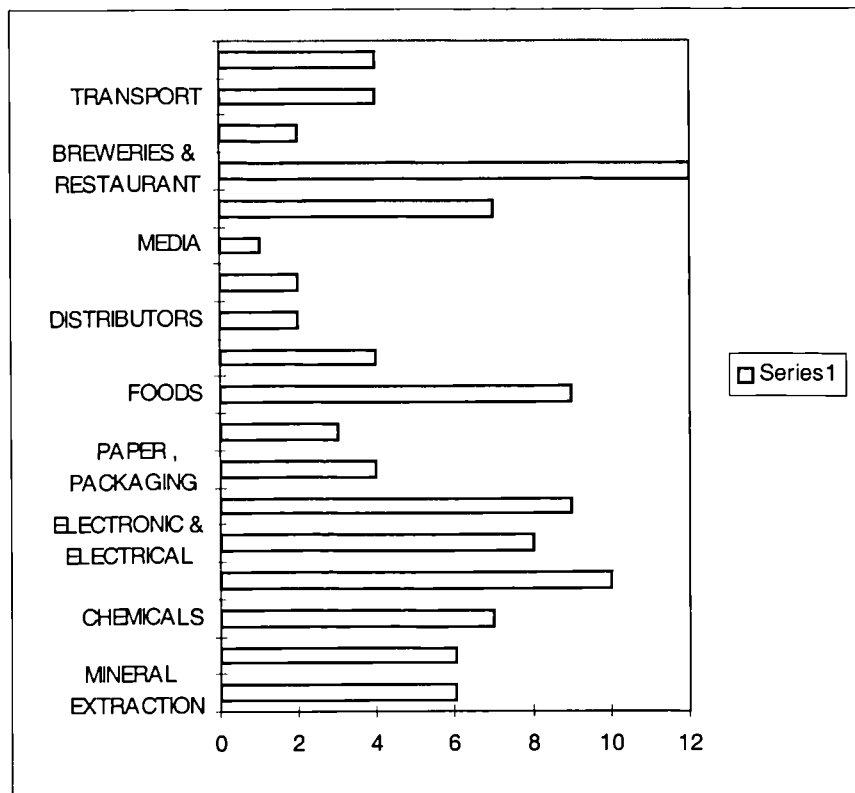


classified by Datastream as dead and taken-over companies and this inclusion was motivated by the suggestions of previous studies that cash flow is an important predictor of bankruptcy, which restricts the generalizations which can be made from the previous UK empirical evidence on the informativeness of cash flow. This selection procedure resulted in selecting the 773 companies satisfying the following criteria: (i) availability of data to calculate the respective return and accounting variables for at least one of the three sampling years; (ii) kept consistent financial year-end over the three sampling period from 1996 to 1998 in order to ensure that the market reaction would be associated with the relevant released accounting information. (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-year sampling period 1996-1998). Separated comparative results are reported for both the surviving-only sample and the pooled (surviving and non-surviving) sample to allow the sensitivity of our results to the survivorship bias to be assessed. Compared to previous UK empirical evidence on the usefulness of earnings and cash flow, our sample appears to be one of the most representative and generalizable, for example; Ali and Pope(1995) limited their sample to companies with December year end only, Garrod and Hadi (1998) restricted their sample to the 1000 largest industrial companies, Board and Day (1989) and Board and Day and Walker (1989) examined the manufacturing sector only and, overall, the previous UK evidence has been limited to existing companies only and has neglected companies classified as dead or taken-over companies, which restricts their generalizability and introduces a survivorship bias.

Table 3.3.1 reports the distributions of the sample firms across the industrial sectors. The distribution indicates that the sample appears to be reasonably comprehensive and representative of the industrial sectors.

**Table 3.3.1:** Sectoral Distribution of the Sample.

SECTOR	%
MINERAL EXTRACTION	6 %
BUILDING MATERIALS	6 %
CHEMICALS	7 %
DIVERSIFIED INDUSTRIALS	10 %
ELECTRONIC & ELECTRICAL	8 %
ENGINEERING	9 %
PAPER , PACKAGING & PRINTING	4 %
TEXTILES & APPAREL	3 %
FOODS ( PRODUCERS & RETAILERS)	9 %
HEALTH CARE & PHARMACEUTICALS	4 %
DISTRIBUTORS	2 %
LEISURE & HOTELS	2 %
MEDIA	1 %
RETAILERS, GENERAL	7 %
BREWERIES & RESTAURANT	12 %
SUPPORT SERVICES	2 %
TRANSPORT	4 %
UTILITIES	4 %



**Figure 3.1:** Sectoral Distribution of the Sample.

### Reliability of the Data Base

Following Ali and Pope (1995) we exclude firm-year observations for which the absolute value of returns, or the annual change in any of the accounting independent variables exceeds 200%, this exclusion policy is of dual purposes: First, as mentioned by Ali and Pope (1995) and Green (1999), it helps in reducing the impact of extreme outliers, the second purpose is to reduce the impact of the potential data base errors. Also, the data is checked for any negative stock price or negative dividends.

### **3.4 Definitions and Measurement of Accounting Variables**

Since, in the present study, the information content of an accounting variable is assumed to exist if its unexpected components are systematically correlated with a measure of the market return on the company's shares over the period surrounding the release of

information about the variable, this places a great importance on the issue of modeling of the investors' expectations of accounting variables.

For the purposes of the present study, earnings variable is defined as the operating profits as stated by the company in the cash flow statement adjusted for any extraordinary items that a company may show after their operating activities (Datastream item 1008), while the cash flow measure is cash flow from continuing operating activities which is adjusted for extraordinary items that a company may show after their operating activities (Datastream item 1009).

The following statement shows a reconciliation between cash flow from operations and earnings using the indirect method which starts with net income and adjusts it for revenue and expense items that were not a result of operating cash transactions in the current period to reconcile it to net cash flow from operating activities.

<b>Reconciliation Between Operating Profit and Cash Flow</b>	
<i>Item</i>	<i>Datasream-item</i>
Operating Profit	1008
<b>Plus:</b> Total depreciation and provision	1010
<b>Plus:</b> Other Adjustments <sup>1</sup>	404
<b>Plus:</b> Exceptional / Extraordinary items	1011
<b>Equals:</b> Funds Flow	
<b>Minus:</b> Increase in stock	445
<b>Minus:</b> Increase in debtors	448
<b>Plus:</b> change in creditors	417
<b>Minus:</b> Other changes in working capital	1012
<b>Minus:</b> Payments from provisions	938
<b>Plus:</b> Other funds from operating activities <sup>2</sup>	1013
<b>Equals:</b> Cashinflow- continuing activities	1009

<sup>1</sup>: Includes grants released to profit & loss accounts, associates tax, associates' retentions and adjustments for assets sold.

<sup>2</sup>: Amounts shown at the operating level that cannot be allocated elsewhere.

The unexpected components of earnings and cash flow from operations are measured as the differences between their actual and expected values per share deflated by the security price of the firm at the beginning of the fiscal year to minimise any heteroscedasticity in the data and because other size-related measures can introduce a greater bias in model estimates as indicated by Christie et al (1984). Generalizing earnings and cash flow as  $X$ , the following equations illustrate the measurement of unexpected component of  $X$  ( $U_{Xit}$ ):

$$\text{Unexpected } X = ((X_{it} - E(X_{it})) / P_{it-1})$$

$$\text{Level of } X = X_{it} / P_{it-1}$$

where;  $X_{it}$  is the actual annual earnings or cash flow per share of company  $i$  in year  $t$ ,  $E(X_{it})$  is the assessed investors' expectations of annual earnings or cash flow per share of company  $i$  in year  $t$ , and,  $P_{it-1}$  is the price of company's  $i$  share at the end of year  $t-1$ .

Being scaled by the beginning of period share price, our resulting unexpected earnings and cash flow can be interpreted as the unexpected earnings or cash flow per one sterling pound invested in company  $i$  at the beginning of fiscal year  $t$ .

To assess the investors' expectations of the company's earnings and cash flow, the random walk model (RW) is used. The random walk expectations model is the most previously used to assess the investors expectations of current earnings and operating cash flow (for example, see Charitou, 1997 and Garrod and Hadi, 1998). In the random walk model, the current year ( $t$ ) earnings and cash flow are assumed to be equal to the earnings and cash flow of the preceding year ( $t-1$ ), and hence, the changes in earnings and cash flow proxy for their unexpected components.

The employment of the random walk model to assess the investors' expectations of annual earnings and cash flow per share is motivated by that this study employ the earnings and cash flow measures as defined and published in the cash flow statement

(datastream items 1008 and 1009, respectively), and given that such data is not available before 1994, it is not being possible to employ any other expectation model that needs a long actual series of data such as the integrated moving average (IMA) or the exponentially weighted moving average (EWMA). Given that the annual change in earnings or cash flow is used as a proxy for the unexpected components, and that the extraordinary items are derive from events or transactions that fall outside the ordinary activities of the company and which are therefore expected not to recur frequently or regularly, it seems necessary to adopt definitions of earnings and cash flow that are recurring in nature and exclude the extraordinary items, else, the unexpected components of earnings or cash flow will be dominated by its extraordinary items.

### **3.5 Accruals Volatility Determinants: Concept and Measurements**

Dechow (1994) and Charitou (1997) demonstrate that, with high volatility of accruals, the reported figures for earnings and cash flow are not expected to be highly correlated with each other, and hence, they are not expected to converge as measures of firm performance. Companies with a longer operating cycle are expected to have larger working capital requirements for a given level of operating activity. For example, the working capital requirements of a supermarket with its high stock turnover and low outstanding debtors are obviously lower than the working capital of a construction or ships building company.

As mentioned earlier, this study employs three determinant of accruals volatility: (i) the absolute value of total accruals (AA); (ii) the length of the operating cycle (LOC) ; and (iii) the coefficient of variation of cash flow to earnings ratio (R).

(i) The absolute value of total accruals (AA): following and Charitou (1997), the absolute value of total accruals is defined as the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation scaled by the beginning of period share price.

(ii) The length of the operating cycle (LOC): following Charitou (1997), the length of the operating cycle is the sum of the number of days it takes to produce and sell the product (days in inventory) and the number of days in receivables and it is calculated for each firm-year observation as follows:

$$LOC_t = \frac{(INV_t + INV_{t-1}) / 2}{(CGS_t / 360)} + \frac{(REC_t + REC_{t-1}) / 2}{(SALES_t / 360)}$$

Where for year t;

REC: is accounts receivable (Datastream item: 287),

INV: is total inventory (Datastream item: 360),

SALES: is total annual sales (Datastream item: 1070),

CGS: Is cost of gold sold (Datastream item: 129),

The first component measures the number of days it takes to produce and sell the product (days in inventory) while, the second component measures the number of days that sales are held in account receivable.

(iii) The coefficient of variation of cash flow to earnings ratio (R): is measured for each company over all its firm-year observations as follows:

$$R_i = SD_i / Average_i$$

where, for company  $i$ :

$SD$  is the standard deviation of cash flow to earnings ratio measured over the period 1995-1998, this short measurement period is imposed by that this study employ the earnings and cash flow measures as defined and published in the cash flow statement (datastream items 1008 and 1009, respectively), and given that such data is not available before 1994; and  $Average_i$  is the average of the cash flow to earnings ratio over the sampling period for each company.

### **3.6 The Market Return Measure**

As mentioned earlier, the present study regresses a measure of firms' share price returns on accounting explanatory variables (earnings, cash flow and interaction terms). In this section, the measurement aspects of the used market return variable are discussed.

Although, as mentioned by Armitage (1995), the market model is the most commonly used model to generate expected returns, and that the abnormal or the cumulative abnormal returns were the dominant return measures in prior studies (i.e., McLeay, Kassab and Helan, 1997; Garrod and Hadi, 1998; Rayburn, 1986; Wilson, 1986, 1987; Bowen et al, 1987; Board et al, 1989; Livnat and Zarowin, 1990, Cheng et al, 1996; among others) there has been a movement toward the use of raw returns or the raw return net of market return rather than the abnormal components (i.e., Charitou, 1997; Dechow, 1994; Ali and Pope, 1995; among others). In the present study raw returns are used as returns measures. The return is measured over twelve months including the four months after the financial year end to ensure that the market reaction to annual report information will be included in the measured return.



Following Dechow (1994) and Charitou (1997) and others, the return is measured as follows:

$$RETURN_i = \frac{(P_t - P_{t-1}) + DIV_t}{P_{t-1}}$$

Where for company *i* and year *t*:

RETURN: is the raw measure of return over twelve months lagged four months after the year end,

$P_t$ : is the beginning price,

$P_{t-1}$ : is the ending price,

$DIV_t$ : is the paid dividends over the return period (datastream item 284), added back according to the X-date.

According to Garrod and Hadi (1998), previous long window association studies have typically utilized a lagged return window of four months in an attempt to best match the security returns with the period over which the accounting information relating earnings is potentially in the public domain. In addition, their investigation of the full report availability indicates that the majority of the UK companies publish their final accounts within four months of the year end. Furthermore, their empirical results confirm that the four month lag models have greater explanatory power than either the five or six months lag models.

Strong (1992) stated that the period over which abnormal returns are analyzed should coincide with the period over which expectations concerning earnings are revised. Furthermore, Strong pointed out that information about actual earnings may be gradually disclosed at any time over the prior twelve months up to the announcement date and that all information is disclosed by the date of the announcement, and hence, the appropriate period for analyzing abnormal returns is therefore the entire twelve- month period up to and including the earnings announcement. According to Neill et al (1991), the studies

that employed an annual holding period generally demonstrated incremental information content for cash flow data. A strength of these studies, as stated by Neill et al, is that an annual holding period allows for a high degree of confidence that the revealed cash flow has been captured by the research design. Moreover, the reliance on the market response during the annual report release period introduces the possibility that other financial statement information may have been partially responsible for the observed results.

### **3.7 Model Specification and Statistical inferences**

The specification of our models reflects the traditional assumption of accounting variables informativeness studies that a variable contains information if its unexpected realization is systematically correlated with a measure of return on the company's share over the period pertaining to the release of relevant financial data, assuming the extent to which the market can be deemed to have a prior expectation of the firm's performance. It is only the unexpected component that is expected to influence the behavior of the investors. Such a relationship has been described in the previous accounting variables informativeness studies in a simple way by a multiple linear regression equation where the unexpected components of the accounting variable are the explanatory variables and the dependent variable is a measure of a company share's return.

In the present study, the informativeness of earnings and cash flow is assessed in terms of the information content of each variable alone and the incremental information content of each variable beyond the other in the context of corroboration.

Below, we discuss the drawing of statistical inferences concerning the informativeness of earnings in terms of information content and incremental information content beyond

cash flow. Statistical inferences concerning the informativeness of cash flow are not discussed here because they can be drawn analogously.

The empirical test for the information content of earnings in a corroboration context is based on the analysis of the following hierarchy of nested models: (note: equivalent models were used to test for the information content of cash flow by replacing the earnings measure by the cash flow measure)

M1; the main effect model:

$$\text{RETURN}_{it} = f(\text{Earnings})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}})$$

M3B: the combination of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}})$$

M4A; the model of interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{con}} * \text{D}^{\text{av}})$$

M4B: the model of interaction between combination of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{com}} * \text{D}^{\text{av}})$$

where,

**Earnings:** is the earnings measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the various combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quintile of the accruals volatility.

*Note: a technical discussion of these models is provided in Appendix 1.*

The following F-statistic is used to compare the goodness of fit of the full and the reduced models:

$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where;  $SSE_r$ ,  $SSE_f$  are the sum of square residuals of the restricted and non restricted models, respectively.  $M$  is the number of variables added to the reduced model, which is the number of restrictions,  $N$  is the number of observations.

Model 1 is the main-effect model in which the valuation relevance of earnings is not allowed to vary among sub-groups according to a moderator variable, and hence, represents the valuation relevance of earnings averaged over all groups.

In contrast, Model 2 allows the valuation relevance of earnings to vary among sub-groups according to the consistency of the signals of earnings and cash flow surprises, and hence, a statistically significant F-statistic between Model 2 as full model, and Model 1 as reduced model, indicates that the relationship between returns and earnings differs according to the consistency of signals shown by earnings and cash flow surprises.

In Model 3A (consistency and accruals volatility effects model) , the relationship between returns and earnings is allowed to differ according to a determinant of accruals volatility. Observations are grouped into five quintiles according to the determinant of accruals volatility, where quintile 1 contains observations with the lowest accruals volatility and quintile 5 contains observations with the highest accruals volatility. A statistically significant F-test between Model 3A and Model 2 would suggest that the

relationship between returns and earnings is moderated by the determinant of accruals volatility ( see Dechow 1994 and Charitou 1997).

Model 4A (interaction between consistency and volatility of accruals model) tests whether or not the interaction between earnings and cash flow investigated by Model 2 is moderated by the determinant of accruals volatility by allowing the relationship between returns and the interaction term in Model 2 to vary according to the determinant of accruals volatility (DAV). A statistically significant F-statistic between Model 4A and Model 3A indicates that the interaction between earnings and cash flow represented by the interaction term UE(CON) in Model 2 is moderated by the determinant of accruals volatility.

To test the hypothesis that the relationship between returns and earnings depends on the various combinations of signals of earnings and cash flow surprises, Model 3B is employed to extend Model 2 by allowing the valuation relevance of earnings to differ according to the combination of signals of earnings and cash flow surprises, while Model 4B extends Model 3B by allowing the relationship between returns and the interaction terms in Model 3B to vary according to a determinant of accruals volatility. Hence, a statistically significant F-statistic between Model 4B, as full model, and model 3B, as reduced model indicates that the relationship between returns and the interaction terms is moderated by the determinant of the accrual volatility.

The empirical test for the incremental information content of earnings beyond cash flow is based on the analysis of the same models used to assess the information content of earnings with the exception that the cash flow measure is included in the specification as regressor to capture the effect of the cash flow, so the specifications indicate the effect of earnings on returns after controlling for the effect of cash flow, the following

hierarchy of nested models is used:

M1A; cash flow only model:

$$\text{RETURN}_{it} = f(\text{Cashflow})$$

M1B; the main effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Cashflow})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Cashflow})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Earnings} * D^{\text{av}}, \text{Cashflow})$$

M3B: the combination of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{com}}, \text{Earnings} * D^{\text{av}}, \text{Cashflow})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Earnings} * D^{\text{av}}, \text{Earnings} * D^{\text{con}} * D^{\text{av}}, \text{Cashflow})$$

M4B: the model of Interaction between combination of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{com}}, \text{Earnings} * D^{\text{av}}, \text{Earnings} * D^{\text{com}} * D^{\text{av}}, \text{Cashflow})$$

where,

**Earnings:** is the earnings measure of performance as defined earlier,

**Cashflow:** is the cash flow measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the various combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quintile of the accruals volatility.

***Note:** a technical discussion of these models is provided in Appendix 1.*

Equivalent models were used to test for the incremental information content of cash flow beyond earnings by replacing the earnings measure by the cash flow measure.

In testing for the incremental information content of earnings and cash flow beyond each

other, prior studies such as those of Bowen et al (1987), Board, Day and Walker (1989), Ali and Pope (1994) and Biddle et al (1994), McLeay, Kassab and Helan (1997) and Garrod and Hadi (1998) have used different methods of assessing the statistical significance of introducing the additional explanatory variables as a test of the incremental information content of that variable. However, F-test was used to examine the reduction in the variance achieved by introducing an additional accounting variable (i.e., Biddle et al,1994; McLeay, Kassab and Helan,1997).

