THE INFORMATION CONTENT OF CASH FLOWS VERSUS ACCRUAL-BASED INCOME NUMBERS

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of
Masters in Commerce (Dissertation only)
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By John Carolin

ABSTRACT

Conventional wisdom holds that the accrual basis is superior to the cash basis in the preparation of financial accounts. Accrual-based earnings are supposed to be a better indicator of future cash flows because they smooth the sometimes-sporadic inflow and outflow of cash. For this reason, it is argued that earnings, rather than cash flows, have a greater capital market significance, reflected by the stronger statistical relationship between the earnings and market-based metrics of a company's performance. This study explores the academic literature behind this broad assumption and specifically examines the relationship between earnings, cash flows, and abnormal returns across industries on the JSE Securities Exchange during the period of 1988 to 2002.

After reviewing the historical development of the accrual basis, the theoretical literature that debated the merits of the cash basis and a cash-flow based system of accounting is reviewed. With the increased availability of statistical financial data, the impetus for enquiry into this field then shifted to a more empirical approach by mostly American researchers that examined the statistical relationship between earnings, cash flows and both security returns, abnormal security returns[1] and future cash flows. These studies are reviewed along methodological lines as these range from simple studies of association, studies of incremental information content and finally to contextual studies including complex non-linear models of security returns specified by a varied mix of cash flow and earnings variables. Lastly, since this study interests itself with the

[1] Abnormal security returns equate to actual return less a specified measure of normal, or market, returns.

relationship between earnings, cash flows and abnormal returns on the JSE Securities exchange, the combined South African literature is also reviewed.

Significant findings, both methodological and theoretical, are highlighted during the review and have been used as the basis for the development of the research design that is employed and the interpretation of results.

Using a stepwise multiple regression, levels of earnings and cash flows, scaled by beginning of period share price, are regressed against monthly abnormal returns cumulated over a 12-month period beginning 3 months after the beginning of the financial year. This is done on a year-by-year basis from the period 1988 to 2002 as well as individually for 11 predefined industry classifications that could potentially have different cash flow implications. Both winsorised and unwinsorised input data is used to control for the effect of significantly large outliers. Furthermore, due to the significant sample size of JSE Security Exchange listed companies, which historically suffer from thin trading, the robustness of the results are tested for the effect of thin trading using a metric that measures annual share turnover.

On the whole or 'pooled basis' the results confirm that earnings dominate cash flows in predicting abnormal annual returns. This finding is robust to tests of the effect of outliers and trading volumes. Cash flows do possess information content both individually, and beyond that already contained in earnings numbers, particularly in certain industries. The industry specific results are not always robust to the effect of trading volume and outliers and, for this reason, it is difficult to draw specific conclusions, at an industry level, beyond the sample set and sample period investigated.

On a year-by-year basis, the results are neither consistent nor conclusive, which further limits the ability to draw general findings about this relationship beyond the specific sample period.

Review of the descriptive statistics of the dependent variable, cumulative abnormal annual returns, suggests that the CAPM, as specified by the economic data used in this study, is a poor predictor of expected returns.

In addition, supplementary tests, including an analysis of variance, are performed to test the association between cumulative abnormal annual returns, and as defined above are associated with the direction of unexpected[2] earnings and cash flows, both individually and when the direction of earnings and cash flow surprises are corroborative or contradictory.

The results of these supplementary tests show, although not always to a statistically significant degree, that unexpected earnings are superior to unexpected cash flows at specifying abnormal returns. Likewise, they confirm that cases where unexpected earnings and cash flows are both positive and both negative, that is to say, they are corroborative, they are better able to specify abnormal returns than in cases where the directions of these surprises are not corroborative.

[2] Unexpected earnings and unexpected cash flows are defined as the difference between actual current year and expected earnings and cash flows and in this case, employing a naïve assumption, expected earnings and cash flows are expected to be equal to the prior year number.

DECLARATION

I declare the following:

I know that plagiarism is wrong. Plagiarism is to use another's work and to pretend that it is one's own.

I have used the Harvard convention for citation and referencing. Each significant contribution to, and quotation in, this report, from the work, or works, of other people has been attributed, cited and referenced.

This dissertation is my own work.

I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature: _____

John Carolin

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Chapter 1

INTRODUCTION

1.1 Objective of this study

Ample empirical research has been conducted into the relationship between earnings and the value of the firm, with the relationship between cash flows and the firm being largely ignored in the South African context. This study examines the role of cash flows and accrual-based earnings, both individually and when combined, in predicting security returns of listed South African equities in order to assess the comparative information content of these two accounting variables. This will provide evidence in the debate over the superiority of the accrual versus the cash basis of accounting. The specific hypotheses and methodology employed to investigate this relationship are stated later in this chapter and in chapter 4 and 5.

Over a number of years, there have been a numerous methodological improvements in research design as well as evidence to suggest that this is a contextual relationship. There has been limited South African evidence into the incremental information content of earnings and cash flows. A previous study by Ogle and Uliana in 1999 suggested that in a South African context, such factors as industry and stage-in-life-cycle may play a role in the contextual relationship between accrual-based earnings, cash flows, and security returns. An industry effect is also suggested in a similar study performed by Lobo and Song in 1989. Accordingly, this study investigates this relationship broadly as well as focussing on the role industry classification plays in the differential market value relevance of earnings and cash flows.

1.2 Historical Background

Merchants in Venice were amongst the first to grapple with the concept of performance measurement or profit determination in the 14th Century AD. This aided them in achieving superior financial control and resource allocation to maximise wealth creation, and Venice became the leading centre of trade and industry in medieval Europe. This success has been attributed particularly to Venice's superior business organisation (Chatfield, 1974, p.33). Intrepid sailors would enter short-term partnerships with wealthy investors who would supply them with consignment stock. They would travel throughout the Mediterranean and the Near East and trade these goods and, upon return, make a detailed account of their transactions. Profit and loss was calculated individually for each voyage and the seafaring trader usually received one quarter of the profit made. (Chatfield, 1974, p.36).

This method of accounting employed in Venice formed the basis of probably the most influential accounting text ever written, *Summa de Arithmetica, Geometria, Proportioni et Proportionalita* by Luca Pacioli in 1496 (Chatfield, 1974, p. 45). This early accounting manual makes no mention of accruals.

Until the beginning of the 18th century the cash basis of accounting was the main system of accounting (Winjun,1972). Until then, periodic income determination was viewed as a process ancillary to the preparation of a statement of wealth; the profit and loss account was used simply to close off the ledger accounts at the end of a period (Lee, 1981, p.64). Because of the nature of business ventures at the time, usually taking the form of a family partnership, accounts were only closed off when there was a change in partnership; the sole motivation being the calculation of a partner's share of the wealth of the business (Chatfield, 1974, p.38). In addition, taxes were exclusively levied on wealth rather than income, and this left very little motivation for determining profit.

After the discovery of the Americas and the opening up of trade routes to the East, the centre of international commerce and industry shifted from the Mediterranean to the countries of the North Atlantic. Similarly, the impetus for accounting evolution shifted. England found itself in a very favourable geographical location and the resultant economic prosperity caused a shift from subsistence manorial life to commerce and trading in a more urbanised environment. Feudal England had been characterised by sporadic business ventures with little need for calculating periodic profit and loss. Traditional single entry accounting systems that were used for manorial accounting could no longer deal with the

new complexities of the accumulation of capital, credit arrangements, and agency transactions. Soon accounting practice began to take on the same form as had been used centuries earlier in Italy.

The oldest surviving accounting text from England is *Breffe Instruction* by John Weddington, which was published in 1567. It borrows substantial volumes from Luca Pacioli's earlier work, but it is the first accounting text to illustrate accruals and deferrals (Chatfield, 1974, p. 56). Although appearing in accounting manuals, it was practised infrequently in England and this was mainly a result of indifference towards calculating total income.

As business operations achieved new levels of continuity and industry, the motivation behind the preparation of accounts was no longer the stewardship of manorial assets, but rather shifted to the protection of corporate investors, income determination, and dividend payment (Chatfield, 1974, p. 28).

The East India Company was the first joint stock company. It started in 1600 as a company partaking in speculative expeditions in the trading of spices. For each separate voyage it needed to raise capital and then, upon return, calculated profit and distributed it to investors. As the number of voyages grew, it became increasingly difficult to keep accounts of separate undertakings distinct from each other and it became obvious that permanent capital was necessary to fund this perpetual process. By 1657, the principle of permanent capital was established and by 1661, the East India Company did away with the customary divisions of profits and assets and announced that in future it would make dividend distributions (Littleton, 1933, p. 210).

It came to pass that, by law, dividends could only be declared from current and accumulated income (Littleton, 1933, p. 215). The main objective of the accountant or corporate steward shifted from wealth determination to the determination of profit available for distribution to shareholders as an annual dividend as well as taxes levied on annual basis (Chatfield, 1974,p. 82). This required a uniform doctrine that all firms could follow. This included, as part of the standardised set of codes, the use of the accrual basis for financial statement preparation. Thus, the accrual basis of accounting was formed.

According to Yamey, by the mid-19th century the abuse of accrual accounting was widely prevalent (Yamey, 1963, p.38). Creative accounting, it would seem, is an age-old scourge.

1.3 Theoretical Background

Fundamental Finance theory holds that the present value of an income-generating asset can be arrived at by discounting its future cash flows at the appropriate discount rate. When valuing companies, earnings prepared on the accrual basis, rather than actual cash flows, is often used as the basis for predicting future cash flows. Despite cash flow accounting being the oldest form of monetary accounting, it is widely held that financial performance measured on the accrual basis provides a better predictor of future cash flows (Winjun, 1972). The Financial Accounting Standards Board in FASB Concepts Statement No. 1, *Objectives of Financial Reporting by Business Enterprises*, paragraph 44, expressly articulates this premise:

> ... information described by accrual accounting generally provides a better indication of an organizations performance than does information about cash receipts and payments.

The operations of a firm that give rise to items of expense and income tends to be ongoing, whereas the disbursement and receipt of cash can be rather haphazard, particularly as the nature of the business environment and financing becomes more complex. Because accruals are used to allocate items of expense and income to the period in which they are incurred or earned, rather than when cash is disbursed or received, respectively; accrual-based income tends to be less volatile. As the period over which performance is measured increases, these timing differences will reverse and financial performance measured on both the accrual and cash basis should be more comparable.

Because of the apparent superiority of the accrual basis, financial statements are prepared on this basis and, since 1988, have been supplemented by a cash flow statement[3]. This requirement indicates that the accounting standard setting authorities recognise the significant usefulness of such information over and above that contained in an income statement and balance sheet alone.

[3] This was mandated worldwide at the following times: Canada (CICA) - 1985, USA(FASB) -1987, South Africa (SAICA) - 1988, UK(ASC) -1991, Australia(ASB) -1992, International(IAS)-1995. (Charitou et al, 1999)

The linkage between earnings and the value of the firm, in finance theory as described above, provides the theoretical underpinning behind the use of Price Earnings (P/E) multiples and Earnings Yields (E/Y) in contemporary equity valuation.

Net income, prepared on the accrual basis, can also be regarded as the increase or diminution in historical cost value of the underlying value of a firm over a given period. This mechanism is expressed by Ball and Kothari in the following excerpt from *Financial Statement Analysis* - Ball and Kothari (1994, p.2):

> Earnings literally is 'the bottom line.' Over the lifetime of a corporation, essentially all of the events influencing the value created in it are ultimately captured in its earnings. This is because, as a matter of law, over the corporation's lifetime all the distributions it makes to its stockholders either are dividends paid out of earnings or are capital distributions (i.e., returns of contributed capital). Essentially all the added value, over and above the contributed capital by stockholders, is therefore reflected in lifetime earnings, by construction. Thus in the long term, there is a fundamental linkage in law between earnings, dividends, returns to stockholders, and the performance of the corporation and its managers.

Cash flows however, are real events and are relatively clean of accounting manipulation; cash flows are not dependent on arbitrary accounting policies and are not susceptible to income smoothing. To a degree however, it is important to remember that cash based performance can be manipulated by delaying capital expenditure or managing working capital by delaying payments to creditors or factoring debtors. Likewise, the creative accountant can cloud the distinction between operating, financing and investing cash flows and their separate disclosure. An example of this would be the incorrect classification of an operating lease as a financing arrangement or vice versa. However, the ability and motivation of management to manipulate cash flows rather than accrual-based earnings is rather limited as there is both less scope to do this and cash flows are perceived to be less important. For this reason, one might suggest that they provide a less tainted view of the real performance of an entity and

accordingly provide decision useful information not necessarily captured in favoured accrual income numbers. This study explores this premise.

Further, the accrual process ignores the timing of cash flows and the consequences of this are twofold; firstly, this ignores the futurity or time value of money and secondly it ignores the risk that accruals might not crystallise into cash flows. Based on the premise that income accruals exceed expense accrual, which, all else being equal, is the situation one expects in a profitable company (or on a macro perspective, in a growing economy), this implies that a Rand of cash based earnings is worth more than a Rand of accrual income (Dechow et al, 1996, p.26).

This view is at odds with the construction outlined by Ball and Kothari above. They take a long-term view of the corporation, assuming that all items of income, expense, and distributions of economic value over the lifetime of the corporation occur at the same historical cost. Put more specifically, they ignore the time value of money and the limitations of historic cost accounting during inflation.

There are a number of companies that report 'paper profits'. However, the reality is that they cannot crystallise accrual-based profits into real cash flows in order to meet their obligations and to pay dividends. This suggests that, in the longer term, a firm's value should be dependent on its ability to generate cash flows and not simply reporting positive accrual-based earnings numbers. Dramatic evidence of this has been provided by such business failures as Laker Airways (Lee, 1982) and WT Grant company (Bruno, 1987, p. 32). Despite both reporting profits for a number of consecutive years, they were forced into bankruptcy after experiencing significant cash outflows from operations for a number of these years.

1.4 Research problem and design

This research hopes to determine whether, as measured by the markets reaction to price sensitive information, there is information in cash flow disclosures that is not already contained in earnings disclosures. This is expressed in more detail in Chapter 4. This is done by examining the differential ability of accrual-based earnings as measured by EPS and cash flows from operations (CFO) to model abnormal returns of JSE Securities Exchange listed shares both on a pooled basis and across a range of industry classifications for the period extending from January 1988 to December 2002

Using the stepwise regression model specified below, the two explanatory variables scaled EPS and CFPS were used to explain a firm's Cumulative Annual Abnormal returns.

$$CAR_{i,j} = \beta_0 + \beta_1 CF_{i,j} + \beta_2 EPS_{i,j} + \varepsilon_{i,j}$$

$CAR_{i,j}$ = cumulative abnormal return for firm j in peroid i

β_0 = y intercept

β_1 = regression coefficient for cash flow variable

β_2 = regression coefficient for earnings variable

$\varepsilon_{i,j}$ = residual term

$uCF_{i,j}$ = cash flow per share scaled by beginning of period share price for firm j in period i

$uEPS_{i,j}$ = earnings per share scaled by beginning of period share price for firm j in period i

Equation 1.1

This stepwise regression identifies the individual variable that is the most statistically significant explanatory variable by measuring how significantly different the coefficient of determination is from zero. In the next step, the second less significant variable, either EPS or CFPS, is then added as a further explanatory variable to identify whether or not it adds explanatory power to the regression model, which would be evidenced by an increase in the Adjusted Coefficient of determination. An increase in Adjusted R-squared confirms that the second explanatory variable also possesses the ability to increase the explanatory power of the prediction model and therefore must contain incremental information content.

The null hypothesis is expressed thus:

H_0: Adj. R^2_1 = Adj. R^2_2 = Multiple $R^2 = 0$ versus H_1: Adj. $R^2_1 \neq$ Adj. $R^2_2 \neq$ Multiple $R^2 \neq 0$

A number of additional tests are also performed to test the robustness of the findings and to deepen the understanding of this relationship. These included winsorising to control for the effect of these outliers and also developing a method to identify the impact of the thin-trading phenomenon anticipated on the JSE Securities exchange.

The pooled data is also analysed by industry to test whether the importance of earnings and cash flows varies across industries as suggested by Barth et al. (1999) and Ogle and Uliana (1999). Further, a year-on-year, as well as a pooled, analysis was performed for all the tests detailed above. This was done in order to test the persistence of findings across time and to possibly provide evidence to support general conclusions beyond the specific sample period.

Further supplementary tests of association between the direction of cash flow and earnings surprises and cumulative abnormal returns are also performed to test if capital markets are discerning and reward quality earnings that crystallise into cash flows. If this were the case on the JSE Securities Exchange then one would expect companies with positive earnings and cash flow surprises to achieve abnormal returns greater than those with only positive earnings surprises. The statistical significance of this is tested in the form of an analysis of variance which allows one to infer about the different strength of association of abnormal returns with accrual-based earnings and cash flows.

Expressed as a formal hypothesis thus:

$$H_0: \mu = 0 \qquad \text{versus} \qquad H_1: \mu \neq 0$$

for each of the 4 combinations of signals from earnings and cash flow surprises as documented in the methodology in Chapter 5.

Chapter 2

CONCEPTUAL FRAMEWORK

2.1 Introduction

This chapter explores the Efficient Market Hypothesis (EMH) and the mechanism responsible for price revisions relating to the dissemination of price sensitive information. It goes on to develop the notion of incremental information content, specifically as it relates to accrual based earnings and cash flows. This chapter also broadly outlines the development of the conceptual models employed to investigate the incremental information content of cash flows and accrual based earnings numbers. The details of this development is further outlined in the review of relevant literature presented in chapter 3 and is later expressed in the specific methodology used in this research in chapter 5.

2.2 The Efficient Market Hypothesis

In 1953, Maurice Kendall first examined stock market prices over time in order to establish patterns that would aid in predicting future economic cycles (Bodie et al., 1996, p. 336). The results that he published, which characterised share prices as being totally random, astounded fellow academics. This initially disturbed financial economists but a different interpretation soon allayed fears that the stock market was dominated by 'animal spirits' (Bodie et al., 1996, p. 336). It soon became clear that this seemingly erratic movement of share prices was characteristic of an efficient, rather than an inefficient, market. Market participants reacted in a timely manner to news that affected share prices, and since the release of price sensitive information is haphazard, the market mechanism would result in seemingly random price revisions.

This is the fundamental premise on which the Efficient Market Hypothesis (EMH) and Modern portfolio theory is based.

The EMH has been classified into three distinct forms: weak form, semi-strong form and strong form efficient:

- The weak form hypothesis holds that share prices reflect all information available from market sources. This implies that past anomalies or price movements cannot be used to make a profit.

- The semi-strong form efficiency asserts that share prices have all publicly available price sensitive information impounded into the share price and hence the only profitable strategy would involve utilising inside information.

- The strong form efficiency holds that all available information, both public and private, is captured in share prices and that the only profits that are made by traders can be attributable to chance. This is an extreme version that is not very widely supported. (Fama, 1976)

Market participants are bombarded with price sensitive information that relates to the wider economy as well as firm specific information. Firm specific information can take on the form of external information, or internal communications. The single most deliberate and explicit disclosure of firm specific information is the publication of the annual financial statements. This express communication with its shareholders about a company's historic

performance and financial position, along with other information in the notes to financial statements, assists users in predicting the enterprise's future cash flows and in particular the timing and certainty of the generation of cash and cash equivalents. (AC101 – 1998 Revised: Presentation of Financial Statements, SAICA)

In a semi strong-form efficient market, the publication of the annual financial results should result in timely share price revisions if the information contained in the annual financial statements results in revisions of prior expectations. Alternatively, ignoring the effect of general market-wide information, if no unanticipated price sensitive information is contained in the annual financial statements, and there are no other coinciding price sensitive disclosures, one would expect no revision of the share prices.

The annual financial statements can be disaggregated into various components that affect share prices. This study concerns itself with an investigation into stock market performance and the quality of earnings. That is to say, whether accrual-based profits per se, affect share prices or rather whether the investing public is discerning enough to look through the accrual-based income numbers and assess whether reported income is supported by real cash flows from operations. As discussed earlier, in the long run a company unable to generate cash cannot pay its creditors and shareholders dividends.

Specifically, this study examines the role of cash flows and accrual-based earnings, both individually and together, in predicting security returns of listed South African equities in order to assess the information content of these two accounting variables. By examining the relevant information content of earnings per share and cash flow from operations per share of a number of JSE Security Exchange listed equities, classified into broad industry classifications, over the period 1988-2002, evidence is provided about the relative importance of these two variables to the users of financial statements. This also provides evidence in the debate of the merits of the accrual basis in income determination.