### **3.8 Alternative Functional Forms;**

An important finding in the recent literature on the modeling of the relationship between returns and accounting measures of performance (earnings or cash flow) is that it may be possible to improve the specification of the relationships model by employing alternative functional forms such as non-linear relationship and introducing both change and level to proxy for the unexpected component of the accounting measures of performance (earnings and cash flow). The following review and discussion emphasize the importance of employing alternative functional forms in our study.

The results reported in previous empirical literature generally suggested that when the relationship between returns and accounting measures of performance is modeled as a linear relationship and only the changes of the accounting variables are included as explanatory variables, only a small fraction of the total variation of returns could be explained. In recent years, the theoretical and empirical literature of return-earnings relationships demonstrates that the relationship between returns and accounting measures of performance (earnings and cash flow) can be significantly improved by considering the fact that accounting measures of performance contain transitory components that are

either value-irrelevant or should have a limited valuation impact (Beaver et al. 1980; Kormendi and Lipe, 1987) which requires re-specification of the relationship by the inclusion of both levels and changes of the explanatory variables to capture both the permanent effect and the transitory effect (Easton and Harris, 1991). In addition, the non-linear models can also proxy for transitory and permanent components of accounting measures of performance (Freeman and Tse, 1992)

The goal of this section is to extend the analysis by introducing the importance of employing the recent innovations in modeling the relationship between returns and accounting measures of performance.

Persistence measures the degree to which an earnings innovation in the current period persists, giving rise to permanent earnings increases/ decreases. The greater the perceived persistence of an earnings innovations, the greater will be the market's reaction to that innovation. Concordantly, the presence of a transitory component dampens market reaction (Beaver et al. 1980; Kormendi and Lipe, 1987) which results in a lower market response to the accounting measure of performance (earnings and cash flow) and lower explanatory power ( R-squared) in return-accounting measure regression models.

The presence of transitory earnings components introduces measurement error into the independent variable. This occurs because the current level of earnings is a better proxy for unexpected earnings when earnings are transitory (Easton and Haris, 1991; Ali and Zarowin, 1992). For example, if last year's earnings were purely transitory, then this year's expected level of earnings is zero, and hence, whatever the level of this year's earnings, they are unexpected.



According to Freeman and Tse (1992), extreme values of unexpected earnings will primarily reflect transitory earnings surprise which, because they carry less weight in determining stock prices, will result in a lower marginal price response for extreme earnings shocks, which implies a nonlinear, S-shaped relation between stock returns and earnings.

Empirically, Easton and Haris (1991) showed that both the earnings change and level variables have explanatory power for stock returns. Ali and Zarowin (1992) also determined that for firms with predominantly permanent earnings in the previous period, the incremental explanatory power and increase in the earnings response coefficient from including the earnings level variable in returns-earnings regression was only small. However, firms with predominantly transitory earnings had a much greater increase in the earnings response coefficient as a result of the inclusion of the earnings level variable. Hence, in our research design we include both levels and changes in the variables of interest.

The assumption of a linear relation between stock returns and earnings has also been challenged by a number of researchers (Cheng et al., 1992; Freeman and Tse, 1992; among others). The linearity assumption rests on the premise of a constant marginal price response to earnings, but earnings persistence will determine the strength of the price response, and persistence is related to the magnitude of the unexpected component of accounting measures of performance (earnings and cash flow). For example, firms that experience a very large one-period change in earnings are seldom capable of maintaining that new level of earnings in subsequent periods. Further, if extreme values of unexpected earnings primarily reflect transitory surprises, there will be a negative

correlation between the absolute magnitude of unexpected earnings and earnings persistence. Assuming such a negative relation, then as the absolute magnitude of unexpected earnings increases, the related price response will decrease. This means that transitory earnings surprises will have less impact on security prices than permanent earnings surprises, and hence, returns and the accounting measures of performance will have an S-shaped relationship.

Ali (1994) argued that nonlinear modeling was also appropriate for cash flows. Using a non-linear model, Ali demonstrated incremental information content beyond earnings only for low absolute values of unexpected cash flows. High absolute values of unexpected cash flows were found to contain no incremental information content beyond earnings. Using a similar approach, Ali and Pope (1995) observed significantly increased explanatory power associated with the nonlinear returns-cash flow regression model. Das and Lev (1994) found evidence of non-linearity in the returns-cash flow relation, which is consistent with the presence of transitory cash flow.

From the above discussion, it can be included that two techniques were used to capture the effect of the existence of transitory components in earnings and cash flow surprises, the first is the employment of both change and level to proxy for the unexpected component of earnings or cash flow and the second technique is the utilization of non-linear relationships between returns and earnings or cash flow.

## CHAPTER FOUR

### PRELIMINARY ANALYSIS AND DIAGNOSTIC TESTS

#### 4.1 Introduction

The aims of the present chapter are, firstly, to provide a descriptive analysis of the employed variables, secondly, to test for multicollinearity between each pair of independent variables employed in the same model, and finally to describe the diagnostic tests and to discuss their assumptions and the consequences of violating any of them and to test whether or not our models satisfy these assumptions and describe the remedial procedures used. This chapter is divided into the following sections: Section 4.2 provides a descriptive analysis of the employed variables, Section 4.3 tests for multicollinearity, and Section 4.4 tests for the statistical assumption of OLS techniques. These assumptions include: insignificant serial correlation, no specification bias, a normally distributed error term, homoscedasticity and cross sectional independence.

#### 4.2 Descriptive Analysis:

This section presents descriptive statistics for the dependent and independent variables employed in the study.

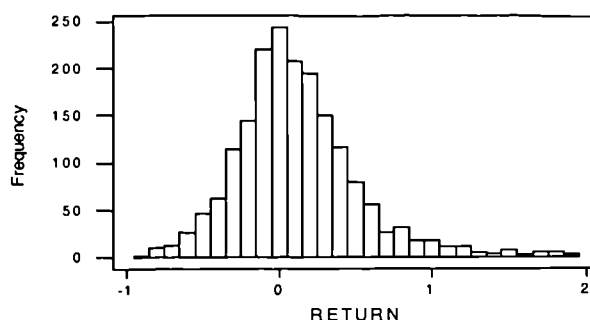
Table 4.2.1 shows descriptive statistics for security returns (RET), changes in cash flow ( $\Delta$ CF), levels of cash flow (CF), changes in earnings ( $\Delta$ E), and levels of earnings (E).

**Table 4.2.1: Descriptive Statistics:**

Variable	Mean	Median	Standard Deviation
Security return	0.11	0.06	0.4
Change in cash flow	0.02	0.013	0.12
Level of cash flow	0.14	0.13	0.13
Change in earnings	0.013	0.013	0.07
Level of earnings	0.11	0.11	0.1

The reported statistics in Table 4.2.1 suggest that the variability of the cash flow measures is greater than the variability of the earnings measures, which is consistent with Dechow (1994) and Charitou (1997). Unfortunately, the prior UK studies performed by Board and Day (1989), Board, Day and Walker (1989) and Garrod and Hadi (1998) do not report descriptive statistics to aid comparison. Ali and Pope (1995) do however report some statistics for their study. It should be noted that the return measure employed in the Ali and Pope (1995) study is different from that employed in the present study, and hence, direct comparison is not possible (Ali and Pope (1995) employ a market adjusted annual holding return).

The following figure shows the frequency plot of the return variable;



**Figure 4.1: Frequency Plot of the Return Variable.**

### **4.3 Multicollinearity:**

Cross-sectional and inter-temporal correlation between any pair of independent variables is of statistical concern in the accounting variables informativeness studies because it could obscure the incremental information content of the explanatory variables, Bowen et al (1987) report that the presence of multicollinearity between the explanatory variables makes the interpretation of significance tests on individual coefficients difficult.

Multicollinearity exists in the model if two or more of the explanatory variables are highly correlated with each other which might lead to an insignificant t-ratio, when in reality it is significant which makes it difficult to evaluate the contribution of each independent variable in explaining the dependent variable. Although the presence of multicollinearity may not be a problem when the model is used for prediction or forecasting purposes, if the purpose of the model is to draw inferences based on a reliable estimation of the individual parameters, which is the common case in the informativeness studies, then the multicollinearity may restrict the inferences.

In the present study, we test for the multicollinearity by estimating the cross sectional and intertemporal pair-wise correlation coefficient between each pair of independent variables employed in the same model. Murphy (1989) reports that if the correlation between two explanatory variables is 70% or more, this may be an indication that multicollinearity could have a bad effect on the results.

Table 4.3.1 presents pooled Pearson correlations between the independent variables;

**Table 4.3.1:** Pooled Pearson Correlations;

<b>Variable</b>	<b>Security return</b>	<b>Change in cash flow</b>	<b>Change in earnings</b>	<b>Level of earnings</b>
Change in cash flow	0.15			
Change in earnings	0.31	0.37		
Level of earnings	0.24	0.27	0.65	
Level of cash flow	0.18	0.58	0.3	0.64

Consistent with previous studies that employ UK data, the correlation between both the levels and changes in earnings and cash flow are positive.

According to Green (1999), prior studies (for example, Ali and Pope, 1995) whilst recognizing the problem, have certainly not taken steps to resolve it. Perhaps the most appropriate action that can be taken is to recognize that the problem may exist and to interpret analysis bearing this fact in mind.

#### **4.4 Diagnostic Tests:**

Employing the ordinary least squares (OLS) technique to investigate the informativeness of earnings and cash flow by regressing a measure of company share's return on the unexpected components of earnings and cash flow requires that the statistical assumptions of OLS techniques are satisfied. These include; insignificant serial correlation, no specification bias, normally distributed error terms, homoscedasticity or equal variance of error terms and finally cross-sectional independence.

According to Green (1999), it should be noted that these problems are not mutually exclusive and attempts to resolve one may in fact induce or exacerbate another.

In this section, we discuss these assumptions and the consequences of violating any of them. We then test whether or not our models satisfy these assumptions and describe any remedial procedures used.

#### 4.4.1 Test for No Serial Correlation Assumption

Under the no serial correlation assumption, the errors corresponding to successive observations are assumed to be serially uncorrelated. According to Green (1999), serial correlation (auto correlation) is expected in time-series analysis but not in cross-sectional analysis. Given that in this study, the employed sample consists of a relatively small number of time series observations (three-years period) with a relatively large number of cross-sectional observations, the problem of serial correlation (auto correlation) is not expected to be a major problem. However, Durbin and Watson (1951) (DW) test statistic is employed to confirm our prediction that no serial-correlation problem exists. Durbin and Watson (1951) (DW) introduced the currently most common test of first order serial correlation that is where they examine the correlation between  $E_t$  and  $E_{t-1}$  where  $E_t$  and  $E_{t-1}$  are the residuals of a linear model. This test statistic is referred to as the Durbin-Watson statistic (DW) which is calculated as follows;

$$d = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{t=1}^n e_t^2}$$

This statistic lies between 0 and 4 and if there is zero serial correlation the statistic would have a value of 2. A statistic significantly less than 2 indicates positive serial correlation whereas a statistic significantly greater than 2 would indicate the presence of negative serial correlation. The DW table provides two critical values, a lower (L) and an upper

(U) value. The values depend on the number of observations, the number of parameter estimates and the level of significance. A one-tailed DW test tests the null hypothesis,  $H_0$ , that there is no serial correlation, against the alternative hypothesis,  $H_{1a}$ , that positive serial correlation exists between residuals corresponding to successive observations. The test procedure is as follows:

- Reject the null hypothesis,  $H_0$ , if the DW statistic  $d$  is less than the lower critical value.
- Accept the null hypothesis,  $H_0$ , if the DW statistic  $d$  is greater than the upper critical value.

To test the significance for  $H_{1b}$  that negative serial correlation exists, the same procedures are applicable with the exception that the value of the DW statistic  $d$  is first subtracted from 4.

The test is inconclusive if the DW statistic  $d$  takes a value between the lower and upper critical values.

In the MICROFIT software package, the DW statistic  $d$ , is routinely provided as a part of the standard results whenever the residuals are presented. The results of this statistic confirm our prediction that the problem of serial (auto) correlation is not expected to be a major problem.



#### 4.4.2 The Mis-specification Test (Test for Linearity Assumption)

The model miss-specification problem results from under-fitting the model by ignoring important variables or over-fitting the model by including unnecessary variables. In the case of under-fitting the model, the coefficient of the variables, error variance and standard error of the OLS estimators are biased (Gujarati, 1992), and the hypothesis testing procedures are not reliable. In the case of over-fitting the model, OLS estimators are unbiased and the t test and F test remain valid.

Ramsey's (1969) RESET (Regression Specification Error Test) was used to test the null hypothesis that the model contains a specification error against the alternative hypothesis that the model does not contain a specification error. The RESET statistic follows the Chi-square distribution with 1 degree of freedom and is calculated as follows;

$$L = n R^2 \sim X^2_{1,\alpha}$$

$n$  : is the number of observations

$R^2$  : is the coefficient of determination

$X^2_{1,\alpha}$  : is the Chi-square critical value with 1 degree of freedom.

If the RESET statistic value exceeds the critical value at the chosen level of significance, the linearity assumption will be violated.

Table 4.4.2 shows the test-statistics for the mis-specification assumption for the models assessing the information content of earnings:

**Table 4.4.2:** Test statistics for the functional form assumption.

Model	Functional form
the main effect model	11.9*
the consistency effect model	12.9*
the consistency and accruals volatility effects model	0.38*
the model of Interaction between consistency and accruals volatility	0.41
the combination of signals and accrual volatility effects model	14.0*
the model of Interaction between combination of signals and accruals volatility	0.24

\* Indicates statistically significant at .05 or less.

#### 4.4.3 Test for the normality assumption

According to Gujarati (1995) the normality assumption is not essential if our objective is merely to estimate since the OLS is Best Linear Unbiased Estimation (BLUE) regardless of whether or not the residuals are normally distributed. However, in the case of non-normality, the residuals cannot be interpreted as the maximum likelihood and, therefore, cannot be considered as asymptotically efficient. In addition, as stated by Gujarati (1995), if the residuals are not normally distributed, then the usual test procedures, the t-test and F-test, are only valid asymptotically, that is, in large samples.

In order to test the null hypothesis that the residuals of the market model regression are normally distributed, we used Bera and Jarque's (1982) Skewness-Kurtosis test. The test

statistic follows a Chi-square distribution with 2 degrees of freedom at significance level

$\alpha$  and is calculated as follows :

$$LM = n [ ( P_1^2 / 6 ) + (( P_2 - 3 )^2 / 24 ) ]$$

where,

n : number of observations,

$P_1$ : the estimate of Skewness coefficient of the error,

$P_2$ : the estimate of Kurtosis coefficient of the error.

If the LM statistic is greater than the critical value from the chi-square distribution with 2 degrees of freedom, we can reject the null hypothesis of normally distributed residuals and can conclude that a normality problem exists.

Dyckman et al (1984) state that the non-normality of individual security return residuals has little effect on the inferences drawn from the use of the t-test applied to portfolios. Brown and Warner (1985) suggest that the non-normality of daily returns has no obvious impact on event study methodologies.

Table 4.4.3 shows the test-statistics for the normality assumption for the models assessing the information content of earnings.

**Table 4.4.3:** Test statistics for the diagnostic tests.

Model	Normality
the main effect model	979*
the consistency effect model	981*
the consistency and accruals volatility effects model	999*
the model of Interaction between consistency and accruals volatility	998*
the combination of signals and accrual volatility effects model	984*
the model of Interaction between combination of signals and accruals volatility	976*

\* Indicates statistically significant at .05 or less.

The reported results suggest that the non-normality problem is existed, but given that as stated by Gujarati (1995), if the residuals are not normally distributed, then the usual test procedures, the t-test and F-test, are only valid asymptotically, that is, in large samples, and given the findings of Dyckman et al (1984) and Brown and Warner (1985) the problem of non-normality is not expected to be a major problem.

#### 4.4.4 Test for the Assumption of Homoscedasticity

Under the homoscedasticity assumption the variance of the residuals of the market model is hypothesized to be constant through the sample.

The violation of the homoscedasticity assumption results in unbiased and consistent OLS estimators which will be neither efficient nor asymptotically efficient, and hence the regression coefficient variances will be less accurate.

To test the null hypothesis,  $H_0$ , that the variance of the residuals of the model is constant through the whole sample, we used the Lagrange Multiplier (LM) test. The LM statistic is calculated as follows:

$$LM = nR^2$$

where;

n is the sample size,

$R^2$  is the coefficient of determination obtained from the following regression where the square of residuals ( $e^2_{it}$ ) is regressed on the predictive values  $R_{it}$  as follows:

$$e^2_{it} = b_0 + b_1 R_{it} + u_{it}$$

If the LM statistic which follows the Chi-square distribution with 1 degree of freedom exceeds the critical value at the chosen level of significance ( $\alpha$ ), we can reject the null hypothesis of homoscedasticity and conclude that the residuals are heteroscedastic.

Table 4.4.4 shows the test-statistics for the heteroscedasticity assumption for the models assessing the information content of earnings:

**Table 4.4.4:** Test statistics for the diagnostic tests.

Model	Heteroscedasticity
the main effect model	19.0*
the consistency effect model	22.0*
the consistency and accruals volatility effects model	11.73*
the model of Interaction between consistency and accruals volatility	11.6*
the combination of signals and accrual volatility effects model	12.0*
the model of Interaction between combination of signals and accruals volatility	7.6*

\* Indicates statistically significant at .05 or less.

Given that, as suggested by the reported statistics, the heteroscedasticity problem exists.

The White (1980) Heteroscedasticity-Consistent Covariance Matrix estimation technique is used to deal with the heteroscedasticity.

#### 4.4.5 Test for Contemporaneous Correlation

The classical residual regression model implicitly assumes that there is no other regression model with residuals which are correlated with the residuals of the regression model in question. The statistical consequences of cross-sectional correlation are that the OLS can give efficient unbiased coefficient estimates but the corresponding standard errors will be biased leading to potential over-statement of t-statistics, and hence to an increase in the likelihood of type I error.

Previous literature provides mixed results about the seriousness of the bias that might be

caused by the contemporaneous correlation problem i.e., Christie (1986) reports that residuals dependence may have a relatively small influence on significant levels, at least in studies that include a spectrum of industries, even when the event is common to all firms.

Christie's suggestion is consistent with results reported by Brown and Warner (1980,1985). Ball (1975) has shown that, if the sample is well diversified across different industries, the average cross-sectional correlation among the residuals approaches an amount that is negative and close to zero, which implies that for a well diversified sample, cross-sectional dependence should not seriously bias the estimate of the standard error.

Schipper and Thompson (1983) and Hughes and Ricks (1984) describe empirical studies in which significant levels vary substantially, depending on whether the problem of contemporaneous correlation is considered in calculating the t value. According to Green (1999) cross-sectional dependence is likely to be a major problem if returns are sampled from a common time period or a common year end. Denny and Walker (1995) observe that returns sampled from common time periods are likely to be correlated cross-sectionally. Relying on the fact that the sample is well diversified across industries, Ball's (1975) result and on the fact that this study sample selection is not restricted to a common time period nor to a common year end, it can be included that the cross-sectional problem is not expected to be a major issue and at the same time we interpret our analysis bearing in mind that the problem may exist. Charitou (1997) recognizes that econometric problems may exist in his study but does not attempt to address such problems.