2.3 Incremental information content

The concept of incremental information content is illustrated in the Venn diagrams below:

Figure 2.1

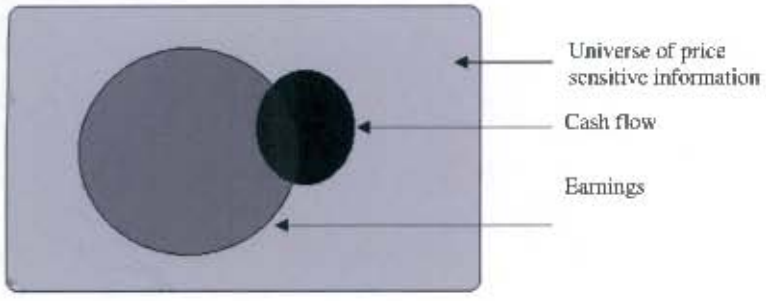


Figure 2.1 illustrates conventional thinking; although evidencing some incremental information beyond earnings, cash flows are inferior at explaining share returns. Earnings however, have superior explanatory power in predicting security returns.

Figure 2.2

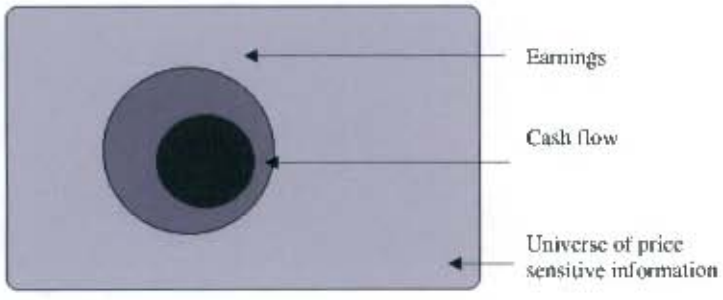


Figure 2.2 depicts a situation where cash flows exhibit no incremental information beyond that exhibited by earnings.

Figure 2.3 below, illustrates a situation where both cash flows and accrual earnings are individually important in explaining share price movements but neither possesses any significant incremental information content beyond that of the other.

Figure 2.3

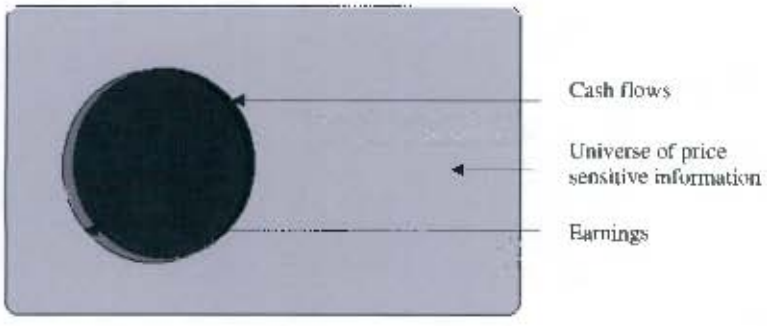
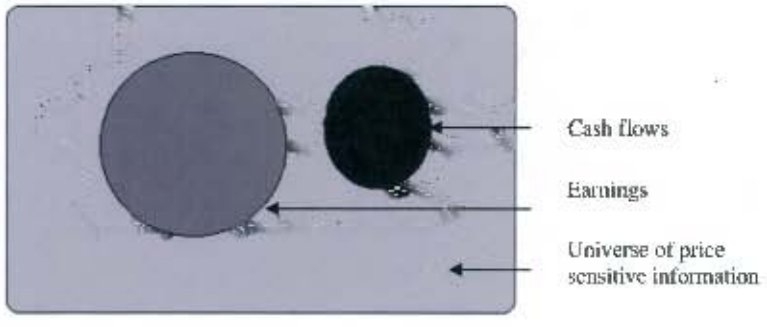


Figure 2.4 below, depicts a scenario where cash flows have information content that is incremental to that of earnings and there is no evidence of multicollinearity [4] between the two accounting variables. This scenario is highly unlikely given the close long-run association between cash flows from operations and earnings.

Figure 2.4



[4] Multicollinearity exists when two or more independent variables are correlated. If two or more variables are highly correlated, their might be an overlap of information inherent in these two explanatory variables and this results in the phenomenon known as multicollinearity.

2.4 The Earnings/Cash Flow- Return Model used for evaluating information content

The methodology used to assess the relative information content of accrual-based earnings and cash flow from operations is discussed in detail in chapter 5: Methodology. Briefly, in the generic model used in this type of study, earnings and cash flows, as the explanatory or independent variables, are regressed against a measure of capital market performance after controlling for market-wide factors. Information content is evidenced by significant response coefficients in the explanatory variable or alternatively, in later refinements, by statistically significant coefficients of determination for the explanatory variables.

Incremental information content is evidenced by controlling or conditioning for the other explanatory variable by using various statistical techniques known as statistical orthogonolisation. This includes the use of stepwise regression, which uses a second explanatory variable to explain the variation in residuals of a univariate model using the primary explanatory variable. In some rare instances, non-statistical methods are also used to condition for other explanatory variable when testing for *incremental* information content.

This type of study use a number of independent or explanatory variable to model a variety of measures of capital market performance[5] depending on the objective of the specific study and the level of methodological refinement. There has been much refinement in the measure of cash flow variable, which, initially had to be reconstructed, as historically it was not published in the Annual financial statements. The review of the literature traces this refinement as well as detailing many variations of cash flow explanatory variable used.

During the evolution of this research framework, both absolute levels of explanatory variable as well as the level of revision in the explanatory variable are used to model the value of a firm or the change in firm value over time. To calculate the level of change in an explanatory variable, an expectation model is developed; the most simple being a random walk model that anticipates in the current period, the same value as was reported in the prior period. The change in earnings in a given year, for instance, would be used to model the change in firm value over that same year. Alternatively, the absolute value of earnings might be used to model the change in firm value over that same year. Some more detailed studies use very complex expectation models for cash flow variables. Recently, there has been a shift

[5] In some cases, capital market performance is not used, but rather other dependant variables such as accounting rates of return or more specifically, future period cash flows. Refer to Chapter 3: Review of relevant literature for a detailed discussion.

back to using absolute levels[6], which has reduced the complexity of the generic research framework.

Likewise, there are numerous choices or variations of dependant variable used to assess the relative usefulness of earnings and cash flows. Broadly, these dependant variables can be classified into the following groups:

- Equity returns,
- Abnormal equity returns using the Capital Asset Pricing Model as an expectation model for normal returns,
- Abnormal equity returns using a multifactor expectation model such as the APT (Arbitrage Pricing Theory) model as an expectation model for normal returns,
- Abnormal equity returns using the return of the market as an expectation model for normal returns[7],
- Future period cash flows,
- Accounting based rates of return.

More contextual models have developed which, to a large extent are some variation of the model discussed above but include dummy coefficients for the choice of explanatory variable that toggle between 1 and 0 based on the state of the various contextual conditions being examined. This effectively results in separate estimates of the regression coefficients under the various contexts being examined.

[6] Scaled by beginning of period price to mitigate the effects of general price increases and reduce serial autocorrelation.

[7] This refinement has been added due to the perceived deficiencies of the CAPM.

Chapter 3

REVIEW OF THE RELEVANT LITERATURE

3.1 Introduction

This chapter reviews the academic literature which adds to the normative debate over the merits of accrual versus cash based accounting measures that has primarily been driven by a limited number of researchers from the United Kingdom before moving onto reviewing almost 4 decades of empirical evidence, driven primarily from researchers in the United States. The empirical evidence is presented based on similarities in methodological framework rather than in a chronological order. Further, the South African evidence, which is far less rich, is presented together despite a great deal of variation in research problem and design. Certain South African and Emerging market literature investigating the valuation of firms and market efficiency, not related specifically to the information content of cash flows and accrual based earnings, but which has relevance to the application of the contemporary research framework in a South African context, is also included in the last section of this chapter.

3.2 The merits of cash flow information: The Normative debate

The accrual basis went unquestioned in academic literature until the 1960s when a number of academics began to argue for the use of a Cash Flow Accounting; a system of financial reporting that describes performance in cash terms. They argued that the accrual basis is fraught with arbitrary allocations and is dependent on the subjective judgement of accounting practitioners (Eggington, 1984). The views of these proponents of Cash Flow accounting are briefly outlined below:

Coughlan (1960, 1962, 1964) recommended that past and expected cash flows should be used to produce discounted cash flow balance sheets from which income could then be determined. This approach was aimed primarily at internal reporting and was never taken any further by Coughlan.

Lee (1972a) examined the relevance of accounting information based on the qualitative characteristics that constitute decision useful accounting information, rather than an empirical investigation. Lee also discussed the view articulated by a fellow academic in 1970, Professor Gerald Lawson of Manchester Business School. Lawson believed that all financial statements should be scrapped and replaced with 15 years of cash flow information. Lee (1972b) made an argument for cash flow accounting because it is free from accounting manipulation.

Lawson and Lee became the two main proponents behind the adoption of an all-encompassing cash flow system of accounting. This framework called for past and future cash flow forecasts, a statement of explanations of variances of actual from forecasts, a list of the assumptions that the forecasts are based on, an audit opinion and an explanation of non-cash transactions (Lee, 1981, p.65). Based on the quantity of academic literature, it is clear that this system of cash flow accounting gained a large degree of acceptance amongst academics in the United Kingdom in the 1970's.

Briston and Fawthrop (1971), however, were the first to advocate an audited statement of variances between actual and forecast cash flows. Jones (1975) agreed with the adoption of this cash flow accounting system as a basis to overcome the problem of discretionary accrual allocations. Climo (1976) supported the merits of this framework and further suggested that

cash flows should be reported separately for distinct segments and should be split between recurring and non-recurring cash flows (Lee, 1981, p.67).

The US literature on cash flows and financial reporting takes on a less structured view than the UK literature, which is in contrast to the outpouring of empirical research from the US.

Thomas (1969) advocated the abandonment of accrual-based income in favour of the concept of funds[8] because of the arbitrary allocations inherent in accruals. Thomas (1974) went on to recommend the inclusion of a statement of monetary and non-monetary assets (Lee, 1981, p.65).

Ijiri (1977, 1979, 1979) called for the use of accounts based on cash flows rather than historical cost allocations in order to appraise management. Management, he argued, base their investment decisions on generating future cash flows. Accordingly, their performance should be measured on this basis (Lee, 1981, p.66).

Heath (1978), in an attempt to provide more relevant financial information to users of financial statements, proposed a new statement of cash receipts and payments. He did not however question the current basis of preparation of accounting information, but rather felt that this new statement would have provided new information about firm solvency and liquidity not already captured in historical cost accrual-based earnings (Lee, 1981, p.66).

[8] Thomas (1969) defines funds as cash plus debtors less creditors.

3.3 Cash flows and Accrual-based income numbers: The Empirical Evidence

The association between security returns and accounting earnings is a well-researched and documented relationship. This relationship, although intuitive to modern valuation theory, was first empirically tested by Ball and Brown (1968) in their seminal paper entitled: 'An empirical evaluation of accounting income numbers'. Not only did they document the relationship between the direction of earnings surprises and abnormal security returns, but they also noted the timeliness of market reaction to such surprises. Although it is not well reported, Ball and Brown (1968) show more substantial evidence in favour of earnings having more information content than a cash flow surrogate does. This paper marked the first of many to investigate the perceived utility that capital markets place on accounting disclosures based on the market's consensus reaction to such information.

The usefulness of cash flow information has been tested empirically in a capital market context extensively over the last 35 years. Albeit the most popular arena in which to test the decision relevance of cash flows, it is not the only one. Other contexts in which the usefulness of cash flows have been assessed include their ability to predict future cash flows, dividends and corporate failure.

The basic research framework followed in these capital market studies involves using earnings and cash flows as explanatory variables in modelling the concurrent revisions in stock prices. Strictly speaking, this says little about the usefulness of earnings or cash flow data. Rather, in the absence of a strong causal link, it only illustrates an association between these accounting variables and stock returns. The implication however, is that they have information utility if they are used by the investing public, and their use is reflected by simultaneous stock market revisions.

Although the literature on this subject makes incremental steps over a period of more than 35 years, some contributions establish newfound benchmarks and result in significant improvements in the contemporary research framework. Thus, rather than trace the development of this literature in a strictly chronological manner, the relevant literature has been reviewed along broad methodological classifications. These include:

1. Early studies of association of earnings, cash flows and security returns (exploring various variants of correlation statistics, both parametric and non parametric, without any examination of causality),

2. Earnings and cash flow's ability to predict future cash flows (directly examining the premise that earnings, rather than cash flows, are a better predictor of future cash flows),

3. Incremental information content studies (studies that examine the ability of earnings or cash flows as an explanatory variable, beyond the other, to explain the variation in equity returns),

4. Contextual studies of the information content of earnings and cash flows (studies that explore this relationship in different contexts in order to identify pervasive factors that, along with earnings and cash flows, explain the variation in equity returns).

5. Lastly, since this study investigates the relationship between earnings, cash flows and security returns in the South African context, the combined South African evidence is also reviewed.

These are summarised in the table below:

Table 3.1

Summary of empirical studies reviewed

Authors	Year	Classification	Event Window
Ball and Brown	1968	Study of Association	Long term
Beaver and Dukes	1972	Study of Association	Long term
Belkaoui	1983	Study of Association	Long term
Bowen, Burgstahler and Daley	1986	Prediction of Future Cash flows	Long term
Greenberg, Johnson and Ramesh	1986	Prediction of Future Cash flows	Long term
Dechow, Kothari and Watts	1998	Prediction of Future Cash flows	Long term
Barth, Cram and Nelson	1998	Prediction of Future Cash flows	Long term
Beaver, Griffin and Landsman	1982	Incremental information content study	Long term
Schaefer and Kennelly	1986	Incremental information content study	Long term
Wilson	1987	Incremental information content study	Short term
Wilson	1986	Incremental information content study	Short term
Rayburn	1987	Incremental information content study	Short term
Bowen, Burgstahler and Daley	1987	Incremental information content study	Long term
Board and Day	1989	Incremental information content study	Long term
Bernard and Stober	1989	Contextual Study	Short term
Lobo and Song	1989	Contextual Study	Short term
Livnat and Zarowin	1990	Contextual Study	Long term
Kinnunen and Niskanen	1993	Contextual Study	Long term (36 weeks)
Dechow	1994	Contextual Study	Long term
Ashiq Ali	1994	Contextual Study	Long term
Ashiq Ali and Pope	1994	Contextual Study	Long term
Cheng, Liu and Schaeffer	1996	Contextual Study	Long term
Garrod and Hadi	1998	Contextual Study	Long term

Quirin and O'Bryan	1999	Contextual Study	Long term
Charitou and Clubb	1999	Contextual Study	Long term
Hodgson and Stevenson-Clarke	2000	Contextual Study	Long term
Graham and Knight	2000	Contextual Study	Long term
Barth, Beaver, Hand and Landsman	2000	Contextual Study	Long term
Marita van Niekerk	1992	South African evidence: Incremental information content study	Long term
Fourie	1992	South African evidence: Study of Association	Long term
Pryce	1993	South African evidence: Prediction of Future Cash flows	Long term
Wessels, Smith and Gevers	1993	South African evidence: Contextual Study	Other[9]
Kobus	1995	South African evidence: Contextual Study	Long term
Wapenaar	1996	South African evidence: Study of Association	Long term
De Jager	1997	South African evidence: Contextual Study	Other[10]
Ogle and Uliana	Unpublisl	South African evidence: Contextual Study	Long term

There are numerous empirical studies into the relationship between various measurements of income and the value of the firm although this review primarily focuses on those studies that compare the differential information content of cash and accrual-based accounting measurements in explaining returns, abnormal returns and future cash flows. One particular study that also warrants particular attention is a review by Baruch Lev in 1989 entitled '*On the Usefulness of Earnings and Earnings research: Lessons from 2 decades of empirical research*'. This study looked at the various variations of the generic earnings[11]/return model and asked the question, 'How useful is earnings at explaining returns and have methodological improvements over two decades increased our understanding of this relationship?' To explore this question he looked at the explanatory power of various models as measured by the coefficient of determination. This is of particular interest at this is the measure later used in this study to compare the differential information content of accrual-based earnings and cash flows when used to explain security returns. The results documented in Lev (1989) are reproduced in Table 3.2 below.

[9] Cash flow/Earnings beta's ability to explain market risk

[10] Factor analysis on cash flow and earnings as factors in the prediction of corporate failure

[11] Earnings being used in a wide sense incorporating accrual earnings, cash based earnings, constant purchasing power earnings, historical earnings and various other accounting based measures of period income.

Table 3.2

Comparable Coefficient of determination of other earningsreturn studies

Author/Reference	*Year*	*Independent variable*	R^2
Bowen et al.	1987	Annual Earnings and Cash flow components	0.02-0.05
Freeman	1983	EPS	0.07-0.10
Jacobson	1987	Residual ROI	0.05
Lustgarten	1982	Earnings and Replacement cost and Sales	0.02-0.09
Beaver et al	1982	Net income and cash flows or inflationary gains	0.14-0.15
Lipe	1986	EPS and 6 earning components	0.15
Rayburn	1986	Components of earnings and cash flow	0.000-0.28
Beaver et al	1982	Net income and inflationary gains	0.03-0.30
Sepe	1982	Various ratios: risk and inflation adjusted measures	0.30
Magliolo	1986	Reserve recognition for oil and gas companies	0.10-0.062
Ogle et al.	1999	Components of earnings and cash flow	0.013-0.0145
		Global range	0.00-0.30
		Range for this study	0.013-0.115

3.3.1 Early Studies of Association

The liquidity crisis of the late 1970s and calls from the proponents of the normative debate regarding the usefulness of cash flows spurred accounting researchers to use what had become a generic earnings-return research methodology to appraise the merits of cash flow disclosures (Lev, 1989). At first researchers were forced to construct a rather crude cash flow proxy because accounting bodies did not mandate the disclosure of cash flow information.

As mentioned earlier, Ball and Brown (1968), although providing the basis for the methodological framework that was revisited by numerous researchers, did some supplementary work into the usefulness of cash flows. Their study was one of association rather than one into the information content of cash flows. In addition, the measure they termed a 'cash flow measure' was simply accrual-based earnings plus depreciation and amortization (Neill, Schaeffer, Bahnson and Bradbury, 1991). They found this measure less successful in explaining the sign of the abnormal performance index (API) around earnings announcement dates. These findings were rendered almost anecdotal given the numerous subsequent refinements made in determining actual cash flows.

Beaver and Dukes (1972) extend the study of Ball and Brown in three respects:

1. to examine alternative accounting methods of measuring earnings, specifically with respect to the issue of inter-period tax allocations,

2. to examine a broader class of expectation models, and

3. to examine a broader class of earnings variable.

It is this last extension that has cash flow significance. Beaver and Dukes (1972) used three measures namely current earnings, earnings before deferrals and lastly cash flows, to model returns. Their chosen measure of cash flow was calculated by adding depreciation, depletion and amortization to earnings before deferrals. They motivated the inclusion of cash flow by stressing that *'many contend that changes in cash flow are a better indication of wealth changes, since cash flow is not obscured by attempts by the accountant to measure depreciation and tax charge'* (Beaver and Dukes, 1972, p.324). Of the three chosen accounting measures, the measure of cash flows performed worst in a test of association with the abnormal performance index (API) and the authors concluded that cash flows are the least consistent with the information set used to price securities.

Ahmed Belkaoui performed a similar study of association, which is documented in his 1983 paper 'Accrual Accounting and Cash Accounting: Relative Merits of Derived Accounting indicator numbers'. He reviewed the descriptive statistics of cash flow per share (CFP), earnings per share (EPS) and common equity per share (CEP) of 66 companies all scaled by share price and market returns over the period 1959-1977. These semi-accounting index rates of return are scaled in this manner to take into account accounting based performance and market based numbers. 'The rationale is that the variables that show the greatest association to security returns are those that the market perceives to have the most information used in setting equilibrium price' (Belkaoui, 1983, p. 300). Thus, the variables that show the least variability and greatest persistence are those that are most meaningful to the market.