# CHAPTER FIVE

## EMPIRICAL RESULTS OF NAIVE MODELS

### 5.1 Introduction;

This chapter presents empirical results concerning the valuation relevance of earnings and cash flow obtained by employing change only models assuming linearity. This chapter is divided into the following sections: Section 5.2 reports and discusses empirical results concerning the informativeness of earnings and cash flow, Section 5.3 shows the incremental information content of earnings and cash flow beyond each other, and finally, Section 5.4 summarizes and concludes this chapter.

### 5.2 Informativeness of Earnings and Cash Flow

As mentioned earlier, the aim of this subsection is to provide evidence on the valuation relevance of earnings and Cash Flow in terms of information content.

The information content of earnings is assessed by reporting and discussing the results obtained by employing the following hierarchy of nested models: (equivalent models were used to test for the information content of cash flow by replacing earnings measure by cash flow measure).

M1; the main effect model:

$$\text{RETURN}_{it} = f(\text{Earnings})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}})$$

M3B; the combinations of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{con}} * \text{D}^{\text{av}})$$

M4B; the model of Interaction between combinations of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{com}} * \text{D}^{\text{av}})$$

where,

**Earnings:** is the earnings measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the various combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quintile of the accruals volatility.

Note: a detailed technical discussion of these models is provided in Appendix 1.

Model 1 is the main-effect model in which the valuation relevance of earnings is not allowed to vary among sub-groups according to any moderator variable, and hence, represents the valuation relevance of earnings averaged over all groups. In contrast, the consistency effect model (Model 2) allows the valuation relevance of earnings to vary among sub-groups according to the consistency of the signals of earnings and cash flows surprises. A statistically significant F-statistic between the consistency effect model (Model 2) as full model, and the main effect model (Model 1) as reduced model, indicates that the relationship between returns and earnings differs according to the



consistency of signals shown by earnings and cash flow surprises.

In the consistency and accruals volatility effects model (Model 3a) , the relationship between returns and earnings is allowed to differ according to a determinant of accruals volatility. Observations are grouped in five quintiles according to the determinant of accruals volatility, where quintile 1 contains observations with the lowest accruals volatility and quintile 5 contains observations with the highest accruals volatility. A statistically significant F-test between the consistency and accruals volatility effects model (Model 3a) and the consistency effect model (Model 2) suggests that the relationship between returns and earnings is moderated by the determinant of accruals volatility ( see Dechow 1994 and Charitou 1997).

The interaction between consistency and volatility of accruals model (Model 4a) tests whether or not the interaction between earnings and cash flow investigated by the consistency effect model is moderated by the determinant of accruals volatility by allowing the relationship between returns and the interaction term in the consistency effect model to vary according to the determinant of accruals volatility. A statistically significant F-statistic between the model of interaction between consistency and accruals volatility (Model 4a) and the consistency and accruals volatility effects model (Model 3a) indicates that the effect of the consistency of signals on the relationship between returns and earnings is moderated by the determinant of accruals volatility.

To test the hypothesis that the relationship between returns and earnings depends on the various combinations of signals of earnings and cash flow surprises, the combinations of signals and accruals volatility effects model (Model 3b) is employed to extend the consistency and accruals volatility effects model by allowing the valuation relevance

of earnings to differ according to the various combinations of signals of earnings and cash flow surprises, while the model of Interaction between combinations of signals and accruals volatility (Model 4b) extends the combinations of signals and accruals volatility effects model by allowing the relationship between returns and the interaction terms in the combinations of signals and accruals volatility effects model to vary according to a determinant of accruals volatility. Hence, a statistically significant F-statistic between the model of Interaction between combinations of signals and accruals volatility (Model 4b) as full model, and the combinations of signals and accruals volatility effects model (Model 3b) as reduced model indicates that the relationship between returns and the interaction term is moderated by a determinant of accrual volatility.

Table 5.2.A reports the results of running the previously discussed models. Panel 1 shows the results when the aggregate accrual (hereafter; AA) is used as a determinant of accruals volatility, while panels 2 and 3 present the results obtained when the length of the operating cycle (hereafter; LOC) and the coefficient of variation of cash flow to earnings ratio (hereafter; R) respectively are used as determinants of accruals volatility. Even though the main effect model (Model 1) and the consistency effect model (Model 2) are not affected by the determinant of accruals volatility in use, we ran them separately for each case because the number of observations differed among the three cases (because of the availability of the required data). Table 5.2.B displays the incremental F-test between the full and reduced models.

**Table 5.2.A: Regression coefficients for the six models assessing the informativeness of earnings (after deleting the outliers using Cook's distance<sup>3</sup> criteria)**

Variable	Panel 1: (AA) <sup>1</sup>						Panel 2: (LOC) <sup>2</sup>						Panel 3: (R) <sup>3</sup>					
	M1	M2	M3A	M3B	M4A	M4B	M1	M2	M3A	M3B	M4A	M4B	M1	M2	M3A	M3B	M4A	M4B
Constant	.09*	.09*	0.07*	0.07*	0.07*	0.08*	0.08*	0.08*	0.07*	0.07*	0.07*	0.08*	0.08*	0.08*	0.08*	0.09*	0.08*	0.08*
UE: all groups	1.6*	1.4*	2.3*	2.1*	2.0*	1.2*	1.9*	1.5*	1.7*	1.4*	1.3*	1.9*	1.8*	1.8*	2.6*	2.2*	4.0*	4.0*
UE(CON): consistent signals group		0.21	0.22	0.2	0.5	2.1*		0.52	0.41	0.8	1.07*		0.11	0.08	0.73	-1.6*	-1.1	
UE(+):negative earnings,positive cashflow surprises				0.34		3.9*			0.7		1.14				0.94		0.02	
UE(++): positive earnings and cash flow surprises				0.39		-1			-0.1		-0.56				-0.6		-0.59	
UE(DAV1): lowest accruals volatility group			1.3*	1.3*	2.3*	1.9			1.7*	1.8*	0.77			-0.5	-0.7	-2.7*	-3.3*	
UE(DAV5): highest accruals volatility group			-1.3*	-1.2*	-0.9	0.1			-0.6*	-0.72	-0.12			-0.9	-0.95	-2.4*	-2.7*	
UE(CON)(DAV1):consistent signals& lower volatility					-1.2	-0.66				1.1	-2.5				2.5*	2.2		
UE(+)(DAV1): negative earnings,positive cashflow surprises & lower volatility group						-1.7					2.3						2.3	
UE(++)(DAV1): positive earnings and cash flow surprises & lower volatility group						-0.29					5.0*						1.88	
UE(CON)(DAV5): consistent signals& higher volatility group					-0.3	-2.4*				0.11	-0.7					1.7	2.4	
UE(+)(DAV5):negative earnings,positive cashflow surprises & higher volatility group						-4.3*					-1.4						0.76	
UE(++)(DAV5): positive earnings and cash flow surprises & higher volatility group						1.7*					0.37						-0.61	
<i>R-squared (%)</i>	10	10	12	12.2	12.1	13	11.7	11.8	13	13.2	14.4	10.9	10.9	11.4	11.6	11.6	12.3	

<sup>3</sup>: Cook's distance criteria combines two other techniques ( leverage and standardized residual) into one overall measure of how unusual an observation is; leverage tells if an observation has unusual predictors, and standardized residual tells if an observation has unusual response.

\* : indicates statistically significant at .05 or less .

**M1**; the main effect model, **M2**; the consistency and accruals volatility effects model, **M3A**; the consistency and accruals volatility effects model, **M3B**: the combinations of signals and accrual volatility effects model, **M4A**; the model of Interaction between consistency and accruals volatility, **M4B**: the model of Interaction between combinations of signals and accruals volatility.

<sup>1</sup>: AA is aggregate accruals, <sup>2</sup>: LOC is length of operating cycle, <sup>3</sup>: R is the coefficient of variation of cash flow to earnings ratio.

**Table 5.2.B:** F-statistics<sup>1</sup> between the models assessing the informativeness of earnings

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		Variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	0.55	1.3	3.3	1.9	0.1	0.8
the consistency and accruals volatility effects model	the consistency effect model	20.0*	4.7*	14.0*	7.4*	3.5*	1.9
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	1.31	1.5	0.86	1.7	1.8	1.3
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	0.37	1.3	0.5	1.2	2.2	2.3
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	2.9	2.2	4.1*	1.8	1.8	1.8

\* : indicates statistically significant at .05 or less .

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998). <sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only <sup>3</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation. <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and days in receivables; <sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The results reported for the main effect model (Model 1) in Panels 1,2 and 3 of Table 5.2.A show that the coefficient on the unexpected earnings is statistically significant which indicates that earnings convey information to the market. The statistically insignificant coefficient on the interaction term UE(CON) in the consistency effect model (Model 2) associated with insignificant F-statistics between the consistency effect model as full model, and the main effect model as reduced model shown in Panels 1,2 and 3 of Table 5.2.B, indicate that the relationship between returns and earnings is not moderated by the consistency of signal, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. Moreover, the statistically significant F-statistics between the model of consistency and accruals volatility effects as full model and the consistency effect model suggest that the relationship between returns and earnings is moderated by the determinant of accruals volatility when the aggregate accruals (AA), the length of the operating cycle (LOC) or the coefficient of variation of cash flow to earnings ratio (R) is used as accruals volatility determinant, implying that, as stated by Dechow (1994) and Charitou (1997), accruals are predicted to improve earnings' ability to reflect firm performance when the accruals volatility is high.

Table 5.2.B shows insignificant F-statistics between the model of the interaction between consistency and accruals volatility (Model 4a) and the model of the consistency and accruals volatility effects (Model 3a) for both the pooled and the survivor-only sample, which implies that the effect of the consistency of signals on the relationship between returns and earnings is not moderated by the accruals volatility determinant, which does not confirm the theoretical prediction that for firms with low accruals volatility, investors

are more expected to assess the reliability of earnings by relating it to cash flow.

The statistically insignificant F-statistics between the combinations of signals and accruals volatility effects model (Model 3b) and the consistency and accruals volatility effects model (Model 2) for both the pooled and the survivor-only sample reported in Table 5.2.B imply that the relationship between returns and earnings is not moderated by the combinations of signals of earnings and cash flow surprises, which does not confirm our prediction that investors are more interested to relate earnings to cash flow if the accruals volatility is low.

The resulted F-statistics between the model of interaction between combinations of signals and accruals volatility (Model 4b) and the model of the combinations of signals and accruals volatility effects (Model 3b) reported for both samples in Table 5.2.B suggest that the effect of the combinations of signals on the relationship between returns and earnings is moderated by the accruals volatility determinant only in the pooled sample but not in the surviving-only sample, implying that investors are more interested in questioning the reliability of earnings if it is revealed by a list of companies which comprises some financially distressed firms.

The information content of earnings is assessed by reporting and discussing the results obtained by employing the following hierarchy of nested models:

M1; the main effect model:

$$\text{RETURN}_{it} = f(\text{Cashflow})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * D^{\text{con}})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * D^{\text{con}}, \text{Cashflow} * D^{\text{av}})$$

M3B: the combinations of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * D^{\text{com}}, \text{Cashflow} * D^{\text{av}})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * D^{\text{con}}, \text{Cashflow} * D^{\text{av}}, \text{Cashflow} * D^{\text{con}} * D^{\text{av}})$$

M4B: the model of Interaction between combinations of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * D^{\text{com}}, \text{Cashflow} * D^{\text{av}}, \text{Cashflow} * D^{\text{com}} * D^{\text{av}})$$

where,

**Cashflow:** is the cash flow measure of performance as defined earlier,

**$D^{\text{con}}$ :** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**$D^{\text{com}}$ :** is a dummy variable representing the combinations of signals of earnings and cash flow surprises,

**$D^{\text{av}}$ :** is a dummy variable representing the quintile of the accruals volatility.

**Note:** a detailed technical discussion of these models is provided in Appendix 1.

Table 5.3.A reports the results obtained when we run the previously discussed models.

Panel 1 shows the results when the aggregate accrual ( hereafter; AA) is used as a determinant of accruals volatility, while panels 2 and 3 present the results obtained when the length of operating cycle (hereafter; LOC) and the coefficient of variation of cash flow to earnings ratio (hereafter; R) are used as determinants of accruals volatility, respectively. Even though that the main effect model (Model 1) and the consistency effect model (Model 2) are not affected by which determinant of accruals volatility is used, we run them separately for each case because the number of observation differs among the three cases. Table 5.3.B addresses the F-test between the full and the reduced models.

**Table 5.3.A: Regression coefficients for the six models assessing the informativeness of cash flow (after deleting the outliers using Cook's distance criteria)**

Variable	Panel 1: (A A) <sup>1</sup>						Panel 2: (I OC) <sup>2</sup>						Panel 3: (R) <sup>3</sup>					
	M1	M2	M3A	M3B	M4A	M4B	M1	M2	M3A	M3B	M4A	M4B	M1	M2	M3A	M3B	M4A	M4B
Constant	0.1*	0.08*	0.09*	.09*	0.07*	.07*	0.1*	0.08*	.08*	.08*	0.07*	0.08*	0.1*	0.08*	.08*	.09*	0.08*	0.09*
UCF: all groups	.49*	-0.4	0.07	-.5*	-0.6*	-0.3	0.5*	-0.44*	-0.28	-4*	-0.6*	-0.3	0.43*	-0.4*	-6*	-.55*	-1.4*	-1.2*
UCF(CON): consistent signals group		1.3*	1.3*	1.6*	2.3*	2.0*		1.4*	1.3*	1.9*	1.8*	2.2*		1.4*	1.5*	2.0*	2.4*	2.7*
UCF(+): negative earnings, positive cashflow surprises				0.2		-0.7				0.2		-0.5				0		-1
UCF(++): positive earnings and cash flow surprises				-0.27		0.15				-5.0*		-0.8*				-8*		-0.6
UCF(DAV1): lowest accruals volatility group			0.02	0.5	-1	-0.66			0.5	0.5	-0.4	-0.5			.8*	0.7	1.2*	0.7
UCF(DAV5): highest accruals volatility group			-.67*	-0.2	0.24	-0.2			-0.3	-0.3	0.29	-0.2			0	0.1	1	0.9
UCF(CON)(DAV1): consistent signals & lower volatility					1.4	1.3					1	-1.1					0.11	-0.4
UCF(+)(DAV1): negative earnings, positive cashflow surprises & lower volatility group						-0.8						-0.1						1.5
UCF(++)(DAV1): positive earnings and cash flow surprises & lower volatility group						-0.4						3.0*						1.3
UCF(CON)(DAV5): consistent signals & higher volatility group					-1.3*	-0.6						-0.3					-1.3	-0.9
UCF(+)(DAV5): negative earnings, positive cashflow surprises & higher volatility group						1.29*						1.1*						1
UCF(++)(DAV5): positive earnings and cash flow surprises & higher volatility group						-0.21						0.02						-0.4
R-squared (%)	2.1	5.7	6.5*	5.9	7.3	7.6	2.2	6.2	6.7	7	7.4	8.6	1.4	4.8	5	5.7	5.9	6.6

<sup>1</sup>: Cook's distance criteria combines two other techniques (leverage and standardized residual) into one overall measure of how unusual an observation is; leverage tells if an observation has unusual predictors, and standardized residual tells if an observation has unusual response.

\*: indicates statistically significant at .05 or less.

**M1**; the main effect model, **M2**; the consistency and accruals volatility effects model, **M3A**; the consistency and accruals volatility effects model, **M3B**; the combinations of signals and accrual volatility effects model, **M4A**; the model of Interaction between consistency and accruals volatility, **M4B**; the model of Interaction between combinations of signals and accruals volatility. <sup>1</sup>: AA is aggregate accruals, <sup>2</sup>: LOC is length of operating cycle, <sup>3</sup>: R is the coefficient of variation of cash flow to earnings ratio.



**Table 5.3.B: F-statistics<sup>1</sup> between the models assessing the Informativeness of cash flow**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	70.0*	46.0*	78.0*	50.0*	47.0*	36.0*
the consistency and accruals volatility effects model	the consistency effect model	7.4*	6.0*	4.8*	4.1*	3.4*	3.0*
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	0.8	0.6	3	1.2	3.2*	1.7
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	8.0*	2.7	6.7*	2	5.0*	2.7
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	3.3*	1.3	5.3*	2.1	2.2	1.9

\* : indicates statistically significant at .05 or less.

$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

<sup>1</sup>: F-statistic is calculated as follows:

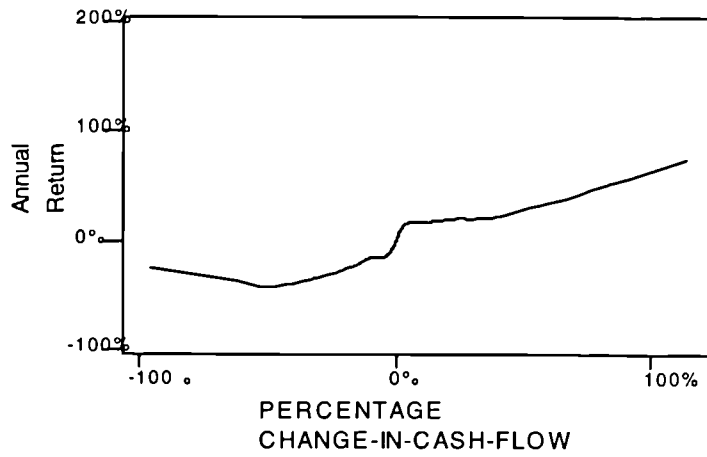
where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998). <sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only. <sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation. <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables; <sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

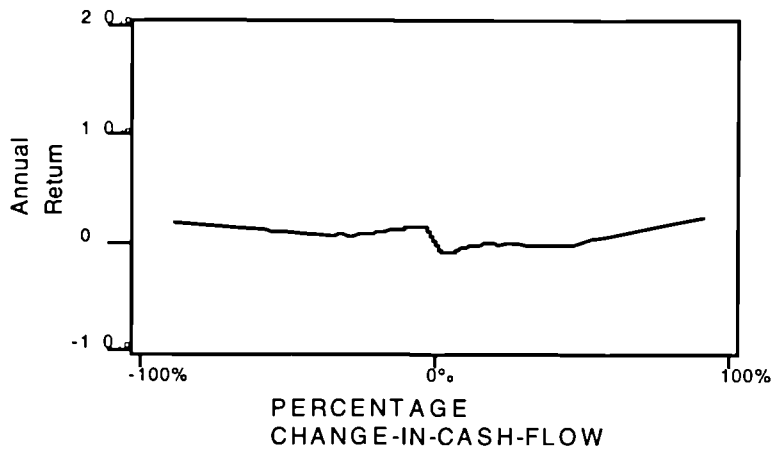
Given that the reported results concerning the valuation relevance of cash flow can be analyzed analogously as the reported results for the valuation relevance of earnings, the figures in Table 5.3.A and Table 5.3.B suggest that: the relationship between returns and cash flow is significant when this relationship is averaged overall groups without allowing it to vary according to any moderator variable, which implies that cash flow does convey information to the marketplace. In addition, the statistically significant coefficient on the interaction term in the consistency effect model (Model 2) reported in Table 5.3.B associated with a significant F-statistics between the consistency effect model and the main effect model reported in Table 5.3.B, suggest that the relationship between returns and cash flow is moderated by the consistency of signals, implying that investors perceive cash flow as more reliable measure of performance when its surprise signal is consistent with the surprise signal of earnings. In addition, the results implies that the accruals volatility determinant moderates the information content of cash flow in both the pooled and the survivor-only samples, which confirms Charitou (1997) that when the volatility of accruals is low, timing and matching problems in cash flow are minimized, and hence, cash flow plays a more important role in the market place. Furthermore, the results imply that the effect of the consistency of signals on the relationship between returns and cash flow is moderated by the volatility of accruals determinant in the pooled sample but not in the survivor-only sample, which implies that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms. In addition, the reported F-statistics between the model of the combinations of signals and accruals volatility effects and the model of interaction between consistency and accruals volatility indicate that the relationship between returns and cash flow is not moderated by the combinations of

signals. Moreover, the reported F-statistics between the model of the interaction between combinations of signals and accruals volatility as full model and the model of the combinations of signals and accruals volatility effects in Table 5.3.B suggest that the accruals volatility determinant moderates the effect of the combinations of signals on the relationship between returns and cash flow in the pooled sample but not in the surviving-only sample, which implies that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms.