Belkaoui had used the most refined measure of cash flow to date. He adjusted net income for any non-cash credits and for any changes in current accounts, excluding cash. This variable represented a cash-accounting based semi-accounting rate of return. The common equity per share was an accrual-based semi-accounting rate of return with a balance sheet focus unlike the earnings per share, which had an income statement focus.

EPS exhibited greater variability than both CFP and CEP. Common equity showed the most persistence, followed by cash flow and earnings faired significantly worse. The author suggests that the lack of association between earnings and security returns was the deviation of true income determined in the market because of management discretion and *'income*

smoothing inherent in the very definition of accounting income'. Another interesting implication highlighted in the light of the superiority of the balance sheet accrual measure is that the fundamental earnings measurement process should be the measurement of assets/liabilities rather than revenue/expenses.

3.3.2 Studies Predicting Future Cash Flows

Bowen, Burgstahler and Daley (1986) made a departure from the contemporary research framework in assessing the usefulness of cash flow information; rather than assessing unexpected earnings and cash flows ability to effect market revisions of security prices, they looked at the ability of these measures to predict future cash flows. This type of study examined the assertion that earnings, rather than cash flows, are a better predictor of future cash flows, in a more direct manner. This type of study is not a capital market based study into the usefulness of cash flows but the similarities it shares with contemporaneous research warrants its inclusion in this review.

This study uses five measures of cash flow: The naïve net income plus depreciation and amortisation (NIDPR), working capital from operations (WCFO) and three new measures of cash flow, namely cash from operating activities (CFO), cash flow after investments (CFAI) and change in cash (CC). These are defined as follows:

$$NIDPR = NIBEI + DPR$$
Equation 3.1

$$WCFO = NIDPR + \textit{adjustments for other elements of NIBEI not affecting working capital.}$$
Equation 3.2

$$CFO = WCFO \pm \Delta \textit{non-cash working capital.}$$
Equation 3.3

$$CFAI = CFO + \textit{proceeds from sale of PPE} + \textit{proceeds from sale of Investments} + \Delta PPE + \Delta Investments$$
Equation 3.4

$$CC = \Delta \textit{balance of cash and cash equivalents.}$$
Equation 3.5

Where:

NIBEI is Net income before extraordinary items,

DPR is Depreciation and amortization charges, and

PPE is property, plant and equipment.

Bowen et al. (1986) couched this research problem as an attempt to answer the following three questions:

1. Are the new definitions of cash flow (CFO, CFAI, CC) different from those used in previous research?
2. Are accrual and cash flow measures highly correlated?
3. Do earnings or cash flows best predict future cash flows?

The answer to the first two questions had implications for the findings of all prior research employing the now superseded traditional measures of cash flows. The coefficients of determination (R^2) between either NIDPR and WCFO in relation to CFO(CFAI) were calculated for the first differences and percentage changes for each of the 324 firms over the 11-year period 1971-1981. A large number of statistically significant R^2's were quite low. This suggests that the traditional cash flow measures used in prior research were poor proxies for the alternative measures introduced for the first time in this paper.

Bowen et al. (1986) showed that traditional measures of cash flow were much closer to net income before extraordinary items whereas the more refined measures of cash flow evidenced significant departures from the accrual-based earnings number. In the past, research using traditional cash flow measures exhibited very high correlations between cash flows and earnings. This made it very difficult for cash flow information to provide any useful information that was not already captured in earnings numbers. The tendency in these cases would then have been to underestimate the information content of cash flows. The findings of prior research may have been biased against making a case for the usefulness of cash flows because of the shortcomings of their measurement of cash flows, rather than the lack of information content in cash flows.

The answer to question three provided a basis on which to criticise the assertion that accrual-based earnings are superior to historic cash flows in predicting future cash flows. It also provided insight into factors that might be used in creating an expectation model for cash flow variables in future research. Earnings had been shown to follow a random walk pattern but the feasibility of such models for cash flows had yet to be explored. The form of this test is a simple linear model specified as follows:

$Y_{i,t+1} = X_{i,t}$
Equation 3.6

Where:

$Y_{i,t+1}$ = *the forecast for the cash flow variable for firm i in period t+1, and*

$X_{i,t}$ = *the value of the predictor variable for firm i in period t.*

Where X and Y are the same variable, this corresponds to a random walk model. The prediction errors of these models were analysed to determine which variables best predicted 1 and 2-year hence cash flows (as measured by the 5 specified measurers of cash flows). The authors qualified their results because of the simplicity of the models employed and the short sample period. They concluded that the forecast models do not support the view that earnings are superior to cash flows in predicting future cash flows. They also concluded that the random walk models were as good as models based on other flow variables with the exception of CFO. This variable was best explained by WCFO and NIDPR.

Three other researchers from Washington University, Greenberg, Johnson and Ramesh, were simultaneously testing the assertion by the Financial Accounting Standards Board in FASB Concepts Statement No. 1, Objectives of Financial Reporting by Business Enterprises, paragraph 44, that:

> Information about enterprise earnings based on accrual accounting generally provides a better indication of an enterprise's present and continued ability to generate favorable cash flows than information limited to the financial effects of cash receipts and payments.

Their study differed from Bowen et al. (1986) in a number of ways. The authors elected to make a trade off with respect to the quality of cash flow measures in order to extend the sample period. Bowen et al. (1986) had chosen a sample period from 1971 to 1981 because prior to 1971 no working capital from operations data was available on Compustat tapes. Greenberg et al. extended their sample period by calculating cash flow from operation, their only cash flow variable, using the indirect method. This was done by adjusting earnings for all non-cash items and for any changes in current assets and liabilities excluding all cash items. This enabled an extension in the sample period from 1963 to 1982.

Earnings and the reconstructed cash flow variable were used separately in a univariate ordinary least squared regression to explain cash flows for the subsequent 5 years. The superiority of earnings or cash flow to predict future cash flows was appraised by inspecting the coefficient of determination for all the OLS models for the 157 firms included in the sample.

The results showed that earnings were statistically significantly superior at explaining future cash flows. All firms that exhibited autocorrelation were removed and earnings were still shown to be far superior at predicting future cash flows than cash flows. Further analysis used two and three period earnings and cash flows in a multivariate model to predict future period cash flows. This once again confirmed the superior explanatory power of accrual-based earnings. A similar study in South Africa produced contradictory results (Pryce, 1993). This is discussed later in the combined South African evidence.

In 1998 Dechow, Kothari, and Watts tested earnings versus cash flow in their respective ability to predict future cash flows. They borrowed insight from Dechow (1994) that showed that, as the length of a firm's operating cycle increases, accruals increase the association between earnings and returns. This research study hypothesized that, as the operating cycle increases, accruals play an increased role in adjusting cash flows for matching and timing problems and therefore increase earnings ability to predict future cash flows. This was tested on financial data from 1337 firms over a sample period extending form 1963-1992.

This paper created a theoretical model for cash flows and accruals constructed primarily from changes in accounts receivables, accounts payable and inventory. Dechow also reported that both earnings and cash flows do have incremental information content beyond each other, despite earnings superiority.

Barth, Cram, and Nelson (1998) extended the work of Dechow et al.(1998). By disaggregating earnings into cash flow and its various components of accruals, the different accrual components were shown to reflect different information relating to future cash flows. This further enhanced the superiority of accrual-based earnings to cash flows as a predictor of subsequent period cash flows.

A similar methodology to Dechow et al. (1998) was employed, but it was expanded to include depreciation, amortization and other accruals in explaining future cash flows. These variables were shown to be statistically significant and were better at predicting future cash

flows than models based on several lagged earnings variables. This disaggregation showed that the components of earnings, namely various current and long-term accruals and cash flows, individually contained information content that was lost when aggregated into earnings.

3.3.3 Early Incremental Information Content Studies

As described earlier in chapter 2, the concept of incremental information content of an explanatory variable implies that, after conditioning for other explanatory variables, further explanatory variables are still associated with returns. This concept is illustrated in the Venn diagrams Figure 2.1 to 2.4.

The inflationary conditions that prevailed in the 1970's lead many to speculate about the usefulness of historic cost accounting. Hawkins (1977) asserted that security returns responded more to cash flows than to historical cost earnings because the latter was meaningless in an inflationary economic environment. Consequently, Beaver, Griffin and Landsman (1982) chose to empirically test this assertion by including a cash flow variable as one of their four explanatory 'earnings' variables in an investigation into the information content of replacement cost earnings. They measured cash flows as historical cost net income prior to adjustments for depletion, depreciation and amortization. This was identical to the variable used by Beaver and Dukes (1972).

For the purpose of inter-study comparability, the basic research design employed in this study was based on Easman, Falken, Stein and Morse (1979). It involved conducting a cross sectional regression with security returns as the dependant variable and one or more of the 'earnings' variables as the explanatory variables. Information content was evidenced by statistically significant regression coefficients of explanatory variables. Incremental information content was evidenced by continued statistically significant regression coefficients when further explanatory variables were introduced in a two-stage regression. Percentage changes from previous year levels were used as the explanatory variables, which assumed they followed a random walk pattern. Returns were calculated over a 12-month holding period from 1 Jan to 31 December and included cash dividends and any capital gains or losses divided by start-of-period share price. A cross-sectional regression was motivated as the authors felt that maximum variation in explanatory variables is desirable and this was achieved cross-sectionally rather than in a time series regression. The sample period was a 2-year period, 1977-1978, and thus insufficient data would have been provided for a time

series regression. The sample included data from 313 firms. The cash flow variable used was net income prior to deductions for depreciation, depletion and amortization. Beaver et al. (1982) alluded to the inadequacy of this as a measure of cash flow by adding that this earnings variable was labelled *'cash flow'* for *'convenience'*.

In their preliminary findings, Beaver et al. (1982), showed that the correlation coefficients of percentage changes in historical cost earnings and cash flow was 0.55 (0.73) in 1977 (1978). Historical cost earnings had a mean percentage change of 13.4 (14.2) and standard deviation of 21.6 (29.1) in 1977 (1978). Cash flow however had a mean of 13.5 (14.1) and standard deviation of 18.3 (20.1). The cash flow measure was, therefore, less volatile over the sample period selected. Beaver et al. (1982) found that cash flows had information content beyond earnings only in a pooled regression. The authors found the lack of year on year consistency between performance measured on a cash and accrual basis disturbing and they concluded that "performance [measurement by earnings and cash flows] is still an open issue"(Beaver et al., 1982, p. 39)

A number of changes were made to this research design in order to test the robustness of their findings. Residual returns were used as the independent variable in a time series expectation model with a sample period of 60 months of historical return data from the period December 1976. An alternative 12-month holding period for the accumulation of returns is also used. This is the period 1 April to 31 March. Under both these modifications, Beaver et al. (1982) reported that all the initial findings persist.

Schaefer and Kennelly (1986) were also amongst the first to investigate the incremental information content of cash flows after conditioning for earnings using statistical orthogonolisation (Neill, Schaeffer, Bahnson and Bradbury, 1991). This study used three cash flow variables:

1. The same crude measure used by Beaver and Dukes (1972): Net income plus depreciation plus depletion and amortization.

2. The second variable included adjustments for both current and long-term accruals.

3. Lastly, the most refined variable simply excluded current maturities of long-term debt from the second variable.

Cross-sectional regression models were run for each of the three-year sample period, using market model residual returns as the dependent variable and the percentage change in accrual earnings for the corresponding 12-month period as the independent variable. The cash flow measure was the second independent variable after controlling for earnings. The resulting cash flow response coefficient estimated the incremental effect of each cash flow variable beyond earnings. Because of the high correlation between explanatory variables, the authors observed high levels of multicollinearity.

These findings showed that accrual earnings dominated cash flow in explaining abnormal returns and, even more surprisingly, the crude measure of cash flow exhibited as much incremental information content as the two more refined measures (Neill, Schaeffer, Bahnson and Bradbury, 1991).

Wilson made significant contributions to the study of the information content of cash flows in two papers: 'The Relative Information Content of Accruals and Cash Flows: Combined evidence at the Earnings Announcement date and Annual Report Release Date', published in the Journal of Accounting Research in 1986 and 'The incremental information content of the accrual and funds components of earnings after controlling for earnings' which first appeared in *The Accounting Review*, April 1987. Despite Wilson (1986) predating Wilson (1987), the former is an extension of the work presented in the latter (Neill, Schaeffer, Bahnson and Bradbury, 1991). Therefore, for ease of discussion, these two papers are not reviewed in chronological order.

Wilson (1987) made a radical departure from the conventional methodological framework that resulted in him being awarded the 1986 competitive manuscript award by The Accounting Review. Wilson identified a peculiarity in the financial reporting environment that provides the opportunity to control for earnings without statistical conditioning. Earnings are announced in the Wall Street Journal (WSJ) prior to the annual report release date or SEC filing. The disaggregation of earnings into both its cash and accrual components can only be made at this later date. Other authors have treated these two events as one and employed 12-month event windows. Wilson used daily abnormal returns around the event signalled by the WSJ publication to measure the market response to earnings. Assuming a semi strong form efficient market, any subsequent revisions at annual report release date are induced by the information that allows investors to disaggregate earnings into its cash and accrual components respectively. Although this methodology provided evidence of

incremental information content, it could not be attributed specifically to the accrual or cash components of earnings. The only conclusion that could be drawn was that disaggregation into these components provided more information than was contained in earnings alone. Wilson (1986) addressed this and separately measured the relative information content of these two components.

This exacting methodology created its own new problems; the precise date of information dissemination into the market was difficult to determine as some firms released abridged results after earnings announcements but prior to the filing of Annual Financial Statements with the SEC. These companies were removed from the sample.

Prior studies employing annual holding periods used either random walk or time series models as expectation models for cash flows. This was previously considered to be acceptable since the abnormal returns were measured over the holding period coinciding with the market revisions of these variables. However, when utilising a short event window, one needed to isolate the short-term explanatory variable revisions that prompted the market to revise share prices. Thus, more accurate expectation models were required for the explanatory variables. Wilson (1987) employed a cross-sectional regression model for 15 current and lagged accounting variables for all the firms in the sample. Encouragingly this expectation model reported a very high R^2 of 47.2%. It is interesting to note that earnings, learnt some weeks before, only contributed 1.2% to the coefficient of determination in the cash flow expectation model.

The regression of these residuals against abnormal returns over a 9-day holding period around SEC filing date provided statistically significant evidence that the disaggregation of earnings into the two components, cash flow and accruals, has information content beyond earnings. Since this study was conducted only over the fourth quarters of the 2-year period 1981-1982, it was suggested that these results might have been a function of contemporaneous macroeconomic conditions. A severe economic downturn during the sample period may have created a market mentality that rewarded companies that decreased inventories and receivables and converted them into cash. This implied that these results were perhaps period specific, rather than providing evidence of the information content of cash flow and accruals per se.

Wilson (1986) followed up on Wilson (1987), which provided evidence that the market relevance of earnings, disaggregated into cash flows and accruals was different to the aggregated earnings figure. The aim of this subsequent study was to conclude which had greater information content. Wilson (1987) could not conclude which had more since the methodology failed to distinguish the market response from the accrual component from its complement, cash flow. Since earnings were already known at the SEC filing date, knowledge of the cash flow component of earnings implied the immediate knowledge of the accrual component as well.

A two-return model was used where abnormal returns are aggregated at two different points in time: earnings announcement date and annual financial statement release date. The combined market response associated with cash flows and accruals at these two dates was used, in conjunction with the restriction of a number of parameters in the model, to determine the information content of cash flows beyond earnings, and accruals beyond cash flows (Neill et al., 1991). The sampling restrictions and expectation models were virtually identical to Wilson (1987).

The findings of Wilson (1986) confirmed that non-current accruals (total accruals) and its complements, working capital from operations (cash flow) had incremental information beyond earnings. They further illustrated that accruals had incremental information beyond funds where accruals are represented by non-current accruals and funds represented by cash flows from operations. The study failed to find evidence that non-current accruals or working capital from operations possess incremental information content beyond each other. This suggested that prior studies, that simply specified cash flows as working capital from operations or other such crude cash flow measures, might have misconstrued the importance of true cash flows when compared with accrual earnings (Neill et al., 1991).

Judy Rayburn, in her 1986 paper entitled *'The Association of Operating cash flow and Accruals with Security returns*, extended the Wilson (1986) study to a 20 year period: 1963-1982 and uses an operating cash flow variable. This extension tested the persistence of the results of Wilson (1986) which Wilson himself hinted might have been period specific.

Two cross-sectional regressions were estimated for each of the sample years. The first assessed the incremental information content of total accruals beyond operating cash flow and the second model tested the incremental information content of depreciation, deferred

tax, and the working capital adjustments of the accrual component of earnings (Neill et al., 1991).

In each model, the dependant variable was the market model annual abnormal return based on 60-months historic returns, while the explanatory variables were the residuals of two firm specific-time series expectation models. Firstly, a simple random walk model was used and secondly, a holdout regression model including post event data was used. This model used all available data from the sample period for the financial statement variable being predicted excluding the current year's value.

Interestingly, the random walk model appeared to give more significant results: both aggregate accruals and operating cash flow were associated with abnormal returns. Less flattering results were achieved for the disaggregation of the components of accruals. With the holdout model, only CFO and changes in WC were significant which agreed with the findings of Wilson (1986) that only current accruals, and not non-current accruals, provide information content. However, all components of accruals were significant under the random walk hypothesis.

Bowen, Burgstahler and Daley (1987) built on their 1986 paper that examined the ability of cash flows versus earnings ability to predict future period cash flows by examining the incremental market value-relevance of cash flows and accruals. They tested two hypotheses, which they labelled the 'institutional' perspective and the 'primitive' perspective. The former held that earnings dominate cash flows in terms of market relevance but cash flows do provide some additional information. The latter suggested that, with the cash basis predating the accrual basis, earnings are calculated after accrual adjustment is made to cash flows. This construction tested the information content of these accrual adjustments.

Bowen et al. (1987) listed five reasons why prior studies failed to show incremental information content in cash flows. These authors set out to improve their research design to overcome these possible reasons. These were:

1. Poorly measured cash flow variables.
2. Poorly specified cash flow expectation models that lead to poorly measured unexpected cash flows.
3. Poorly measured abnormal returns.

4. A poorly specified holding period for the cumulation of returns while information disseminates into the market.

5. Lastly, the reality that cash flow information did not possess any incremental information content.

They used cash flow measures defined in Bowen, Burgstahler, and Daley (1986) because these had earlier been shown to be poorly correlated with earnings. This reduced the problem of multicollinearity as discussed in Christie (1984).

The specifications of the expectation models differed in format for the various explanatory variables. For operating flows (accrual-based earnings), it was suggested that these measures follow a random walk process meaning that a subsequent year's expectation was consistent with the prior year's observed value. The two accrual flows, unexpected earnings (UE) and unexpected working capital from operations (UWCFO), were calculated as the percentage change from the prior year's net income before extraordinary items (NIBEI) and working capital from operations (WCFO) thus below:

$$UE_t = \frac{(NIBEI_t - NIBEI_{t-1})}{|NIBEI_{t-1}|}$$

Equation 3.7

$$UWCFO_t = \frac{(WCFO_t - WCFO_{t-1})}{|WCFO_{t-1}|}$$

Equation 3.8

Based on Bowen et al. (1986), the expectation models for cash flows were not necessarily random walk models as specified for the accrual-based variables. WCFO appeared to be a better predictor of cash flow from operations (CFO) than CFO itself but cash flow after investment (CFAI) was best modelled using a random walk model. Thus, the unexpected cash flows were calculated as follows:

$$UCFO_t = \frac{(CFO_t - WCFO_{t-1})}{|WCFO_{t-1}|}$$

Equation 3.9

$$UCFAI_{it} = \frac{(CFAI_{it} - CFAI_{it-1})}{|CFAI_{it-1}|}$$

Equation 3.10

The relationship between cash flows and cumulative abnormal returns (CAR) was based on a pooled cross-sectional and time series regression approach. The return window was a 12-month period running to 4 months after the year-end as all financial statements are mailed by this date. Expected returns were calculated using a standard market model using returns from 60 months prior to the start of the event window.