The following two graphs plot the relationship between returns and cash flow separately for the group of consistent surprises signals and the group of inconsistent signals:



**Figure 5.1:** Relationship between returns and cash flow for the group of consistent signals



**Figure 5.2:** Relationship between returns and cash flow for the group of inconsistent signals

To sum up, the following conclusions can be drawn regarding the information content of each of earnings and cash flow:

- 1) The information content of earnings beyond cash flow in both samples is not moderated by the consistency of signals of earnings and cash flow surprises, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow.
- 2) The information content of earnings is moderated by the accruals volatility determinants which is consistent with Dechow (1994) and Charitou (1997) that when timing and matching problems in cash flow are minimized, cash flow plays a more important role in the market place.
- 3) The effect of the consistency of signals on the information content of earnings is not moderated by the accruals volatility determinant.
- 4) The information content of earnings is not affected by the combinations of signals and that the effect of the combinations of signals on the information content and the incremental information content of earnings is however moderated by the accruals volatility determinant in the pooled sample but not in the surviving-only sample, which implies that investors are more interested in questioning the reliability of earnings if it is revealed by a list of companies which comprises some financially distressed firms.
- 5) The consistency of signals of earnings and cash flow surprises moderates the information content of cash flow.
- 6) The accruals volatility determinants moderates the information content of cash flow.
- 7) The accruals volatility determinants moderate the effect of the consistency of signals on the information content of cash flow in the pooled sample but not in the survivor-only

sample, which implies that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms.

8) The information content of cash flow is not moderated by the combinations of signals of earnings and cash flow surprises, but the effect of the combinations of signals on the information content is moderated by the accruals volatility determinant, mainly in the pooled sample.

### **5.3 Incremental Information Content:**

In this section, we estimate the incremental information content of earnings and cash flow beyond each other; in other words we investigate whether earnings have incremental information content after controlling for cash flow and whether cash flow has incremental information content after controlling for earnings.

Concerning the incremental information content of earnings beyond cash flow, Table 5.4.A reports F-statistics for both the pooled and the survivor-only samples between the following models which investigate the incremental information content of earnings after controlling for cash flow.

M1A; cash flow only model:

$$\text{RETURN}_{it} = f(\text{Cashflow})$$

M1B; the main effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Cashflow})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Cashflow})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Earnings} * D^{\text{av}}, \text{Cashflow})$$

M3B; the combinations of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{com}}, \text{Earnings} * D^{\text{av}}, \text{Cashflow})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{con}}, \text{Earnings} * D^{\text{av}}, \text{Earnings} * D^{\text{con}} * D^{\text{av}}, \text{Cashflow})$$

M4B; the model of Interaction between combinations of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * D^{\text{com}}, \text{Earnings} * D^{\text{av}}, \text{Earnings} * D^{\text{com}} * D^{\text{av}}, \text{Cashflow})$$

where,

**Earnings:** is the earnings measure of performance as defined earlier,

**Cashflow:** is the cash flow measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quintile of the accruals volatility.

Note: a detailed technical discussion of these models is provided in Appendix 1.

Table 5.4.A shows the F-statistic between the full and reduced models when aggregate accruals (AA), the length of the operating cycle (LOC) and the coefficient of variation of cash flow to earnings ratio is used as the determinants of accruals volatility, respectively.

Table 5.4.A: F-statistics<sup>1</sup> between the models assessing the incremental information content of earnings

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	0.1	1.3	1.2	1.4	0.2	1.1
the consistency and accruals volatility effects model	the consistency effect model	20.0*	4.6*	14.0*	7.4*	3.6*	2
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	0.9	1.5	0.8	1.8	1.8	1.5
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	0.5	0.3	0.5	1.1	2.2	2.2
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	3.0*	2	4.0*	1.7	1.8	1.7

\*: indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables; <sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.



**Table 5.4.A2: F-statistics between Each of Earnings-Return Specification as Full Model and the Cash Flow-only Model as Reduced Model**

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
	Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model,	164.0*	125.0*	199.0*	129.0*	144.0*	110.0*
the consistency effect model	82.0*	63.0*	99.0*	65.0*	72.0*	56.0*
the consistency and accruals volatility effects model	52.0*	34.0*	57.0*	36.0*	38.0*	29.0*
the combinations of signals and accrual volatility effects model	35.0*	23.0*	38.0*	25.0*	26.0*	20.0*
the model of Interaction between consistency and accruals volatility	34.0*	22.0*	38.0*	25.0*	26.0*	20.0*
the model of Interaction between combinations of signals and accruals volatility	19.0*	12.0*	21.0*	13.0*	14.0*	11.0*

\*: indicates statistically significant at .05 or less.

: F statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The reported results in Table 5.4.A suggest that the relationship between returns and earnings is not being moderated by the consistency of signals of earnings and cash flow surprises, implying that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. In addition, our results indicate that the relationship between returns and earnings is moderated by the accruals

volatility when the aggregate accruals (AA) or the length of the operating cycle (LOC) is used as accruals volatility determinant, which confirms Dechow (1994) that accruals are predicted to improve earnings ability to reflect firm performance when accruals volatility is high. When the coefficient of variation of cash flow to earnings ratio (R) is used as accruals volatility determinant, the relationship between returns and earnings is suggested to be moderated by the accruals volatility in the pooled sample but not in the survivor-only sample. Moreover, the reported F-statistics between the model of the interaction between consistency and accruals volatility as full model and the model of the consistency and accruals volatility effects as reduced model in Table 5.4.A suggest that the effect of the consistency of signals on the relationship between returns and earnings is not being moderated by the volatility of accruals whichever accruals volatility determinant is used.

The statistically insignificant F-statistics between the combinations of signals and accrual volatility effects model and the consistency and accruals volatility effects for both samples (the pooled and the survivor-only samples) reported in Table 5.4.A suggest that the relationship between returns and earnings is not moderated by the combinations of signals of earnings and cash flow surprises. Moreover, the reported F-statistics between the model of the interaction between combinations of signals and accruals volatility as full model and the model of the combinations of signals and accrual volatility effects as reduced model suggest that the effect of the combinations of signals on the relationship between returns and earnings is moderated by the accruals volatility determinant in the pooled sample but not in the survivor-only sample, which confirms the prediction that investors are more interested in questioning the reliability of earnings if it is revealed by

a list of companies which comprises some financially distressed firms.

The analysis of the results reported in table 5.4.B concerning the F-statistics between the hierarchy nested models that assess the incremental information content of cash flow beyond earnings suggests that cash flow conveys incremental information content beyond earnings in the pooled sample when the relationship between cash flow and returns is allowed to be moderated by the determinant of accruals volatility and when the effect of the consistency of signals is allowed to be moderated by the accruals volatility determinant and when the relationship between cash flow and returns is allowed to be moderated by the combinations of signals of earnings and cash flow surprises and also when the effect of the combinations of signals on the relationship between returns and cash flow is allowed to be moderated by the accruals volatility determinant.

Moreover, the statistically insignificant F-statistics between the consistency effect model and the main effect model reported for both the pooled as well as the survivor-only sample suggest that the incremental information content of cash flow beyond earnings does not depend on the consistency of signals. The reported F-statistics between the consistency and accruals volatility effects model and the consistency effect model indicate that the relationship between returns and cash flow is moderated by the determinant of accruals volatility for both samples when the length of operating cycle (LOC) is used as the accruals volatility determinant, which confirms Dechow (1994) and Charitou (1997). When the aggregate accruals (AA) is used as a determinant of accruals volatility, the reported F-statistics suggest that the relationship between returns and cash flow is not moderated by the determinant of accruals volatility in the survivor-only

sample.

The F-statistics between the model of the interaction between consistency and accruals volatility as full model and the consistency and accruals volatility effects model as reduced model, suggest that the effect of the consistency of signals on the relationship between returns and cash flow is moderated by the accruals volatility determinant only in the pooled sample.

The statistically insignificant F-statistics between the model of the combinations of signals and accrual volatility effects as full model and the model of consistency and accruals volatility effects as reduced model reported in Table 5.4.B for both the pooled and the survivor-only sample suggest that the relationship between returns and cash flow is not moderated by the combinations of signals of earnings and cash flow surprises.

The reported F-statistics between the model of Interaction between combinations of signals and accruals volatility and the model of the combinations of signals and accrual volatility effects suggest that the determinant of accruals volatility moderates the effect of the combinations of signals on the relationship between the returns and cash flow in the pooled sample.

**Table 5.4.B:** F-statistics<sup>1</sup> between the models assessing the incremental information content of cash flow

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	1.8	0.07	0.4	1.4	0.7	0.1
the consistency and accruals volatility effects model	the consistency effect model	4.9*	3	4.9*	5.0*	0.7	0.5
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	1.2	0.1	1.2	0.1	2	0.5
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	6.2*	0.7	5.2*	1.3	2.8	1.7
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	3.4*	1	6.0*	2.2	2.2	2

\* : indicates statistically significant at .05 or less.

$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

<sup>1</sup>: F-statistic is calculated as follows:

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables; <sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

**Table 5.4.B2 :F-statistics between Each of Cash Flow-Return Specification as Full Model and the Earnings-only Model as Reduced Model**

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
	Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model,	1.8	0.2	2.3	0.6	0.1	0.1
the consistency effect model	1.8	0.4	1.3	1	0.01	0.001
the consistency and accruals volatility effects model	3.4*	1.7	3.1*	3.0*	0.3	0.3
the combinations of signals and accrual volatility effects model	2.7*	1.1	2.5*	2	1	0.4
the model of Interaction between consistency and accruals volatility	4.3*	1.3	3.8*	2.4*	1.1	0.8
the model of Interaction between combinations of signals and accruals volatility	3.0*	1	4.2*	2.1*	1.5	1.1

\* : indicates statistically significant at .05 or less.

<sup>1</sup>: F statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>:variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The reported results in Table 5.4.B2 suggest that cash flow convey incremental information content beyond earnings when the relationship between returns and cash flow is allowed to be moderated by the consistency of signals or by the combinations of signals. Which implies that investors do not evaluate cash flow in isolation of earnings and perceive cash flow as more reliable when its surprise signal is consistent with the

surprise signal of earnings.

To sum up, the following conclusions can be drawn regarding the incremental information content of earnings and cash flow beyond each other:

- 1) The incremental information content of earnings beyond cash flow in both samples is not moderated by the consistency of signals of earnings and cash flow surprises, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow.
- 2) The incremental information content of earnings beyond cash flow is moderated by the accruals volatility determinants which is consistent with Dechow (1994) and Charitou (1997) that when timing and matching problems in cash flow are minimized, cash flow plays a more important role in the market place.
- 3) The effect of the consistency of signals on the incremental information content of earnings beyond cash flow is not moderated by the accruals volatility determinant.
- 4) The incremental information content of earnings beyond cash flow is not affected by the combinations of signals.
- 5) The effect of the combinations of signals on the incremental information content of earnings beyond cash flow is however moderated by the accruals volatility determinant in the pooled sample but not in the surviving-only sample, which implies that investors are more interested in questioning the reliability of earnings if it is revealed by a list of companies which comprises some financially distressed firms.
- 6) The consistency of signals of earnings and cash flow surprises does not moderate the incremental information content of cash flow beyond earnings.

7) The accruals volatility determinants moderates the information content and the incremental information content of cash flow beyond earnings.

8) The accruals volatility determinants moderate the effect of the consistency of signals on the incremental information content of cash flow beyond earnings in the pooled sample but not in the survivor-only sample, which implies that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms.

9) The incremental information content of cash flow beyond earnings is not moderated by the combinations of signals of earnings and cash flow surprises, but the effect of the combinations of signals on the incremental information content of cash flow beyond earnings is moderated by the accruals volatility determinant, mainly in the pooled sample.

#### **5.4 Summary and Conclusions:**

The main purpose of this chapter has been to investigate the valuation relevance of earnings and cash flow on a contextual base, this chapter employed naive models without considering recent innovations in modeling the relationship between returns and accounting measures of performance, such as, employing the level as well as change of earnings and cash flow, and the non-linearity of the relationship, which are considered in chapter six. More specifically, the goals of this chapter were to test whether the valuation relevance (in terms of information content and incremental information content) of earnings and cash flow is moderated by the consistency and/ or the combinations of signals of earnings and cash flow surprises, and whether the effect of the consistency and/or the combinations of signals on the valuation-relevance of earnings and cash flow



is moderated by the accruals volatility determinants.

The reported empirical results in this chapter imply that the information content and the incremental information content of earnings beyond cash flow in both samples are not moderated by the consistency of signals of earnings and cash flow surprises, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. The information content and the incremental information content of earnings however are moderated by the accruals volatility determinants which is consistent with Dechow (1994) and Charitou (1997) that when timing and matching problems in cash flow are minimized, cash flow plays a more important role in the market place. In addition, our results indicate that the effect of the consistency of signals on the information content of earnings and the incremental information content of earnings beyond cash flow is not moderated by the accruals volatility determinant. Extending our investigation to consider the effect of the combinations of signals of earnings and cash flow surprises on the information content and the incremental information content of earnings suggests that the information content and the incremental information content of earnings is not affected by the combinations of signals and that the effect of the combinations of signals on the information content and the incremental information content of earnings is however moderated by the accruals volatility determinant in the pooled sample but not in the surviving-only sample, which implies that investors are more interested in questioning the reliability of earnings if it is revealed by a list of companies which comprises some financially distressed firms.

Regarding the valuation relevance of cash flow, our empirical results in this chapter suggest that the consistency of signals of earnings and cash flow surprises moderates the

information content of cash flow but does not moderate the incremental information content of cash flow beyond earnings. In addition, our empirical investigation implies that the accruals volatility determinants moderates the information content and the incremental information content of cash flow beyond earnings, moreover, the accruals volatility determinants moderate the effect of the consistency of signals on the information content and the incremental information content of cash flow beyond earnings in the pooled sample but not in the survivor-only sample, which implies that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms. In addition, our results implies that the information content of cash flow and the incremental information content of cash flow beyond earnings are not moderated by the combinations of signals of earnings and cash flow surprises, but the effect of the combinations of signals on the information content and the incremental information content of cash flow beyond earnings is moderated by the accruals volatility determinant, mainly in the pooled sample.

# CHAPTER SIX

## EMPIRICAL RESULTS OF

### ALTERNATIVE FUNCTIONAL FORMS

The goal of this chapter is to extend the investigation of the relationship between market returns and the accounting measures of performance (earnings and cash flow) by employing two techniques to capture the effect of the existence of transitory components in earnings and cash flow surprises: the first is the employment of both change and level to proxy for the unexpected component of earnings or cash flow and the second technique is the utilisation of a non-linear relationship between returns and earnings or cash flow. The chapter is divided into the following sections: the first section provides a brief introduction and discussion of the recent innovations in modeling the relationship; the second section empirically demonstrates the importance of considering the time effect in explaining the variation in the returns variable; the third section presents and discusses the empirical results obtained by employing the level and the change of each explanatory variable instead of the change alone, the fourth section reports and discusses the results obtained by applying nonlinear functional forms, and the fifth section concludes and summarises the chapter.

#### **6.1 Introduction**

The results reported in the previous chapter generally suggest that when the relationship between returns and accounting measures of performance is modeled without considering the recent innovations in the returns-earnings relationship, only a small fraction of the total variation of returns can be explained. In recent years, the theoretical

and empirical literature on the return-earnings relationship has demonstrated that the relationship between returns and accounting measures of performance (earnings and cash flow) can be significantly improved by considering the fact that accounting measures of performance contain transitory components that are either value-irrelevant or should have a limited valuation impact (Beaver et al. 1980; Kormendi and Lipe, 1987). This requires re-specification of the relationship by the inclusion of both levels and changes of the explanatory variables to capture both the permanent effect and the transitory effect (Easton and Harris, 1991) or by the application of non-linear models in order to proxy for transitory and permanent components of accounting measures of performance (Freeman and Tse, 1992)

The goal of this chapter is to extend the analysis in the previous chapter by introducing recent innovations in modeling the relationship between returns and accounting measures of performance. Persistence measures the degree to which an earnings innovation in the current period persists, thus giving rise to permanent earnings increase or decrease. The greater the perceived persistence of an earnings innovation, the greater will be the market's reaction to that innovation. Correspondingly, the presence of a transitory component dampens the market reaction (Beaver et al. 1980; Kormendi and Lipe, 1987) which results in a lower explanatory power (R-squared) in return-accounting measure regression models.

The presence of transitory earnings components introduces measurement error into the independent variable. This occurs because the current level of earnings is a better proxy for unexpected earnings when earnings are transitory (Easton and Harris, 1991; Ali and Zarowin, 1992). For example, if last year's earnings were purely transitory, then this

years expected level of earnings is zero, and hence, whatever the level of this year's earnings, they are unexpected.

According to Freeman and Tse (1992), extreme values of unexpected earnings will primarily reflect transitory earnings surprises which, because these carry less weight in determining stock prices, will result in a lower marginal price response for extreme earnings shocks, which implies a nonlinear, S-shaped relation between stock returns and earnings.

Empirically, Easton and Haris (1991) showed that both the earnings change and level variables have explanatory power for stock returns. Ali and Zarowin (1992) also determined that, for firms with predominantly permanent earnings in the previous period, the incremental explanatory power and increase in the earnings response coefficient obtained by including the earnings level variable in returns-earnings regression was only small. However, firms with predominantly transitory earnings had a much greater increase in the ERC as a result of the inclusion of the earnings level variable. Hence, in our research design we have included both levels and changes in the variables of interest.