This study found significant incremental information content for cash flow variables beyond earnings (particularly for CFO) from an institutional perspective. There was, however, little evidence for WCFO having incremental information content beyond earnings. The conclusion that can be drawn from this is that non-current accruals possess little information content. From the so-called primitive perspective, results confirmed that earnings do have significant information content after controlling for cash flows. Thus, the expensive accrual process performed by accountants to convert cash flow information into accrual-based earnings numbers has its merits. The overall findings were that, 'in every form of the analysis' earnings have superior information content to the cash flow variables considered. The cross-sectional results were inferior to those produced by the pooled time series analysis. The above analysis was also performed on explanatory variables that were winsorised to 100% in order to control for outliers. The findings still supported the same conclusions, but the results for the cash flow variables were less compelling and the authors felt that more extreme results may be of particular interest to market participants. This observation was later given further credit by more contextual models based on nonlinear models suggesting that earnings response coefficients are dependant on the permanence of changes in earnings (Ashiq Ali, 1994).

Board and Day (1989) were also motivated by the onset of inflation and the accounting professions attempt to grapple with changing price levels within a very limited historical cost framework. The relationship between historical cost earnings was re-examined with the addition of two cash flow measures to investigate their information content over the period 1961-1977 on a sample of UK companies. The methodology was rather backward given the level of refinement found in contemporary American studies. The authors' methodology did

not differ significantly from that of Ball and Brown (1968). The independent variables in this unexpected earnings/ cash flow - return regression were

ROI = Net Income/Net Book Value
Equation 3.11

Working Capital from Operations (WCAP) = (Net Income + Depreciation + Deferred Taxation)/Net Book value
Equation 3.12

NETQ (Net quick assets) = WCAP+ (Change in Stock and Work in progress)/Net Book value
Equation 3.13

These variables were scaled by book value rather than market value as suggested by Christie (1987). Their expected values for explanatory variables were generated by three models: a random walk model, an average of the preceding six years, and a time series ordinary least squared (OLS) regression model. The latter two, however, were found to be inferior in a related study: Board, Day and Walker (1989). The unexpected residual was calculated as the first difference in the expected values.

The information content of each variable was evaluated by examining the coefficient of determination (R^2) of each variable from the regression of it against abnormal share returns. Cumulative abnormal returns (CAR) were based on the market model using the monthly returns from the preceding six years.

The incremental information content was examined by stepwise regression. That is to say, CAR residuals from the initial univariate unexpected earnings/cash flow -- CAR regression were regressed against the unexpected portion of subsequent explanatory variables. Since the first explanatory variable had been controlled for, evidence of a further association with the additional explanatory variable, would suggest that it had incremental information content. This study also investigated the permanence of the established relationship between the value-relevance of historical cost earnings in times of inflation. The results of this particular analysis had no significant cash flow implications.

The univariate regressions showed that earnings and WCAP had information content, but not NETQ. No conclusions were drawn about the incremental information content of any of these accounting rates of returns.

This mixed evidence on incremental information content of cash flows and accrual-based earnings, their inability to provide meaningful conclusions beyond the specified sample

period, and the apparent complexity of the relationship between earnings, cash flows, and security returns lead to the development of more contextual studies being developed.

3.3.4 Contextual studies

In 1989, Bernard and Stober replicated and extended the work of Wilson (1987) in two ways. They conducted the same test over 32 quarters to test the pervasiveness of his findings and to test if they were not simply a result of contemporaneous macroeconomic conditions as Wilson (1986) had suggested. The second extension involved examining more contextual models of the implications of cash flows and accruals. The authors gave three alternative explanations for capital markets valuing earnings and its disaggregated cash and accrual components differently.

The first was termed the 'quality of earnings' explanation. This explanation surmised that cash flows are more valuable than accruals because accruals are either subjected to management manipulation or represent indirect links to future cash flows. This explanation would be confirmed by a statistically significantly greater slope coefficient for cash flows than for accruals.

The second alternative explanation was first suggested by Wilson (1987) and was termed the 'macroeconomic conditions' explanation. It was based on the premise that under certain macroeconomic conditions the market prefers cash flows to accruals. The period 1977-1982 was split into three economic regimes: the eleven quarters with the worst economic indicators, the eleven best quarters, and ten others. A test for the validity of this explanation involved comparing the relative magnitude of the slope coefficients of cash flows and accruals under the three different economic regimes.

The last explanation put forward by these authors was the 'mix of components of unexpected current accruals' explanation. This explanation suggested that the market implication of cash flows versus accruals is generally indistinguishable. These two components of earnings were further decomposed. For instance, current accruals could be decomposed into changes in inventories, receivables and payables. The first two explanations assumed that these sub components were similarly associated with abnormal returns; put more technically, they would have the same slope coefficients. This was not necessarily the case as the market may have rewarded an increase in accounts receivables more generously as this might indicate future sales growth. This was tested by further

decomposing cash flows and accruals and testing to see if their slope coefficients were statistically different from each other.

As alluded to above, the findings were inconsistent with Wilson (1987). The decomposition of earnings into its accrual and cash components did not seem to possess information content beyond earnings alone. The three contextual models provided no further insight into the information content of cash flows. The authors suggested that capital markets reactions to this information might be "so highly contextual that this analysis does not lend itself to parsimonious modelling" or alternatively any uncertainties about these variables may have been resolved before their publication. This suggestion, which was inconsistent with Wilson (1987), was levelled because of the low R^2 of 3% which does not seem to be that low for a short event window study in the light of the discussion by Baruch Lev in his paper, 'On the Usefulness of Earnings and Earnings research: Lessons from 2 decades of empirical research'.

Bernard and Stober felt that further research into this area is needed with more focus in the following specific areas:

- A better understanding of economic contexts.
- More information on the process of information dissemination from firms to the investing public.
- A better understanding of the market pricing mechanism.

In 1989, Gerald Lobo and In-Man Song added to this body of research in a related study investigating the incremental information content of new income disclosures mandated by SFAS No. 33 over historical cost income and its cash and accrual components. SFAS No. 33 was issued in 1979 in response to the onset of inflation and the limitations of historical cost income in measuring true economic income. The income disclosures in SFAS No. 33 were current cost and constant dollar operating income.

This study used a very similar methodology to Wilson's (1987). It exploited the delay between the release of the annual report or 10-k report and the variables used to measure price-change adjusted income.

These authors found that cash flow had incremental information content over all six measures of price-change adjusted income. No comment was delivered on the information content of cash flow beyond ordinary earnings or accruals, as this was not an objective of this study. It was noted that the response coefficients of earnings and cash flow variables were negative in a number of the industries studied. The interpretation given for this was that these variables might only have information content in certain industries. This further highlighted the highly contextual nature of this relationship and motivates the industry effect testing in this study.

'The Incremental Information Content of Cash Flow Components', by Livnat and Zarowin (1990) focused on the components of cash flows rather than cash flow from operations and other more primitive cash flow measures. FAS 95 (1988) defined cash flows from operations (CFO), cash flow from investments (CFI), and cash flow from financing activities (CFFA). Consequently, these measures were not available for the sample period, 1974-1986. The authors estimated these from balance sheets, income statements, and statements of changes in financial position using the indirect method (Livnat and Sondhi, 1989).

This paper framed this research problem in terms of some rather interesting economic theory:

1. Financing cash flows

- It tests the Modigliani-Miller indifference of capital structure theory that financing cash flows have response coefficients of zero.

- It tests signalling theory of financing flows:

    - An increase in debt is good because management, being insiders, have superior information and are leveraging their returns by taking on further debt (Ross, 1977). This would be evidenced by a positive response coefficient for financing flows

    - The issuance of common stock signals that managers believe the current share price is inflated and this represent an opportunity to raise cheap capital (Smith, 1986). An increase in financing flow, as a result of common stock issues, would result in a negative response coefficient.

- Miller and Rock (1985) speculate that an increased dividend signals greater future cash flows, which would be associated with positive abnormal returns.

This suggested that Livnat and Sondhi (1989) believed the response coefficients of the components of cash flows from financing activities were not all similarly associated with security returns. Hence, their signs and magnitude were compared to provide evidence in favour of the economic theories expounded above.

2. Investing cash flows

- Although increased investment is associated with higher future cash flows, it is incorrect to assume that this will result in increased abnormal returns as capital investment is usually planned and anticipated. The authors suggested that financing flows should have a zero slope coefficient because of the irrelevance of investing cash flows.

3. Operating cash flows

- Most valuation models suggest that abnormal returns should be generated by positive unexpected operating cash flows. Thus, the components of operating cash flow should be positively associated with security returns and the response coefficient of CFO was tested to see if it is significantly greater than zero.

At least 345 firms per year were used in the cross-sectional regression model employed. Cash flow expectations were primarily modelled using a random walk model but alternative expectation models to test the robustness of the findings were also used. The explanatory variable, unexpected cash flows, was scaled by a measure of size to minimise heteroskedasticity (Christie 1987). The authors chose to use the market value of equity at the beginning of the year as this deflator.

This study used a twelve-month event window from April of one year to March of the following year, which allowed three months for the release of annual reports and the dissemination of information into the market. Cumulative abnormal returns were estimated using the standard market model with 60 months of historical data unless fewer data points were available. Firms were rejected from the sample if less than 30 months of historic returns were available.

By using Pearson's rank correlation, this investigation found that net income, followed by operating cash flow and lastly accruals had the strongest association with the cumulative abnormal returns. The response coefficients (student's t-test statistic) of the cash flow components were as follows: CFO=0.217(5.86), CFFA = 0.041(1.64), CFI = -0.048(-2.4). The coefficient of determination was 11.6%. The interpretation given to this was that operating cash flows were positively associated with excess returns and investors were indifferent to investment and financing flows. In a regression that tested the association of the cash and accrual components of earnings with abnormal returns, the following response coefficients were observed: CFO = 0.168(4.23), ACCR=0.159(3.7), R^2 = 8.5%. The similar coefficients implied that there was little additional value in disaggregating returns into these components. These response coefficients were not significantly dissimilar over the 13-year period based on the observations and an analysis of variance.

The robustness of these results was tested in the following respects:

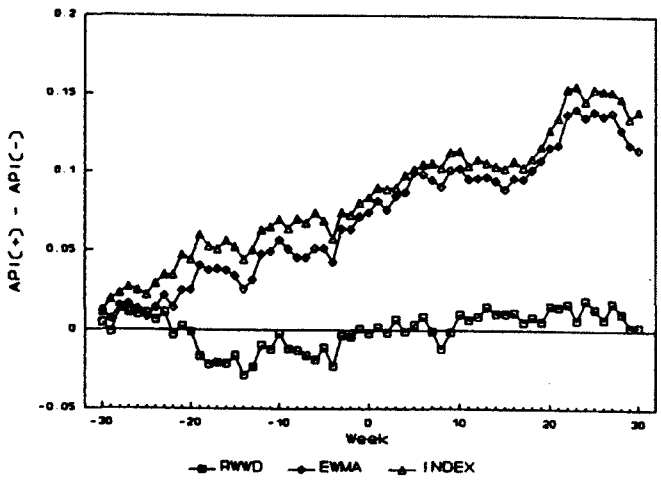
- The accumulation period for abnormal returns and non risk-adjusted returns.
- Size.
- Outliers.
- Expected returns based on prior returns.
- Expectation models for explanatory variables based on prior year components.