As we discussed earlier in the literature review chapter (chapter two), the assumption of a linear relationship between stock returns and earnings has also been challenged by a number of researchers (Cheng et al., 1992; Freeman and Tse, 1992; among others). The linearity assumption rests on the premise of a constant marginal price response to earnings, but earnings persistence will determine the strength of the price response, and persistence is related to the magnitude of the unexpected component of accounting

measures of performance (earnings and cash flow). For example, firms that experience a very large one-period change in earnings are seldom capable of maintaining that new level of earnings in subsequent periods. Further, if extreme values of unexpected earnings primarily reflect transitory surprises, there will be a negative correlation between the absolute magnitude of unexpected earnings and earnings persistence. Assuming such a negative relation, an increase in the absolute magnitude of unexpected earnings will result in a decrease in the related price response. This means that transitory earnings surprises will have less impact on security prices than permanent earnings surprises, and hence, returns and the accounting measures of performance will have an S-shaped relationship.

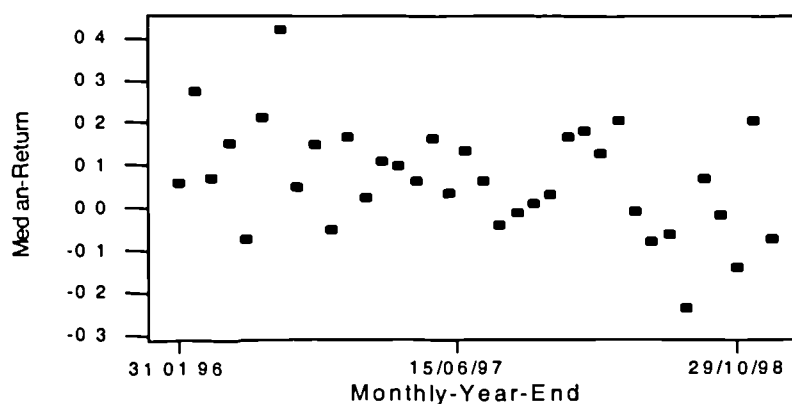
Ali (1994) argued that nonlinear modeling was also appropriate for cash flows. Using a non-linear model, he demonstrated incremental information content beyond earnings only for low absolute values of unexpected cash flows. High absolute values of unexpected cash flows were found to contain no incremental information content beyond earnings. Using a similar approach, Ali and Pope (1995) observed a significantly increased explanatory power associated with the nonlinear returns-cash flow regression model. Das and Lev (1994) found evidence of non-linearity in the returns-cash flow relation, which is consistent with the presence of transitory cash flow.

From the above discussion we can conclude that two techniques have been used to capture the effect of the existence of transitory components in earnings and cash flow surprises: the first is the employment of both change and level to proxy for the unexpected component of earnings or cash flow and the second technique is the utilisation of a non-linear relationship between returns and earnings or cash flow.

## Section 6.2: Time Effect

As stated earlier, our firm-year end observations cover the years 1996, 1997 and 1998 and our sample is not limited to any month year-end, which results in 36 months year-end from January 96 to December 98. Thus, our observations can be grouped into 36 groups according to the year-end. For each group of different year-ends we have a different 12-months return window lagged four months after the year-end of each group. In this section we explore the trend of monthly market returns over the period January 96 to December 98 in order to establish the importance of controlling for the time effect in the return-accounting measures models:

The following graph plots the median of the annual market returns against the time over the period January- 96 to December- 98:



**Figure 6.1:** Plot of the Median Annual Market Return over the 36-months Sampling Period.

From the above graph we can observe that the median market return experienced a diminishing trend over the sampling period. In addition, regressing the median of the market return on time shows explanatory power of 16.7% which means that 16.7% of the variation in the median of market return is explained by the time trend of the market

return. Regressing the return variable on the median of the market return shows that about 6% of the variation in the return variable is explained by the median of market return.

The above results support the inclusion of the median market return as an explanatory variable in the models used in the previous chapter. Thus in this section we report the R-squared obtained by including the median of market return in the models as follows:

M1; the main effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{MKTRTN})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{MKTRTN})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M3B: the combinations of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{con}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{con}} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M4B: the model of Interaction between combinations of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Earnings}, \text{Earnings} * \text{D}^{\text{com}}, \text{Earnings} * \text{D}^{\text{av}}, \text{Earnings} * \text{D}^{\text{com}} * \text{D}^{\text{av}}, \text{MKTRTN})$$

where,

**Earnings:** is the earnings measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quintile of the accruals volatility,

**MKTRTN:** is the median of market return.

**Note:** a detailed technical discussion of these models is provided in Appendix 1.

The following table shows the comparative R-squared between the models which include the median market return as an explanatory variable and the those which do not employ median market return.



**Table 6.2.1: Comparative Goodness of Fit of the Return-Earnings Models after the Inclusion of Median Market return as Regressor**

Model	Without Median market return variable	With Median market return variable
<i>Panel 1: Aggregate accruals (AA):</i>		
the main effect	10.0%	15.0%
the consistency effect	10.0%	15.0%
the consistency and accruals volatility effects	12.0%	16.6%
the combinations of signals and accrual volatility effects	10.5%	16.7%
Interaction between consistency and accruals volatility	12.1%	16.6%
Interaction between combinations of signals and accruals volatility.	13.0%	17.5%
<i>Panel 2: Length of Operating Cycle (LOC):</i>		
the main effect	11.7%	16.2%
the consistency effect	11.8%	16.3%
the consistency and accruals volatility effects	13.0%	17.5%
the combinations of signals and accrual volatility effects	11.8%	17.6%
Interaction between consistency and accruals volatility	13.2%	17.5%
Interaction between combinations of signals and accruals volatility.	14.4%	18.6%
<i>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R):</i>		
the main effect	10.9%	17.9%
the consistency effect	10.9%	17.9%
the consistency and accruals volatility effects	11.3%	18.2%
the combinations of signals and accrual volatility effects	11.1%	18.3%
Interaction between consistency and accruals volatility;	11.6%	18.4%
Interaction between combinations of signals and accruals volatility.	12.3%	19.0%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

The following models extend the models used in the previous chapter to assess the relationship between returns and cash flow by including of the median of market return as an explanatory variable:

M1; the main effect model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{MKTRTN})$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * \text{D}^{\text{con}}, \text{MKTRTN})$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * \text{D}^{\text{con}}, \text{Cashflow} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M3B: the combinations of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * \text{D}^{\text{com}}, \text{Cashflow} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * \text{D}^{\text{con}}, \text{Cashflow} * \text{D}^{\text{av}}, \text{Cashflow} * \text{D}^{\text{con}} * \text{D}^{\text{av}}, \text{MKTRTN})$$

M4B: the model of Interaction between combinations of signals and accruals volatility:

$$\text{RETURN}_{it} = f(\text{Cashflow}, \text{Cashflow} * \text{D}^{\text{com}}, \text{Cashflow} * \text{D}^{\text{av}}, \text{Cashflow} * \text{D}^{\text{com}} * \text{D}^{\text{av}}, \text{MKTRTN})$$

where,

**Cashflow:** is the cash flow measure of performance as defined earlier,

**D<sup>con</sup>:** is a dummy variable representing the consistency of signals of earnings and cash flow surprises,

**D<sup>com</sup>:** is a dummy variable representing the combinations of signals of earnings and cash flow surprises,

**D<sup>av</sup>:** is a dummy variable representing the quantile of the accruals volatility,

**MKTRTN:** is the median of market return.

The following table shows the comparative R-squared between the above models which include the median market return as an explanatory variable and those without the median market return.

**Table 6.2.2: Comparative Goodness of Fit of the Return-Cash Flow Models after the Inclusion of Median Market return as Regressor**

Model	Without Median market return variable	With Median market return variable
<i>Panel 1: Aggregate Accruals (AA):</i>		
the main effect	02.1%	07.5%
the consistency effect	05.7%	11.0%
the consistency and accruals volatility effects	02.9%	11.8%
the combinations of signals and accrual volatility effects	05.9%	11.8%
Interaction between consistency and accruals volatility;	07.3%	12.4%
Interaction between combinations of signals and accruals volatility.	07.6%	12.9%
<i>Panel 2: Length of Operating Cycle (LOC):</i>		
the main effect	02.2%	07.6%
the consistency effect	06.2%	11.4%
the consistency and accruals volatility effects	03.3%	11.9%
the combinations of signals and accrual volatility effects	06.6%	12.1%
Interaction between consistency and accruals volatility;	07.4%	12.6%
Interaction between combinations of signals and accruals volatility.	08.6%	13.5%
<i>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R):</i>		
the main effect	01.4%	10.2%
the consistency effect	04.8%	12.9%
the consistency and accruals volatility effects	01.7%	13.3%
the combinations of signals and accrual volatility effects	05.3%	13.4%
Interaction between consistency and accruals volatility;	05.9%	13.8%
Interaction between combinations of signals and accruals volatility.	06.6%	14.2%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

### **Section 6.3: Results obtained by Employing Both the Change and the Level of the Explanatory Variable**

This section reports and discusses the results obtained from the functional forms that employ both levels and changes of the explanatory variables and which consider the time effect by the inclusion of the median of market return as explanatory variable, and it is divided into three subsections: sub-section 6.3.1 reports and discusses results regarding the information content of earnings and cash flow, while sub-section 6.3.2 reports and discusses results regarding the incremental information content of earnings and cash flow beyond each other.

#### **6.3.1 Information Content of Earnings and Cash Flow**

This section presents and discusses the results of running the models to assess the information content of earnings and cash flow by employing both the levels and the changes and considering the time effect by the inclusion of the median of market return as explanatory variable;

From Table 6.3.1.A which reports the results of the F-statistic between the hierarchy nested models that investigate the information content of earnings, the following conclusions can be drawn:

1) The value relevance of earnings does not depend on the consistency of signals of earnings and cash flow surprises, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. This confirms our conclusion in Section 5.2 by employing the change-only models.

2) The value relevance of earnings is moderated by the accruals volatility determinant (after controlling for the effect of the consistency of signals) only when the aggregate accruals (AA) or the length of operating cycle (LOC) is used as the accruals volatility determinant, which implies that, as stated by Dechow (1994) and Charitou (1997), accruals improve earnings ability to reflect firm performance when accruals volatility is high. This is consistent with the suggested conclusion in Section 5.2 when change-only models were employed. This is not the case when the coefficient of variation of the cash flow to earnings ratio is used as the accruals volatility determinant.

3) As in Section 5.2, the effect of the consistency of signals on the valuation relevance of earnings is not moderated by the accruals volatility in both the pooled and the surviving-only sample, whichever accruals volatility determinant is used.

4) Contrary to the suggestion of the change-only models, the relationship between returns and earnings is moderated by the combinations of signals in the pooled sample, but not in the surviving-only sample, Which confirms our theoretical prediction that investors are more interested in questioning the reliability of earnings by relating earnings and cash flow to each other if it was revealed by a list of companies which comprises some financially distressed firms.

5) whichever accruals volatility determinant is employed, the impact of the combinations of signals on the valuation relevance of earnings is not moderated by the volatility of accruals. which disconfirms the conclusion suggested by employing change-only models.

**Table 6.3.1.A : F-statistics' Between the Nested Models Assessing the Information Content of Earnings Employing Changes and Levels**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	0.4	0.8	0.9	1.1	0.1	0.6
the consistency and accruals volatility effects model	the consistency effect model	7.9*	2.7*	8.7*	4.8*	1	0.7
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	4.8*	2	4.4*	1.8	2	1.9
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	1.4	2.4	0.4	1.1	1.6	1.1
The model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.5	1.4	2	1.3	1.5	0.9

\* : indicates statistically significant at .05 or less.

$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

1: F-statistic is calculated as follows:

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

2: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

a: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

c: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The following table shows the comparative R-squared between the models that employ change only explanatory variables and those that employ both change and levels.

**Table 6.3.1.B: Comparative Goodness of Fit of the Return-Earnings Models Employing Both Level and Change**

Model	Change only	Change and Level
<i>Panel 1: Aggregate accruals (AA)<sup>a</sup>:</i>		
the main effect	15.0%	15.2%
the consistency effect	15.0%	15.2%
the consistency and accruals volatility effects	16.6%	17.0%
the combinations of signals and accrual volatility effects	16.7%	18.1%
Interaction between consistency and accruals volatility	16.6%	17.3%
Interaction between combinations of signals and accruals volatility.	17.5%	19.0%
<i>Panel 2: Length of Operating Cycle (LOC)<sup>b</sup>:</i>		
the main effect	16.2%	16.4%
the consistency effect	16.3%	16.5%
the consistency and accruals volatility effects	17.5%	18.5%
the combinations of signals and accrual volatility effects	17.6%	19.5%
Interaction between consistency and accruals volatility	17.5%	18.6%
Interaction between combinations of signals and accruals volatility.	18.6%	20.6%
<i>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R)<sup>c</sup>:</i>		
the main effect	17.9%	18.2%
the consistency effect	17.9%	18.2%
the consistency and accruals volatility effects	18.2%	18.5%
the combinations of signals and accrual volatility effects	18.3%	19.1%
Interaction between consistency and accruals volatility	18.4%	19.0%
Interaction between combinations of signals and accruals volatility.	19.0%	20.2%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

Concerning the information content of cash flow, Table 6.3.2.A reports results that investigate the informativeness of cash flow by employing both level and change:

**Table 6.3.2.A: F-statistics<sup>1</sup> Between the Nested Models Assessing the Information Content of Cash Flow Employing Changes and Levels**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	19.0*	14.0*	22.0*	15.0*	10.0*	8.5*
the consistency and accruals volatility effects model	the consistency effect model	5.2*	3.4*	5.7*	4.3*	1.5	1.1
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	8.7*	3.8*	9.6*	3.9*	7.4*	4.5*
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	3.0*	1.7	2.7*	1.1	1.2	1.7
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.8	1.1	1.4	1.1	1.7	1.3

\* : indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>; Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.



The following conclusions can be drawn from Table 6.3.2.A:

1) In support to what has been suggested in Section 5.2 by implementing change-only models, The information content of cash flow depends on the consistency of signals of earnings and cash flow surprises, which confirms the prediction that investors do perceive cash flow as a more reliable measure of firm performance if its surprise signal is consistent with the surprise signal of earnings, and hence, they give more credence to the consistent signals compared to contradictory ones.

2) The relationship between returns and cash flow is moderated by the accruals volatility when the volatility of accruals is measured by aggregate accruals (AA) or the length of operating cycle (LOC). These results are consistent with Dechow (1994) and Charitou (1997) in that when the volatility of accruals is low, timing and matching problems in cash flow are minimized, and hence cash flow plays a more important role in the market place. Such conclusion confirms our previous one in Section 5.2 by employing change-only models.

3) The relationship between returns and cash flow, in both samples, is moderated by the different combinations of the signals of earnings and cash flow surprises. such conclusion is partially confirmative to our conclusion in Section 5.2 where the change-only models results suggest that only in the pooled sample the relationship is moderated by the different combinations of signals.

4) The volatility of accruals does not moderate the effect of the combinations of signals on the relationship between returns and cash flow in both the pooled and the surviving-

only sample. This confirms the results of the change-only models in the surviving sample.

The following table shows comparative R-squared between the models that employ changes only explanatory variables and those which use both changes and levels.

**Table 6.3.2.B: Comparative Goodness of Fit of the Return-Cash Flow Models Employing Both Level and Change**

Model	Change only	Change and Level
<i>Panel 1: Aggregate accruals (AA):</i>		
the main effect	07.5%	08.6%
the consistency effect	11.0%	11.5%
the consistency and accruals volatility effects	11.8%	12.8%
the combinations of signals and accrual volatility effects	11.8%	14.8%
Interaction between consistency and accruals volatility	12.4%	13.5%
Interaction between combinations of signals and accruals volatility.	12.9%	15.8%
<i>Panel 2: Length of Operating Cycle (LOC):</i>		
the main effect	07.6%	08.7%
the consistency effect	11.4%	11.9%
the consistency and accruals volatility effects	11.9%	13.3%
the combinations of signals and accrual volatility effects	12.1%	15.5%
Interaction between consistency and accruals volatility	12.6%	13.9%
Interaction between combinations of signals and accruals volatility.	13.5%	16.4%
<i>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R):</i>		
the main effect	10.2%	11.7%
the consistency effect	12.9%	13.6%
the consistency and accruals volatility effects	13.3%	14.1%
the combinations of signals and accrual volatility effects	13.4%	16.4%
Interaction between consistency and accruals volatility	13.8%	14.5%
Interaction between combinations of signals and accruals volatility.	14.2%	17.8%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

### **6.3.2 Incremental Information Content**

This section reports and discusses the results concerning the incremental information content of earnings and cash flow beyond each other by employing models that employ both levels and changes of the explanatory terms.

Concerning the incremental information content of earnings beyond cash flow, the following conclusions can be drawn from Table 6.3.3.1 which reports the resulted F-statistics of running the models which assess the incremental information content of earnings beyond cash flow:

1) The incremental information content of earnings is not moderated by the consistency of signals of earnings and cash flow surprises in both the pooled and the surviving-only samples, which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. Which confirms the conclusions provided by the change-only models in Section 5.3.

2) The incremental information content of earnings is moderated by the determinant of accruals volatility in both samples when the aggregate accruals (AA) or the length of the operating cycle (LOC) is used as the accruals volatility determinant, which confirms Dechow (1994) and Charitou (1997) that accruals improve earnings ability to reflect firm performance when the accruals volatility is high. Which is supportive to the conclusion provided by the change-only models in Section 5.3.

3) The determinant of accruals volatility does not moderates the consistency effect on the incremental information content of earnings. Which confirms the conclusion

provided by the change-only models in Section 5.3.

4) The different combinations of signals of earnings and cash flow surprises moderate the relationship between returns and earnings in the pooled and in the surviving-only sample. Which disconfirms the conclusion provided in Section 5.3.

5) In support of the suggestions of the models, the accruals volatility determinant moderates the effect of the combinations of signals on the relationship between returns and earnings in the pooled sample when the length of the operating cycle (LOC) is used as accruals volatility determinant, implying that for firms with lower accruals volatility, investors are more expected to relate earnings to cash flow.

**Table 6.3.3.1: F-statistics Between the Nested Models Assessing the Incremental Information Content of Earnings Employing Change and Level**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample	Survivor sample	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	0.3	1.4	0.5	1.7	0.1	1.1
the consistency and accruals volatility effects model	the consistency effect model	9.0*	3.0*	10.0*	5.0*	1.6	1.3
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	5.0*	2.3	5.4*	2	3.0*	2.2
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	2.4	2.8	0.5	1.4	2	1.2
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.7	1.6	2.2*	1.5	1.7	1

\* indicates statistically significant at .05 or less.

1: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>; Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

2: Pooled sample results depends on surviving and non-surviving companies; 3: Surviving-only sample results depends on the surviving companies only

a: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); b: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

c: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

**Table 6.3.3.1.B: F-statistics between Each of the Earnings-Return Specification as the Full Model and the Cash flow-only Model as the Reduced Model**

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals		Length of operating cycle		variation of CF/E Ratio	
	Pooled sample	Survivor sample	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model,	75.0*	56.0*	87.0*	59.0*	56.0*	46.0*
the consistency effect model	38.0*	29.0*	43.0*	30.0*	27.0*	24.0*
the consistency and accruals volatility effects model	23.0*	16.0*	27.0*	18.0*	14.0*	12.0*
the combinations of signals and accrual volatility effects model	17.0*	11.0*	20.0*	12.0*	11.0*	10.0*
the model of Interaction between consistency and accruals volatility	16.0*	12.0*	18.0*	12.0*	10.0*	9.0*
the model of Interaction between combinations of signals and accruals volatility	10.0*	6.7*	11.0*	73.0*	6.4*	5.2*

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The reported F-statistics in Table 6.3.3.1.B between each of the following models as full model: the main effect model; the consistency effect model; the consistency and accruals volatility effects model; the model of interaction between consistency and accruals volatility; the combinations of signals and accrual volatility effects model; and the model of Interaction between combinations of signals and accruals volatility, and the cash flow only model as reduced model suggest that earnings convey incremental information

content beyond cash flow.

The following conclusions can be drawn from Table 6.3.3.2 concerning the incremental information content of cash flow.

1) The incremental information content of cash flow is not moderated by the consistency of signals of earnings and cash flow surprises, which implies that investors do not perceive cash flow as more reliable measure of firm performance when its surprise signal is consistent with the surprise signal of earnings. Which is supportive of the conclusion provided by the change-only models.

2) The determinant of accruals volatility moderates the relationship between returns and cash flow, which confirms Charitou (1997) that when the volatility of accruals is low, timing and matching problems in cash flow are minimized, and hence, cash flow plays more important role in the market place.

3) The accruals volatility determinant moderates the effect of the consistency of signals on the relationship between returns and cash flow in the pooled sample but not in the surviving-only sample, implying that investors are more interested in questioning the reliability of cash flow measure of performance if it is revealed by a list of companies which comprises some financially distressed firms. Which confirms the suggestions of the change-only models.

4) In contrary with the suggestions of the change-only models, the relationship between returns and cash flow is moderated by the different combinations of signals in the pooled sample, reflecting that investors are more interested in relating cash flow to earnings to question its reliability if it is revealed by a list of companies which comprises some financially distressed firms.

5) The effect of the combinations of signals on the relationship between returns and cash flow is not moderated by the accruals volatility in any of the two samples.

**Table 6.3.3.2: F-statistics<sup>1</sup> Between the Nested Models Assessing the Incremental Information Content of Cash Flow Employing Changes and Levels**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	1.1	0.7	0.3	1.2	0.1	0.2
the consistency and accruals volatility effects model	the consistency effect model	4.1*	2.6	7.0*	5.0*	1.2	0.6
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	5.4*	1.4	5.4*	1.3	4.0*	1.8
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	3.3*	2	2.9*	1.1	1.1	1.2
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.9	1.1	1.9	1.2	1.1	0.9

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>; Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.



**Table 6.3.3.2.B:F-statistics between Each of Cash Flow-Return Specification as Full Model and the Earnings-only Model as Reduced Model**

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
	Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model	4.6*	2.7	2.3	3.6	1.8	4.5*
the consistency effect model	2.8*	1.7	1.3	2.4*	1	2.3
the consistency and accruals volatility effects model	3.5*	2.2*	4.2*	3.7*	1.1	1.4
the combinations of signals and accrual volatility effects model	4.1*	1.9	4.6*	2.9*	2.0*	1.5
the model of Interaction between consistency and accruals volatility	3.4*	2.1	3.7*	2.8*	1.1	1.3
the model of Interaction between combinations of signals and accruals volatility	3.0*	1.5	3.3*	2.0*	1.6	1.2

\*: indicates statistically significant at .05 or less.

<sup>1</sup>: F statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The reported F-statistics in Table 6.3.3.2.B between each of the following models as full model: the consistency and accruals volatility effects model; the model of Interaction between consistency and accruals volatility; the combinations of signals and accrual volatility effects model;and the model of Interaction between combinations of signals and accruals volatility, and model 1a (the earnings only model) as reduced model

indicate that cash flow convey incremental information content beyond earnings when the relationship between cash flow and returns is allowed to be moderated by the determinant of accruals volatility and when the effect of the consistency of signals is allowed to be moderated by the accruals volatility determinant and when the relationship between cash flow and returns is allowed to be moderated by the combinations of signals of earnings and cash flow surprises and also when the effect of the combinations of signals on the relationship between returns and cash flow is allowed to be moderated by the accruals volatility determinant.

## **6.4 Results Obtained by Applying Nonlinear Functional Forms:**

This section reports and discusses results regarding the information content of earnings and cash flow obtained by applying non-linear functional forms to estimate the relationship between returns and the accounting measures of performance (earnings and cash flow);

Following Ali (1994), for each sample year we classified firms into two groups according to whether the absolute value of their earnings change deflated by beginning of period market value of equity lay above or below the annual median. To the group with changes larger than the annual median was designated the high group and the one with changes smaller than the annual median, was the low group. The same procedures were used to classify firm-years into high and low magnitude groups for cash flow.

### **6.4.1 Information Content of Earnings and Cash Flow**

This section presents the results concerning the information content of earnings and cash flow obtained by running the models using nonlinear functional forms;

The results reported in Table 6.4.1.A show F-statistic between the nested models that assess the relationship between returns and earnings when non-linear functional forms are used.

**Table 6.4.1.A: F-statistics<sup>1</sup> Between the Models Assessing the Information Content of Earnings by Employing Non Linear Functional Forms**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	0.1	0.5	0.8	0.6	0.2	0.3
the consistency and accruals volatility effects model	the consistency effect model	6.2*	1.5*	6.1*	3.3*	1.2	0.6
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	1.5	1.5	1.4	2.1	1.6	1.9
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	0.4	0.1	0.2	0.4	1.3	1.4
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.8	1.1	1.9	0.9	1.5	1.1

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

From the results reported in Table 6.4.1.A, the following conclusions can be drawn:

1) The relationship between returns and earnings does not depend on the consistency of signals of earnings and cash flow surprises when the non-linear functional form is used, implying that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. This conclusion confirms the results suggested by change-only models in Section 5.2.

2) The relationship between returns and earnings is moderated by the volatility of accruals when the aggregate accruals (AA) or the length of operating cycle (LOC) is used as a determinant of accruals volatility, which confirms Dechow (1994) that accruals are predicted to improve earnings ability to reflect firm performance when the accruals volatility is high. This is supportive to the results of the change-only models.

3) The effect of the consistency of signals on the relationship between returns and earnings does not depend on the volatility of accruals whichever accruals volatility determinant is in use. This confirms the results of the change-only models.

4) in support of the change only models, the relationship between returns and earnings is not moderated by the combinations of signals of earnings and cash flow surprises in both samples.

5) the volatility of accruals does not moderate the effect of the combinations of signals on the relationship between returns and earnings in both samples. Which disconfirms the conclusions provided by employing change-only models.

The following table shows the comparative R-squared between the models that employ linear functional forms and those which apply non-linear functional forms.

**Table 6.4.1.B: Comparative Goodness of Fit Between Linear and non-Linear Functional Forms**

<b>Model</b>	<b>Linear</b>	<b>Non-Linear</b>
<b>Panel 1: Aggregate accruals (AA):</b>		
the main effect	15.0%	15.6%
the consistency effect	15.0%	15.6%
the consistency and accruals volatility effects	16.6%	17.0%
the combinations of signals and accrual volatility effects	16.7%	17.3%
Interaction between consistency and accruals volatility	16.6%	17.1%
Interaction between combinations of signals and accruals volatility.	17.5%	18.4%
<b>Panel 2: Length of Cycle (LOC):</b>		
the main effect	16.2%	16.8%
the consistency effect	16.3%	16.9%
the consistency and accruals volatility effects	17.5%	18.3%
the combinations of signals and accrual volatility effects	17.6%	18.6%
Interaction between consistency and accruals volatility	17.5%	18.3%
Interaction between combinations of signals and accruals volatility.	18.6%	19.7%
<b>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R):</b>		
the main effect	17.9%	18.4%
the consistency effect	17.9%	18.4%
the consistency and accruals volatility effects	18.2%	18.8%
the combinations of signals and accrual volatility effects	18.3%	19.3%
Interaction between consistency and accruals volatility	18.4%	19.2%
Interaction between combinations of signals and accruals volatility.	19.0%	20.4%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

Concerning the information content of cash flow, the following conclusion can be drawn from the results reported in Table 6.4.2.A:

1) As provided by the results of change only models in Section 5.2, the relationship between returns and cash flow is moderated by the consistency of signals of earnings and cash flow surprise, implying that investors perceive cash flow as more reliable when its surprise signal is consistent with the surprise signal of earnings.

2) The relationship between returns and cash flow is suggested to be moderated by the volatility of accruals in the pooled sample when aggregate accruals (AA) is used as the accruals volatility determinant but not when the length of operating cycle (LOC) or the coefficient of variation of the cash flow to earnings ratio is used as the accruals volatility determinant.

3) The volatility of accruals is suggested to moderate the effect of the consistency of signals on the relationship between returns and cash flow when the volatility of accruals is determined by the aggregate accruals (AA) and the length of the operating cycle (LOC) but not when the volatility of accruals is determined by the coefficient of variation of the cash flow to earnings ratio. Which confirms the conclusion provided by employing change-only technique.

4) In contrast with the suggestions provided by employing change-only models, the relationship between returns and cash flow is not moderated by the combinations of signals of earnings and cash flow surprises in both the pooled and the surviving-only sample.

5) The effect of the combinations of signals on the relationship between returns and cash flow is moderated by the volatility of accruals in the pooled sample when the length of the operating cycle (LOC) is used as the accruals volatility determinant, which confirms the prediction that investors are more interested in questioning the reliability of cash flow if it was revealed by a list of companies which comprises some financially distressed firms. Which confirms the results provided by employing the change-only models.



**Table 6.4.2.A: F-statistics<sup>1</sup> between the nested models Assessing the Informativeness of Cash Flow Employing Non-Linear Functional Forms**

	The Full Model	The Reduced Model	Accruals Volatility Determinant					
			Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
			Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model		the main effect model	31.0*	20.0*	34.0*	20.0*	20.0*	14.0*
the consistency and accruals volatility effects model		the consistency effect model	2.9*	2.2	2.2	2.1	1.1	0.9
the combinations of signals and accrual volatility effects model		the consistency and accruals volatility effects model	2.3	0.8	2.7	1.1	1.2	1.5
the model of Interaction between consistency and accruals volatility		the consistency and accruals volatility effects model	2.3*	0.6	3.2*	1.2	2.8	1.7
the model of Interaction between combinations of signals and accruals volatility		the combinations of signals and accrual volatility effects model	1.6	0.7	2.5*	1.6	1.6	0.9

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The following table shows the comparative R-squared between the models that employ linear functional forms and those which apply non-linear functional forms:

**Table 6.4.2.B: Comparative Goodness of Fit Between Linear and non-linear Functional Forms.**

Model	Linear	Non-Linear
<i>Panel 1: Aggregate accruals (AA):</i>		
the main effect	07.5%	07.8%
the consistency effect	11.0%	12.3%
the consistency and accruals volatility effects	11.8%	13.0%
the combinations of signals and accrual volatility effects	11.8%	13.6%
Interaction between consistency and accruals volatility	12.4%	13.6%
Interaction between combinations of signals and accruals volatility.	12.9%	14.6%
<i>Panel 2: Length of Operating Cycle (LOC):</i>		
the main effect	07.6%	07.8%
the consistency effect	11.4%	12.8%
the consistency and accruals volatility effects	11.9%	13.4%
the combinations of signals and accrual volatility effects	12.1%	14.0%
Interaction between consistency and accruals volatility	12.6%	14.1%
Interaction between combinations of signals and accruals volatility.	13.5%	15.5%
<i>Panel 3: Coefficient of Variation of Cash Flow/ Earnings Ratio (R):</i>		
the main effect	10.2%	10.5%
the consistency effect	12.9%	14.2%
the consistency and accruals volatility effects	13.3%	14.6%
the combinations of signals and accrual volatility effects	13.4%	15.0%
Interaction between consistency and accruals volatility	13.8%	15.5%
Interaction between combinations of signals and accruals volatility.	14.2%	16.3%

*Note:* the reported results are obtained from the pooled sample, see appendix 2 for comparative survivors-only results.

### **6.4.3 Incremental Information Content of Earnings and Cash Flow**

This section reports and discusses empirical results concerning the incremental information content of earnings and cash flow beyond each other, obtained by employing non-linear functional forms.

The following conclusions can be drawn from Table 6.4.3.1 which reports results obtained by employing non-linear functional forms to assess the relationship between returns and earnings after controlling for cash flow;

1) The incremental information content of earnings is not moderated by the consistency of signals of earnings and cash flow surprises, implying that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. Which confirms the results provided by employing the change-only models.

2) The accruals volatility determinant moderates the relationship between returns and earnings in the pooled sample when the aggregate accruals (AA) or the length of the operating cycle (LOC) is used as accruals volatility determinant, which confirms Dechow (1994) that accruals improve earnings ability to reflect firm performance when the accruals volatility is high. When the coefficient of variation of cash flow to earnings ratio is used as accruals volatility determinant, the reported results for both samples suggest that the relationship between returns and earnings is not moderated by the accruals volatility determinant.

3) The effect of the consistency of signals on the relationship between returns and earnings is suggested not to be moderated by the accruals volatility determinant in both

the pooled and the surviving-only samples. Which is consistent with the results provided by the change-only models.

4) the incremental information content of earnings does not depend on the combinations of signals of earnings and cash flow surprises. Which confirms the conclusions drawn from the change-only models.

5) the accruals volatility determinant does not moderate the effect of the combinations of signals on the relationship between returns and earnings in both samples. Which disconfirms the conclusion provided by employing the change-only models.

**Table 6.4.3.1: F-statistics<sup>1</sup> Between the Nested Models Assessing the Incremental Information Content of Earnings by Employing Non-Linear Functional Form**

	The Full Model	The Reduced Model	Accruals Volatility Determinant					
			Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
			Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model		the main effect model	0.5	0.4	0.3	0.5	0.1	0.4
the consistency and accruals volatility effects model		the consistency effect model	7.4*	1.6	7.5*	4.1*	1.5	0.8
the combinations of signals and accrual volatility effects model		the consistency and accruals volatility effects model	1.6	2.5	1.6	2.7	2	2.5
the model of Interaction between consistency and accruals volatility		the consistency and accruals volatility effects model	0.4	0.3	0.2	0.5	1.7	1.8
the model of Interaction between combinations of signals and accruals volatility		the combinations of signals and accrual volatility effects model	1.8	1.2	2	1	1.6	1.1

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

**Table 6.4.3.1.B:** F-statistics between Each of Earnings-Return Specification as Full Model and the Cash Flow-only Model as Reduced Model

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
	Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model	87.0*	61.0*	99.0*	64.0*	67.0*	50.0*
the consistency effect model	28.0*	31.0*	50.0*	32.0*	33.0*	25.0*
the consistency and accruals volatility effects model	26.0*	16.0*	29.0*	18.0*	17.0*	13.0*
the combinations of signals and accrual volatility effects model	18.0*	12.0*	20.0*	13.0*	12.0*	9.7*
the model of Interaction between consistency and accruals volatility	17.0*	11.0*	19.0*	12.0*	12.0*	9.5*
the model of Interaction between combinations of signals and accruals volatility	10.0*	6.6*	11.0*	7.2*	7.1*	5.5*

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The reported results in Table 6.4.3.1.B indicate that earnings convey incremental information content beyond cash flow in both the pooled and the surviving-only samples whether the signalling effect is taken into consideration or not.

Concerning the incremental information content of cash flow beyond earnings, The following conclusions can be drawn from Table 6.4.3.2 which reports results obtained by employing non-linear functional forms.

1) In support for the conclusion drawn from the change-only technique, the relationship between returns and cash flow is not moderated by the consistency of signals, which implies that the incremental information content of cash flow does not depend on the consistency of signals of earnings and cash flow surprises, and that investors do not give more credence to the consistent stories compared to contradictory ones.

2) the incremental information content of cash flow is suggested to be moderated by the accruals volatility determinant only when the length of operating cycle (LOC) is used as accruals volatility determinant. Which confirms the results provided by employing the change-only models.

3) the effect of the consistency of signals on the incremental information content of cash flow is moderated by the accruals volatility determinant in the pooled sample but not in the surviving-only sample, which confirms the theoretical prediction that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some financially distressed firms.

4) the incremental information content of cash flow is not affected by the combinations of signals of earnings and cash flow surprises but it is moderated by the accruals volatility determinant in the pooled sample when the length of operating cycle (LOC) is used as accruals volatility determinant.

**Table 6.4.3.2; F-statistics<sup>1</sup> Between the Nested Models Assessing the Incremental Information Content of Cash Flow Beyond Earnings by Non-Linear Functional Forms**

The Full Model	The Reduced Model	Accruals Volatility Determinant					
		Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
		Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the consistency effect model	the main effect model	2.8	0.9	1.9	1.1	1.3	0.7
the consistency and accruals volatility effects model	the consistency effect model	2.5	1.6	2.6*	3.0*	0.5	0.2
the combinations of signals and accrual volatility effects model	the consistency and accruals volatility effects model	2.5	0.4	1.8	0.5	0.5	0.1
the model of Interaction between consistency and accruals volatility	the consistency and accruals volatility effects model	1.8	0.1	3.4*	1.3	1.7	0.6
the model of Interaction between combinations of signals and accruals volatility	the combinations of signals and accrual volatility effects model	1.7	1	3.0*	1.7	1.4	0.8

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>; Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price); <sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.



**Table 6.4.3.2.B: F-statistics between Each of Cash Flow-Return Specification as Full Model and the Earnings-only Model as Reduced Model**

The Full Model	Accruals Volatility Determinant					
	Aggregate accruals <sup>a</sup>		Length of operating cycle <sup>b</sup>		variation of CF/E Ratio <sup>c</sup>	
	Pooled sample <sup>2</sup>	Survivor sample <sup>3</sup>	Pooled sample	Survivor sample	Pooled sample	Survivor sample
the main effect model	2.6	0.5	2.7	0.7	1.5	0.4
the consistency effect model	2.7*	0.6	2.3	0.9	1.4	0.5
the consistency and accruals volatility effects model	2.6*	1.1	2.5*	1.9	1	0.4
the combinations of signals and accrual volatility effects model	2.6*	0.9	2.3*	1.4	0.9	0.3
the model of Interaction between consistency and accruals volatility	2.4*	0.8	2.8*	1.7	1.2	0.5
the model of Interaction between combinations of signals and accruals volatility	2.1*	0.9	2.6*	1.6	1.1	0.5

\* indicates statistically significant at .05 or less.

<sup>1</sup>: F statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

<sup>c</sup>: variation of CF/E ratio is the coefficient of variation of cash flow to earnings ratio.

The statistically significant F-statistics reported for the pooled sample in Table 6.4.3.2.B

suggest that cash flow conveys incremental information content beyond earnings when:

- (i) the relationship between returns and cash flow is allowed to be moderated by the consistency of signals of earnings and cash flow surprises, (ii) when the effect of the consistency of signals on the relationship between returns and cash flow is allowed to

be moderated by the accruals volatility determinant, (iii) when the relationship between returns and cash flow is allowed to be moderated by the combinations of signals of earnings and cash flow surprises, and (iv) when the effect of the combinations of signals is allowed to be moderated by accruals volatility determinant.

### **6.5 Summary and Conclusions:**

The purpose of this chapter has been to extend the investigation of the relationship between market returns and the accounting measures of performance (earnings and cash flow) by utilizing the recent innovations in modelling the relationship between returns and the accounting measures of performance in order to test the predictions of this study. In particular, two techniques are employed to capture the effect of the existence of transitory components in earnings and cash flow surprises. The first is the employment of both change and level of each explanatory term to proxy for the unexpected component of earnings or cash flow and the second technique is the utilisation of a non-linear relationship between returns and earnings or cash flow.

Concerning the valuation relevance of earnings, the following conclusions are suggested:

1) The information content of earnings and the incremental information content of earnings beyond cash flow are not moderated by the consistency of signals of earnings and cash flow surprises, implying that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow.

2) The effect of the consistency of signals on the valuation relevance of earnings is

moderated by the accruals volatility of accruals in the surviving sample.

3) The information content and the incremental information content of earnings is moderated by the combinations of signals of earnings and cash flow surprises in the pooled sample but not in the surviving-only sample, implying that investors are more interested in questioning the reliability of earnings if it is revealed by a list of companies which comprises some financially distressed firms.

4) The effect of the combinations of signals on the information content and the incremental information content of earnings is not moderated by the accruals volatility determinant in both samples, whichever accruals volatility determinant is in use.

Concerning the valuation relevance of cash flow, the following conclusions were suggested:

1) Whilst the information content of cash flow is moderated by the consistency of signals of earnings and cash flow surprises, its incremental information content beyond earnings is not suggested to be moderated in the same manner. which confirms the theoretical prediction that investors perceive cash flow as more reliable when its surprise signal is consistent with the surprise signal of earnings.

2) The effect of the consistency of signals on the information content and the incremental information content of cash flow is moderated by the accruals volatility determinant, mainly in the pooled sample, implying that investors are more interested in questioning the reliability of cash flow if it is revealed by a list of companies which comprises some

financially distressed firms.

3) The combinations of signals of earnings and cash flow surprises moderate the information content of cash flow in both samples and moderates the incremental information content of cash flow in the pooled sample only.

4) The effect of the combinations of signals on the information content and the incremental information content of cash flow beyond earnings are moderated by the accruals volatility determinant in the pooled sample.

## CHAPTER SEVEN

### SUMMARY, CONCLUSIONS AND COMPARISON WITH PREVIOUS EVIDENCE

#### 7.1 Main Findings and Conclusions

The purpose of this thesis has been to contribute to the growing empirical literature on the association of earnings and cash flow with security returns by examining whether investors relate earnings and cash flow measures of performance to each other to assess the quality of each of them, which leads to a corroboration (interaction) effect on stock prices. More specifically, the goals of this thesis are to test whether the valuation relevance of earnings and cash flow is moderated by the consistency of signals, and whether such effect on the valuation relevance of earnings and cash flow is moderated in turn by the volatility of accruals.

In terms of research design, this study considers the survivorship bias by employing a unique data set by sampling from both existing companies and other companies which have ceased exist.

This study has been built on the underlying assumption that an accounting variable is informative if its unexpected components are systematically correlated with a measure of the returns on the company's stock, and that such a relationship could be presented by a single or multiple regression model. This study employes two techniques to capture the effect of the existence of transitory components in earnings and cash flow surprises: the

first is the employment of both change and level to proxy for the unexpected components of earnings or cash flow and the second technique is the utilisation of a non-linear relationship between returns and earnings or cash flow.

Although it is plausible to predict that consistent signalling of surprises in both measures improves the perceived reliability of each because each measure diminishes the shortcomings of the other, and hence, the expectation that investors give more credence to the consistent stories compared to contradictory ones may be questioned. Indeed, the consideration of the consistency effect may be criticised in that it assumes an identical signalling effect in the worst-news scenario (negative surprises of both earnings and cash flow) to that in the best-news scenario (positive surprises of both earnings and cash flow). It also assumes an identical signalling effect among the two combinations of contradictory signals (positive earnings surprise and negative cash flow surprise, or vice-versa). As a result, we also consider the signalling effect in terms of the various combinations which may be theoretically justified by the conservativeness of investors who may be more interested in relating earnings and cash flow to each other as a reliability check when the surprise signal of the performance measure in respect is positive.

Table 7.1 summarises the results of testing the hypotheses concerning the signalling effects (consistency and combinations effects) on the valuation relevance of both earnings and cash flow, and the effect of the volatility of accruals on such signalling effects.

**Table 7.1: Results of Testing Hypotheses Concerning the Valuation Relevance of Earnings and cash flow.**

Hypothesis:	In terms of information content		In terms of incremental information content	
	Pooled	Survivors	Pooled	Survivors
<b>H1:</b> The value-relevance of earnings is moderated by the consistency of signals	Reject	Reject	Reject	Reject
<b>H2:</b> The value-relevance of earnings is moderated by the different combinations of signals	Accept (CL)	Reject	Accept (CL)	Accept (CL)
<b>H3a:</b> Accruals volatility determinants moderate the consistency effect on the value-relevance of earnings	Reject	Reject	Reject	Reject
<b>H3b:</b> Accruals volatility determinants moderate the effect of the different combination of signals on the value-relevance of earnings	Accept (CO)	Reject	Accept (CO)	Reject
<b>H4:</b> The value-relevance of cash flow is moderated by the consistency of signals	Accept (CO,CL,NL)	Accept (CO,CL,NL)	Reject	Reject
<b>H5:</b> The value-relevance of cash flow is moderated by the different combinations of signals	Accept (CO,CL)	Accept (CL)	Accept (CL)	Reject
<b>H6a:</b> Accruals volatility determinants moderate the consistency effect on the value-relevance of cash flow	Accept (CO,CL,NL)	Reject	Accept (CO,CL,NL)	Reject
<b>H6b:</b> Accruals volatility determinants moderate the effect of the different combination of signals on the value-relevance of cash flow	Accept (CO,NL)	Reject	Accept (CO,NL)	Reject

**Notes:**

The results are derived using change-only (CO), changes and levels (CL) and nonlinear (NL) estimation schemes, hence, any hypothesis is accepted if it was confirmed by the results of, at least, one estimation scheme.

Symbols in brackets indicate the estimation schemes by which the hypothesis was confirmed.

The sample consists of 773 UK companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

The following conclusions can be drawn from Table 7.1:

1. The valuation relevance of earnings (either in terms of information content or

incremental information content beyond cash flow) is not affected by whether or not the signal of earnings surprise is consistent with the signal of cash flow surprise. which implies that investors do not perceive earnings as more reliable when its surprise signal is consistent with the surprise signal of cash flow. In other words, investors do not give more credence to earnings when it provides a consistent signal with cash flow.

**2.** Our results suggest that the valuation relevance of earnings is moderated by the different combinations of signals when the change and level (CL) estimation scheme is employed to capture the effect of the existence of transitory components in earnings. But this effect is confirmed only for the pooled sample, which implies that investors are more interested in questioning the reliability of earnings by relating it to cash flow when it is revealed by a list of companies which comprises some financially distressed firms. This effect is also moderated by the volatility of accruals, which confirms our prediction that investors are more likely to check the reliability of earnings by relating it to cash flow when accruals volatility is low.

**3.** Concerning the valuation relevance of cash flow, our results suggest that its information content is affected by whether its surprise signal is consistent with the surprise signal of earnings. This supports the prediction that investors to give more credence to cash flow when its surprise signal is consistent with the signal of earnings surprise. When the valuation relevance of cash flow is considered as its incremental information content beyond earnings, it is not suggested to be affected by whether it provides consistent signalling with earnings or not. In addition, such consistency effect on the valuation relevance of cash flow is suggested to be moderated by the volatility of accruals in the



pooled sample whichever estimation scheme is employed. Such finding implies that investors are more interested in assessing the reliability of cash flow by relating it to earnings if it is revealed by a list of companies which comprises some financially distressed firms.

**4.** The different combinations of signal play a significant role in affecting the information content of cash flow in both samples, while they play a significant role in affecting the incremental information content of cash flow in the pooled sample which confirms our prediction that investors are more interested in relating cash flow to earnings if it is revealed by a list of companies which comprises some financially distressed firms.

Generally, our results suggest that earnings and cash flow are not evaluated in isolation of each other in the market place implying that the investors give more credence to the consistent stories compared to contradictory ones. In particular, investors are seen to relate cash flow to earnings to assess the reliability of cash flow data. The extent to which this occurs, however, depends on the volatility of accruals. Finally, it should be emphasised that the more supportive results are provided after controlling for survivorship bias, which constrains the generalisability of prior research findings in this area. Given that a precise estimate of survivorship bias is not being possible because the disappeared companies tend to do so not necessarily due to financial and liquidity distress and poor performance, but may be for being highly profitable and liquid, the survivor bias can be predicted to be more severe and more serious if it was possible to distinguish between companies those been delisted for being distressed and those been taken-over because of their relative high performance.

The following table shows the goodness of fit and the F-statistics between the reduced and the full models when assessing signalling and accruals volatility effects on the incremental information content of cash flow.

**Table 7.2:** Signalling and accruals volatility Effects on the Incremental Information Content of Cash Flow

interaction terms in the reduced model	Added interaction terms in the full model	Pooled sample			Survivor sample		
		Reduced model R <sup>2</sup>	Full model R <sup>2</sup>	F-test	Reduced model R <sup>2</sup>	Full model R <sup>2</sup>	F-test
No interaction effect term (main effect only)	Consistency effect	16.6	16.7	0.3	16.5	16.7	1.2
Consistency effect	Accruals volatility effect	16.7	17.9	7.0*	16.7	17.9	5.0*
Consistency and accruals volatility effects	Combinations of signals effect	17.9	18.9	5.4*	17.9	18.2	1.3
Consistency & accruals volatility effects	interaction between consistency and accruals volatility effects	17.9	18.5	2.9*	17.9	18.2	1.1
Combinations of signals & accruals volatility effects	interaction between combination of signals and accruals volatility.	18.9	19.9	1.9	18.2	19.1	1.2

Notes:

\* : indicates statistically significant at .05 or less . The reported results are from the change & level estimation scheme with the length of operating cycle as the accruals volatility determinant.

The F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

The sample consists of 773 companies (515 surviving companies and 258 non-surviving companies, with 1843 firm-year observations over the three-years sampling period 1996-1998).

Concerning whether cash flow conveys incremental information content beyond earnings, our empirical results suggest that cash flow has incremental information content beyond earnings when the signalling effect and the effect of the volatility of accruals on signalling effects are taken into consideration. More interesting, these results are confirmed with the pooled sample but not with the restricted survivor sample suggests that many of the inferences drawn from the previous work may have been misleading. The following table shows the goodness of fit and the F-statistics between the reduced (earnings-only) model and each of the models assessing the incremental information content of cash flow beyond earnings as full model.

**Table 7.3:** Goodness of Fit and the F-statistics between Each of Cash Flow-Return Specification as Full Model and the Earnings-only Model as Reduced Model

Full Model	Pooled sample		Survivor sample	
	R <sup>2</sup>	F-statistic	R <sup>2</sup>	F-statistic
Earnings-only model	15.6	N/A	16.3	N/A
Main effect model	15.8	2.6	16.4	0.5
Consistency effect model	16.1	2.7*	16.5	0.6
Consistency and accruals volatility effects model	16.5	2.6*	16.9	1.1
Combination of signals and accruals volatility effects model	17	2.6*	17	0.9
Interaction between consistency and accruals volatility model	16.9	2.4*	16.9	0.8
Interaction between combination of signals and accruals volatility model	17.9	2.1*	17.8	0.9

**Note:** the reduced model is the earnings-only model. The reported results are from the non-linear estimation scheme and when aggregate accruals is used as a determinant of accruals volatility,

The F-statistic is calculated as follows: 
$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively. M: number of variables added to the reduced model, N: number of observations.

N/A indicates not applicable

\*: statistically significant at .05 or less.

Concerning whether earnings convey incremental information content beyond cash flow, our results confirm the previous empirical finding (Charitou, 1997, Garrod and Hadi, 1998, Green, 1999: among others) that earnings convey incremental information content over and above that conveyed by cash flow) whether the relationship between returns and earnings is contextualized or not.

## **7.2 Comparison with Previous Studies**

The present study extends the literature on the association of earnings and cash flow with security returns by employing a unique data set to examine a new research question of whether or not the valuation relevance of earnings and cash flow is moderated by the consistency and by the combination of the signals of their surprises. We also demonstrate whether firm-specific determinants of accruals volatility moderate the signalling effects of earnings and cash flow surprises. However, it is interesting to compare our main findings to the previous evidence.

Regarding the question of whether cash flow numbers provide valuation-relevant information over and above earnings numbers, our findings suggest that cash flow conveys incremental information content beyond earnings when the effect of the accruals volatility determinants on the interaction between earnings and cash flow is taken into consideration, which supports Charitou (1997), McLeay, Kassab and Helan(1997), Cheng et al.(1997) and Garrod and Hadi (1998). In addition, our results confirm Bernard and Stober (1989), Board and Day and Walker (1989) and Board and Day (1986) in that cash flow disclosure does not provide valuation relevant information over and beyond earnings numbers when the relationship between returns and cash flow is averaged over

all groups. Table 7.4 compares our findings on the incremental information content of cash flow beyond earnings to the previous empirical studies. Also our results confirm Dechow (1994) and Charitou (1997) in that the role of cash flow becomes more important in the marketplace when the volatility of accruals is lower.

**Table 7.4: Comparison with Previous Studies on the Incremental Information Content of Cash Flow;**

<b>Author</b>	<b>Sample</b>	<b>Incremental information content confirmed?!</b>
<i>Present study</i>	<i>UK (surviving &amp; non-surviving firms)</i>	<i>Yes</i>
Rayburn 1986	US	No
Bowen et al. 1987	US	Yes
Wilson 1986,87	US	Yes
Bernard & Stober1989	US	No
Board & Day 1989	UK	No
Board et al. 1989	UK	No
Livnat & Zarowin 1990	US	No
Ali 1994	US	Yes
Ali & Pope 1995	UK	Yes
Clubb 1995	UK	Yes
McLeay et al 1997	UK	Yes
Sloan 1996	US	Yes
Cheng et al 1996	US	No
Charitou 1997	UK	Yes
Green 1999	UK	Yes

Table 7.5 compares our findings on the earnings and cash flow response coefficients and goodness of fit with previous empirical findings.

Table 7.5: Comparison with Previous Empirical Findings on the Estimation Coefficients and Goodness of Fit;

Author	Estimation Scheme	Variable				R <sup>2</sup>	Other Variables
		Earnings change	Earnings level	Cash Flow change	Cash Flow level		
Present Study	Change only	1.52***		0.08		14.4	Median of Market Return, accruals volatility and consistency interaction terms
	Change & Level	1.53***	0.07	0.98	.31***	20.7	
Green 1999 <sup>a</sup>	Change only	.44***		0.069		21	Total Market Price Index, Dividends
	Change & Level	.45***	.047***	0.15	.14***	22	
Charitou & Clubb 1999 <sup>b</sup>	Change only	N/R		N/R			Investment Cash Flow
	Change & Level	N/R	2.27***	N/R	-.114***	18	
Garrod & Hadji 1998 <sup>c</sup>	Change only	.22***		.17***		5	Taxation, Investment and Financing cash flow
	Change & Level	.26***	0.028	.11***	.14***	10	
McLeay et al 1997 <sup>d</sup>	Change only	0.4		0.16		23	Unexpected Fund Flow
	Change & Level	N/R	N/R	N/R	N/R	N/R	
Charitou 1997 <sup>e</sup>	Change only						
	Change & Level	1.7***	1.3***	-0.05	.24***	25	
Cheng et al 1996 <sup>f</sup>	Change only	.62***		0.15		9	
	Change & Level	0.68	0.18	-0.02	0.4	12	
Ali & Pope 1995 <sup>g</sup>	Change only	N/R		N/R		N/R	Unexpected Fund Flow
	Change & Level	0.032	1.32***	-0.118	0.096	15	
Ali 1994 <sup>h</sup>	Change only	.26***		0.01		8	
	Change & Level						

\*\*\* denotes statistically significant at conventional levels; the present study results are obtained from the pooled sample.

<sup>a</sup>: Pooled results restricted to 197 firms with 23 years time series data, i.e. 4531 firm-year. <sup>b</sup>: to maintain comparability, results over longer intervals (i.e. 2 years and 4 years) have been ignored.

<sup>c</sup>: Total accruals variable was employed as a measure of accruals earnings. <sup>d</sup>: the unexpected values of accounting variables are exponentially weighted moving average (EWMA). Coefficients have been re-calculated and converted from their results on unexpected earnings, unexpected current accruals and unexpected long term accruals to maintain comparability.

<sup>e</sup>: mean results over the four sampling period 1989-1992. <sup>f</sup>: linear model results have been chosen to maintain comparability. <sup>g</sup>: mean results of 15 yearly coefficients.

Although direct comparison with previous findings is restricted by the differences in the model specifications and variable definitions. The first point to note from Table 7.5 is that our results are consistent with previous findings in that the inclusion of earnings/ cash flow levels variable improves the goodness of fit of the models. Concerning the sign of the coefficient on the cash flow change variable, there has been some debate in the literature, that is Ali and Pope (1995) argue that the sign on the coefficient of unexpected cash flow depends on macroeconomic factors such as economic expansion. In addition, our results confirm Freeman and Tse (1992), Ali (1994), Ali and Pope (1995) and Cheng et al (1996) that employing a nonlinear functional form to express the relationship between returns and the accounting measure of performance (earnings or cash flow) increases the goodness of fit because the marginal security return response to the accounting measure of performance is negatively related to the absolute size of the unexpected components of the accounting measure of performance (earnings or cash flow) because the large changes in the accounting measures of performance are not expected to persist and, thus, have reduced implications for returns.

Moreover, our results are consistent with Ali and Pope (1995), Garrod and Hadi (1998), Charitou (1997) and Green (1999) that significant increases in the goodness of fit of the relationship between returns and accounting measures of performance are achieved by employing both the levels and the changes of the explanatory variables instead of employing change only.

In brief, this study extends the previous findings by demonstrating that earnings and cash flow are not evaluated in isolation of each other in the market place and that investors give

more credence to consistent stories compared to contradictory ones. In particular, investors are seen to relate cash flow to earnings to assess the reliability of cash flow data. The extent to which this occurs, however, depends on the volatility of accruals. Moreover, this study provides additional contextual evidence on the existence of the usefulness of cash flow disclosures beyond earnings which in turn supports the Accounting Standards Board (ASB) views of the necessity of cash flow disclosure as an integral component of financial reports. Finally, it should be emphasised that the more supportive results are provided after controlling for survivorship bias, which constrains the generalisability of prior research findings in this area and implies that investors are more likely to question the reliability of the accounting performance revealed by a list of companies which comprises some financially distressed firms. Given that this study, in common with Ali and Pope (1995), Charitou (1997) and Green (1999), concludes that the relative usefulness of cash flow disclosure is confirmed only when contextual factors are considered, this motivates future researchers to contextualize their investigation by considering a wider range of firm-specific criteria.

### **The importance of the study**

The conclusions of this study are supposed to have several implications for the researchers, accounting standards setting bodies and the users of companies' annual reports.

For the researchers, this study brings their attention to the importance of considering the survivorship bias in the studies of the valuation relevance of accounting information. In addition this study guides researchers to the importance of contextualizing the relationship between returns and accounting information instead of assuming identical



relationships.

For the accounting standards setting bodies, the present study may encourage them to adopt simultaneously disclosure of earnings and cash flow as complementary parts of each other instead of the current practice of releasing primary information about earnings before cash flow which is subsequently declared as part of the annual report.

For the users of companies' annual reports, this study is supposed to give a guide as to the way of evaluating and perceiving the reliability of the accounting measures of performance (earnings and cash flow) and it may affect the way they contextualize and look at accounting information.

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## **APPENDIX 1**

### **Technical Analysis of Models' Specification and Statistical inferences**

The specification of our models reflects the traditional assumption of accounting variables informativeness studies that a variable contains information if its unexpected realization is systematically correlated with a measure of return on the company's share over the period pertaining to the release of relevant financial data, assuming the extent to which the market can be deemed to have a prior expectation of the firm's performance. It is only the unexpected component that is expected to influence the behavior of the investors. Such a relationship has been described in the previous accounting variables informativeness studies in a simple way by a multiple linear regression equation where the unexpected components of the accounting variable are the explanatory variables and the dependent variable is a measure of a company share's returns. In the present study, the informativeness of earnings and cash flow is assessed in terms of the information content of each variable alone and the incremental information content of each variable beyond the other in the context of corroboration. Below, we discuss the drawing of statistical inferences concerning the informativeness of earnings in terms of information content and incremental information content beyond cash flow. Statistical inferences concerning the informativeness of cash flow are not discussed here because they can be drawn analogously.

The empirical test for the information content of earnings in a corroboration context is based on the analysis of the following hierarchy of nested models : (note: equivalent models were used to test for the information content of operating cash flow by replacing earnings measure by operating cash flow measure)

M1; the main effect model:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + e_{it}$$

M2; the consistency effect model:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + a_2 \text{UE}_{it} (\text{CON}) + e_{it}$$

M3A; the consistency and accruals volatility effects model:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + a_2 \text{UE}_{it} (\text{CON}) + a_3 \text{UE}_{it} (\text{DAV1}) + a_4 \text{UE}_{it} (\text{DAV5}) + e_{it}$$

M3B: the combination of signals and accruals volatility effects model:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + a_2 \text{UE}_{it} (\text{CON}) + a_3 \text{UE}_{it} (-+) + a_4 \text{UE}_{it} (++) + a_5 \text{UE}_{it} (\text{DAV1}) + a_6 \text{UE}_{it} (\text{DAV5})$$

M4A; the model of Interaction between consistency and accruals volatility:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + a_2 \text{UE}_{it} (\text{CON}) + a_3 \text{UE}_{it} (\text{DAV1}) + a_4 \text{UE}_{it} (\text{DAV5}) + a_5 \text{UE}_{it} (\text{CON})(\text{DAV1}) + a_6 \text{UE}_{it} (\text{CON})(\text{DAV5}) + e_{it}$$

M4B: the model of Interaction between combination of signals and accruals volatility:

$$\text{RETURN}_{it} = a_0 + a_1 \text{UE}_{it} + a_2 \text{UE}_{it} (\text{CON}) + a_3 \text{UE}_{it} (-+) + a_4 \text{UE}_{it} (++) + a_5 \text{UE}_{it} (\text{DAV1}) + a_6 \text{UE}_{it} (\text{DAV5}) + a_7 \text{UE}_{it} (\text{CON})(\text{DAV1}) + a_8 \text{UE}_{it} (-+)(\text{DAV1}) + a_9 \text{UE}_{it} (++) (\text{DAV1}) + a_{10} \text{UE}_{it} (\text{CON})(\text{DAV5}) + a_{11} \text{UE}_{it} (-+)(\text{DAV5}) + a_{12} \text{UE}_{it} (++) (\text{DAV5})$$

where,

RET the return on the company's share price over twelve months lagged four months after the year end.

UE unexpected components of earnings,

(CON) dummy variable which takes the value of 1 if the company i shows consistent earnings and cash flows surprise for period t, otherwise 0.

(++) dummy variable which takes the value of 1 if the company i shows positive earnings and cash flows surprise for period t, otherwise 0. The other variables are defined analogously.

DAV1, DAV5 dummy variables which take the value of 1 if the observation is located in the first or the fifth quantile respectively according to the determinant of accruals volatility

The following F-statistic is used to compare the goodness of fit of the full and the reduced models:

$$F = \frac{(SSE_r - SSE_f) / M}{SSE_f / (N - M - 1)}$$

where; SSE<sub>r</sub>, SSE<sub>f</sub>: Sum of square residuals of the restricted and non restricted models, respectively.

M: number of variables added to the reduced model, which is the number of restrictions)

N: number of observations.

Model 1 is the main-effect model in which the valuation relevance of earnings is not allowed to vary among sub-groups according to a moderator variable, and hence, represents the valuation relevance of earnings averaged over all groups.

In contrast, Model 2 allows the valuation relevance of earnings to vary among sub-groups according to the dummy variable (CON) which represents the sub-group that has consistent surprise signals of earnings and cash flows, and hence, the coefficient  $a_1$  no longer provides estimate of the average effect of earnings across all groups as it does in model 1, instead, it represents the valuation relevance of earnings in the reference sub-group which is the group that shows inconsistent surprise signals, while the coefficient  $a_2$  on the interaction term represents the difference in the valuation relevance between the reference group and the group represented by the dummy variable (CON). Hence, the t-test for the coefficient of the product term does not test the significance of the effect of earnings on returns for the consistency group, the significance of the relationship between returns and earnings in the consistency group is indicated by  $(a_1+a_2)$ . A statistically significant coefficient on the interaction term UE (CON) and statistically significant F-statistic between Model 2 as full model, and model, 1 as reduced model, indicates that the relationship between returns and earnings differs according to the consistency of signals shown by earnings and cash flow surprises.

In Model 3A (consistency and accruals volatility effects model) , the relationship between returns and earnings is allowed to differ according to a determinant of accruals volatility. Observations are grouped into five quintiles according to the determinant of accruals volatility, where quintile 1 contains observations with the lowest accruals volatility and quintile 5 contains observations with the highest accruals volatility. A statistically significant F-test between Model 3A and Model 2 would suggest that the relationship between returns and earnings is moderated by the determinant of accruals volatility ( see Dechow 1994 and Charitou 1997).

Model 4A (interaction between consistency and volatility of accruals model) tests whether or not the interaction between earnings and cash flow investigated by Model 2 is moderated by the determinant of accruals volatility by allowing the relationship

between returns and the interaction term in Model 2 to vary according to the determinant of accruals volatility (DAV). A statistically significant F-statistic between Model 4A and Model 3A indicates that the interaction between earnings and cash flow represented by the interaction term UE(CON) in Model 2 is moderated by the determinant of accruals volatility.

To test the hypothesis that the relationship between returns and earnings depends on the combination of signals of earnings and cash flow surprises, Model 3B is employed to extend Model 2 by allowing the valuation relevance of earnings to differ according to the combination of signals of earnings and cash flow surprises, while Model 4B extends Model 3B by allowing the relationship between returns and the interaction terms in Model 3B to vary according to a determinant of accruals volatility. Hence, a statistically significant F-statistic between Model 4B, as full model, and model 3B, as reduced model indicates that the relationship between returns and the interaction term is moderated by a determinant of accrual volatility.

The empirical test for the incremental information content of earnings beyond operating cash flow is based on the analysis of the same models used to assess the information content of earnings with the exception that the operating cash flow measure is included in the specification, so the specifications indicate the effect of earnings on returns after controlling for the effect of operating cash flow, the following hierarchy of nested models is used:



M1A; the cash flow only model:

$$RET_{it} = a_0 + a_1 UCF_{it} + e_{it}$$

M1B; the main effect model:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UCF_{it} + e_{it}$$

M2; the consistency effect model:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UE_{it} (CON) + a_3 UCF_{it} + e_{it}$$

M3A; the consistency and accruals volatility effects model:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UE_{it} (CON) + a_3 UE_{it} (DAV1) + a_4 UE_{it} (DAV5) + a_5 UCF_{it} + e_{it}$$

M3B; the combination of signals and accruals volatility effects model:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UE_{it} (CON) + a_3 UE_{it} (-+) + a_4 UE_{it} (++) + a_5 UE_{it} (DAV1) + a_6 UE_{it} (DAV5) + a_7 UCF_{it} + e_{it}$$

M4A; the model of Interaction between consistency and accruals volatility:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UE_{it} (CON) + a_3 UE_{it} (DAV1) + a_4 UE_{it} (DAV5) + a_5 UE_{it} (CON)(DAV1) + a_6 UE_{it} (CON)(DAV5) + a_7 UCF_{it} + e_{it}$$

M4B; the model of Interaction between combination of signals and accruals volatility:

$$RET_{it} = a_0 + a_1 UE_{it} + a_2 UE_{it} (CON) + a_3 UE_{it} (-+) + a_4 UE_{it} (++) + a_5 UE_{it} (DAV1) + a_6 UE_{it} (DAV5) + a_7 UE_{it} (CON)(DAV1) + a_8 UE_{it} (-+)(DAV1) + a_9 UE_{it} (++) (DAV1) + a_{10} UE_{it} (CON)(DAV5) + a_{11} UE_{it} (-+)(DAV5) + a_{12} UE_{it} (++) (DAV5) + a_{13} UCF_{it} + e_{it}$$

Where,

RET the return on the company's share price over twelve months lagged four months after the year end.

UE unexpected components of earnings.

UCF unexpected components of earnings.

(CON) dummy variable which takes the value of 1 if the company i shows consistent earnings and cash flows surprise for period t otherwise 0

(++) dummy variable which takes the value of 1 if the company i shows positive earnings and cash flows surprise for period t, otherwise 0. the other variables are defined analogously.

DAV1, DAV5 dummy variables which take the value of 1 if the observation is located in the first or the fifth quantile respectively according to the determinant of accruals volatility

(note: equivalent models were used to test for the incremental information content of operating cash flow beyond earnings by replacing earnings measure by operating cash flow measure)

In testing for the incremental information content of earnings and cash flow beyond each other, prior studies such as those of Bowen et al (1987), Board, Day and walker (1989), Ali and Pope (1994) and Biddle et al (1994), Mcleay, Kassab and Helan (1997) and Garrod and Hadi (1998) have used different methods of assessing the statistical significance of introducing the additional explanatory variables as a test of the

incremental information content of that variable. But in the main they used F-test to examine the reduction in the variance achieved by introducing that additional accounting variable (i.e., Biddle et al,1994; Mcleay, Kassab and Helan,1997).

## **APPENDIX 2**

### **Comparative Goodness of Fit**

This appendix provides comparative goodness of fit of the employed models among the alternative estimation schemes, Tables **Appendix 2.1** and **Appendix 2.2** provides comparative goodness of fit of the models assessing the information content and incremental information content of earnings and cash flow, respectively, among estimation schemes.

**Table Appendix 2.1: Goodness of Fit of the Models Assessing the Information Content and Incremental Information Content of Earnings Among Estimation schemes**

Model	Estimation Scheme					
	Change-only		Change & Level		Non-Linear	
	Pooled-	Survivor	Pooled	Survivor	Pooled	Survivor
<b>Panel (1): Aggregate Accruals<sup>a</sup> as Determinant of Accruals Volatility</b>						
Main Effect Model	10.1 (10.2)	10.1 (10.1)	15.2 (15.6)	15.9 (16.3)	15.6 (15.8)	16.3 (16.4)
Consistency Effect Model	10.2 (10.2)	10.2 (10.2)	15.2 (15.6)	16.1 (16.4)	15.6 (15.9)	16.4 (16.4)
Consistency and Accruals volatility Effects Model	12.1 (12.2)	10.8 (10.8)	17.0 (17.2)	16.9 (17.2)	17.0 (17.2)	16.8 (16.8)
Combination of Signals and Accrual volatility Effects Model	12.2 (12.3)	11.0 (11.0)	18.1 (18.2)	17.6 (17.8)	17.3 (17.5)	17.4 (17.5)
Interaction between Consistency and Accruals volatility Model	12.1 (12.2)	10.9 (10.9)	17.1 (17.5)	17.6 (18.1)	17.1 (17.3)	16.9 (16.9)
Interaction between Combination of Signals and Accruals volatility Model	13.1 (13.1)	11.8 (11.9)	19.0 (19.1)	18.7 (19.0)	18.4 (18.5)	18.4 (18.4)
<b>Panel (2): Length of Operating Cycle<sup>b</sup> as Determinant of Accruals Volatility</b>						
Main Effect Model	11.7 (11.8)	10.4 (10.4)	16.4 (16.6)	16.1 (16.5)	16.8 (17.0)	16.5 (16.5)
Consistency Effect Model	11.9 (11.9)	10.5 (10.5)	16.5 (16.7)	16.3 (16.7)	16.9 (17.1)	16.6 (16.6)
Consistency and Accruals volatility Effects Model	13.2 (13.2)	11.5 (11.5)	18.5 (18.5)	17.8 (18.0)	18.3 (18.4)	17.6 (17.6)
Combination of Signals and Accrual volatility Effects Model	13.3 (13.3)	11.8 (11.8)	19.5 (19.5)	18.3 (18.5)	18.6 (18.7)	18.3 (18.3)
Interaction between Consistency and Accruals volatility Model	13.2 (13.3)	11.7 (11.7)	18.6 (18.6)	18.1 (18.3)	18.3 (18.4)	17.7 (17.7)
Interaction between Combination of Signals and Accruals volatility Model	14.4 (14.4)	12.5 (12.5)	20.6 (20.7)	19.4 (19.7)	19.7 (19.8)	19.0 (19.1)
<b>Panel (3): Coefficient of Variation of CF/E Ratio as Determinant of Accruals Volatility</b>						
Main Effect Model	10.9 (10.9)	10.0 (10.0)	18.2 (18.4)	17.8 (18.5)	18.4 (18.5)	18.3 (18.4)
Consistency Effect Model	10.9 (11.0)	10.1 (10.1)	18.2 (18.4)	18.0 (18.7)	18.4 (18.6)	18.4 (18.4)
Consistency and Accruals volatility Effects Model	11.4 (11.4)	10.4 (10.4)	18.5 (18.8)	18.3 (19.0)	18.8 (18.9)	18.6 (18.7)
Combination of Signals and Accrual volatility Effects Model	11.6 (11.7)	10.6 (10.7)	19.1 (19.5)	18.9 (19.7)	19.3 (19.4)	19.3 (19.4)
Interaction between Consistency and Accruals volatility Model	11.7 (11.7)	10.7 (10.8)	18.9 (19.2)	18.5 (19.3)	19.1 (19.3)	19.0 (19.1)
Interaction between Combination of Signals and Accruals volatility Model	12.3 (12.4)	11.4 (11.5)	20.2 (20.7)	19.8 (20.5)	20.4 (20.6)	20.3 (20.3)

*Notes:* Figures in brackets are the R-squared of the incremental information content models.

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;

**Table Appendix 2.2: Goodness of Fit of the Models Assessing the Information Content and Incremental Information Content of Cash Flow Among Estimation schemes**

Model	Estimation Scheme					
	Change-only		Change & Level		Non-Linear	
	Pooled	Survivor	Pooled	Survivor	Pooled	Survivor
<b>Panel (1): Aggregate Accruals<sup>a</sup> as Determinant of Accruals Volatility</b>						
Main Effect Model	2.2 (10.2)	1.6 (10.1)	8.6 (15.6)	9.1 (16.3)	7.8 (15.8)	8.6 (16.4)
Consistency Effect Model	5.8 (10.3)	5.0 (10.2)	11.5 (15.7)	11.9 (16.4)	12.3 (16.1)	12.4 (16.5)
Consistency and Accruals volatility Effects Model	6.6 (10.8)	5.8 (10.6)	12.8 (16.4)	13.0 (17.0)	13.0 (16.5)	13.3 (16.9)
Combination of Signals and Accrual volatility Effects Model	6.6 (10.9)	5.9 (10.6)	14.8 (17.4)	14.2 (17.4)	13.6 (17.0)	13.6 (17.0)
Interaction between Consistency and Accruals volatility Model	7.4 (11.4)	6.2 (10.7)	13.5 (17.1)	13.6 (17.5)	13.6 (16.9)	13.5 (16.9)
Interaction between Combination of Signals and Accruals volatility Model	7.7 (11.9)	6.5 (10.9)	15.8 (18.4)	15.1 (18.2)	14.6 (17.9)	14.3 (17.8)
<b>Panel (2): Length of Operating Cycle<sup>b</sup> as Determinant of Accruals Volatility</b>						
Main Effect Model	2.2 (11.8)	1.7 (10.4)	8.7 (16.6)	9.0 (16.5)	7.8 (17.0)	8.5 (16.5)
Consistency Effect Model	6.3 (11.8)	5.3 (10.5)	11.9 (16.7)	12.1 (16.7)	12.8 (17.2)	12.6 (16.7)
Consistency and Accruals volatility Effects Model	6.8 (12.3)	5.9 (11.2)	13.3 (17.9)	13.5 (17.9)	13.4 (17.7)	13.3 (17.4)
Combination of Signals and Accrual volatility Effects Model	7.1 (12.4)	6.1 (11.2)	15.5 (18.9)	14.8 (18.2)	14.0 (18.0)	13.6 (17.5)
Interaction between Consistency and Accruals volatility Model	7.4 (12.8)	6.2 (11.4)	13.9 (18.5)	13.9 (18.2)	14.1 (18.3)	13.7 (17.8)
Interaction between Combination of Signals and Accruals volatility Model	8.7 (14.1)	7.1 (12.1)	16.4 (19.9)	15.7 (19.1)	15.5 (19.6)	15.0 (18.9)
<b>Panel (3): Coefficient of Variation of CF/E Ratio as Determinant of Accruals Volatility</b>						
Main Effect Model	1.5 (10.9)	1.3 (10.0)	11.7 (18.4)	11.8 (18.5)	10.5 (18.5)	11.1 (18.4)
Consistency Effect Model	4.8 (10.9)	4.4 (10.0)	13.6 (18.4)	13.8 (18.5)	14.2 (18.7)	14.3 (18.4)
Consistency and Accruals volatility Effects Model	5.3 (11.0)	4.9 (10.1)	14.1 (18.7)	14.2 (18.7)	14.6 (18.8)	14.6 (18.5)
Combination of Signals and Accrual volatility Effects Model	5.7 (11.3)	5.2 (10.2)	16.4 (19.6)	15.9 (19.2)	15.0 (19.0)	14.8 (18.5)
Interaction between Consistency and Accruals volatility Model	6.0 (11.4)	5.6 (10.4)	14.5 (19.0)	14.8 (19.0)	15.5 (19.3)	15.3 (18.7)
Interaction between Combination of Signals and Accruals volatility Model	6.6 (12.2)	6.1 (11.1)	17.8 (20.5)	17.2 (20.0)	16.3 (20.0)	15.7 (19.2)

*Notes:* Figures in brackets are the R-squared of the incremental information content models.

<sup>2</sup>: Pooled sample results depends on surviving and non-surviving companies; <sup>3</sup>: Surviving-only sample results depends on the surviving companies only

<sup>a</sup>: Aggregate accruals is the absolute value of the difference between the measures of earnings and cash flow for each firm-year observation (scaled by the beginning of period share price);

<sup>b</sup>: Length of operating cycle is the sum of the number of days in inventory and the number of days in receivables;