In all cases, the results were found to be insensitive to these methodological refinements. For this reason, the authors went on to conclude that their research design is very robust.

Kinnunen and Niskanen (1993) from the Helsinki School of Economics in Finland first documented the association between earnings and cash flows with share returns outside of the United States and the United Kingdom. Their research study was performed on data from three non-consecutive years (1976, 1979, 1982) for 35 firms listed on the Helsinki Stock Exchange (HeSE). They controlled for other explanatory variables by measuring at earnings announcement date and financial statement release date, which were about six weeks apart. This now familiar methodology borrowed significantly from the research framework set out in Wilson (1987), which removed the need for statistical orthogonolisation.

The authors used an event window running from 30 weeks prior to announcement date until two weeks thereafter. Three different expectation models were utilised for the 'expected' earnings or cash flow level: a random walk with drift model (RWWD), exponentially weighted moving average (EWMA) and an index model using gross domestic product (INDEX). Many prior studies motivated the use of a random walk expectation model for cash flow simply because earnings had previously been shown to follow a random walk process. The authors noted that in a Finnish context cash flow variables do not follow a random walk process, as their first differences are negatively autocorrelated. This warranted the use of further expectation models with respect to the cash flow explanatory variables. The superiority of these expectation models is illustrated in figure 4.4 reproduced below. This clearly indicates that the EWMA and INDEX models were superior to the RWWD model at predicting the sign of the market reaction to unexpected cash flows. This same trend was not evident with accrual-based earnings variables.

Figure 3.1



Difference in the API around Financial Statement Releases between the Portfolios of Positive versus Negative Unexpected Cash-based Operating Income (Kinnunen, J. and Niskanen, J., 1983)

Firstly, single regression models were run on each of the variables at their respective events to test for significant response coefficients and the presence of information content. Secondly, multiple regressions were run to test for incremental information content of the cash flow variable beyond the accrual-based earnings variable.

The choice of cash and accrual-based performance measures were

- Cash based operating income (COI), which is very close to CFO,
- Cash based net income(CNI)
- Accrual operating income (AOI), and
- Accrual net income (ANI).

Where:

CNI = COI + other (non-operating) revenues – other (non-operating) expenses - interest expense - direct taxes ± any other changes in accruals and deferrals relating to other revenues and expenses, interest and taxes - net investment in fixed assets (this equates to Net Cash flow examined by Bowen et al. [1987]),
Equation 3.14

These were tested against their logical counterparts thereby testing 'apples with apples' which many other studies have failed to do.

Another noteworthy refinement in this particular study was the use of weekly returns rather than monthly. Adjustments were made to nominal cash flow and accrual time series in order to account for inflation. This removed some of the non-stationarity of the data. Outliers were identified graphically and winsorised to their 95% confidence limits.

In the univariate regressions, all earnings variables (unexpected accrual-based earnings calculated using the RWWD, EWMA and INDEX expectation model for earnings) were statistically significant at a level of at least 5% at the earnings announcement date. The cash flow explanatory variables were also significant at a 5% significance level at the financial statement release date except when the RWWD expectation model was used. In the multivariate regression, both cash flow variables had incremental information content over their accrual counterpart using the EWMA expectation model. Only cash based net income had incremental information content over accrual-based net income when the INDEX expectation model was used, and cash flows exhibited no incremental information content when the RWWD expectation model was used. The coefficients of determination ranged from 9% to 32.3% for these regression models, thus showing a relatively high degree of explanatory power. The authors felt that these results may be sample specific and recommended further research in other markets, particularly into the failure of the random walk model in cash-flow prediction.

Patricia Dechow (1994) from the University of Pennsylvania examined the role of accruals by measuring their usefulness beyond cash flows in three different contexts. Implicit in her research design is the 'primitive perspective' articulated by Bowen et al. (1986) that the accrual process adds to usefulness of the more primitive measurement of cash flows. The importance of accruals was hypothesized to increase the relative explanatory power of earnings when the performance measurement interval was short, the absolute magnitude of accruals large, and the operating cycle long.

Dechow (1994) made a number of departures from previous researchers in this field. Rather than attempting to explain abnormal returns by revisions in expected earnings and cash flows, she used actual earnings excluding extraordinary items and discontinued operations, cash flow from operations and net change in cash to explain the contemporaneous stock return minus a value weighted market index. This was presumably in response to Ohlson (1991) who proposes that earnings, rather than unexpected earnings, ought to serve as an explanatory variable for returns. Easton and Harris (1991) who found that earnings dominated unexpected earnings as an explanatory variable for annual return windows supported this viewpoint.

This significant departure from contemporary research design raised a number of questions about the market pricing mechanism and information dissemination. The traditional research design as outlined earlier, attributed abnormal returns to revisions of prior expectations of earnings or cash flow variables because market participants re-evaluated consensus future cash flows. Thus, the unexpected portion of these explanatory variables was regressed against abnormal returns in order to test the association with returns.

Simplified somewhat, under certainty, Ohlson (1991) illustrated that the value of a savings account (P_t) increases by the interest (i.e., earnings) it earned in a given year. The return it generated, the risk free rate (R_f), was equal to its earnings deflated by beginning of period value:

$$P_{t+1} = P_t \times (1 + R_f)$$

Equation 3.15

Therefore,

$$\left(P_{t+1} / P_t \right) - 1 = R_f$$

Equation 3.16

Extending this to the valuation of a firm with uncertainty, value should have increased by the excess of its production of resources over its consumption thereof. A firm that had no income in any given year, had consumed as much of its resources as it had generated and should neither have increased nor diminished in value in real terms. Thus, positive earnings would give rise to positive shareholder returns. Therefore, the level of earnings should be used as the explanatory variable for raw returns.

Dechow (1994) used this methodological refinement and also added that scaling these explanatory variables by beginning of period price also avoids spurious correlations due to general price increases and reduces problems associated with heteroskedasticity. Rather than assessing the role of accruals and cash flows by testing the statistical significance of their response coefficients, Dechow (1994) tested the significance of the coefficients of determination (R^2) of the univariate regression models. These tests were of the explanatory power of these variables rather than the strength of their relative association with returns and were advocated by Patel (1989).

To test whether the process of raising accruals improved earnings ability to measure performance over shorter intervals, Dechow (1994) observed whether the explanatory power of cash based models increased relative to accrual-based ones as the period increased from 1 quarter to 4 years. The results are summarised below in table 3.3.

Table 3.3

Explanatory Power of Earnings, CFO and NCF over different return windows (Dechow, 1994)

		Earnings	CFO	NCF
Quarterly	*Adj. R-sqrd*	3.24%	0.01%	0.01%
	% of earnings R-sqrd	N/A	0.30%	0.30%
Annual	*Adj. R-sqrd*	16.20%	3.18%	2.47%
	% of earnings R-sqrd	N/A	20.00%	15.00%
Four-yearly	*Adj. R-sqrd*	40.30%	10.90%	6.12%
	% of earnings R-sqrd	N/A	27.00%	15.00%

Based on the premise that cash flows have little explanatory power over the short term as it only measures the flow cash rather than the accumulation of value, the process of making accruals to this primitive number was expected to result in a more meaningful earnings number (also called the 'primitive perspective' by Bowen et al. [1987]). These statistics categorically confirmed that accruals increased the explanatory power of earnings relative to CFO and NCF as the period over which performance was measured decreased. It also illustrated the superiority of earnings over cash flow from operations and cash flow over net cash flow as explanatory variables for security returns.

An unlikely alternative argument not suggested by Dechow et al. (1998) is that the insignificant explanatory power of CFO and NCF over short return windows might be the ability of management to manipulate cash flows, and particularly working capital, over shorter periods, resulting in a lack of explanatory power in these variables.

To test whether accrual-based earnings superseded net cash flow when the absolute magnitude of accruals was large, firms were arranged into quintiles based on the absolute magnitude of their accruals. Excerpts of these regression statistics are presented in 3.4 and interpreted below.

Table 3.4

Explanatory Power of Earnings and NCF as the magnitude of Accruals increases (Dechow, 1994)

	Adjusted R-squared	
	Net cash flows	***Earnings***
Quintile 1	16.20%	16.84%
Quintile 2	12.23%	15.44%
Quintile 3	8.76%	14.49%
Quintile 4	6.51%	14.82%
Quintile 5	0.24%	21.98%

As the magnitude of the absolute value of accruals increased from quintile one through to five, the explanatory power of net cash flow decreased and accrual-based earnings improved in their ability to explain performance. The permanence of response coefficients conditional on the magnitude of changes in explanatory variables was repeatedly tested in a number of subsequent studies. The best results were achieved with the use of nonlinear earning-return models.

A similar process to the one employed above was used to assess the increased usefulness of accruals when the operating cycle was long. It showed that changes in working capital become more volatile as the operating cycle increased. Firms were then ranked according to the magnitude of their changes in working capital and placed in quintiles. Quintile 1 had those firms with the smallest changes in working capital (shorter operating cycle) and quintile 5 had the largest changes in working capital (longer operating cycle). The results for the annual return window are presented below in table 3.5.

Table 3.5

Explanatory Power of Earnings and CFO as the magnitude of changes in working capital increases (Dechow, 1994)

	Adjusted R-squared	
	Cash flow from operations	***Earnings***
Quintile 1	7.72%	14.24%
Quintile 2	8.69%	15.73%
Quintile 3	8.24%	16.54%
Quintile 4	7.34%	19.08%
Quintile 5	0.79%	18.19%

It is self evident that accrual-based earnings were more useful where the magnitude of changes in working capital were large, which is typical of firms that have longer operating cycles.

This research paper made a number of significant new contributions. Apart from breaking new methodological ground, it also contextualised various scenarios where the accrual process adds significant information content to cash flows. These significant results, supporting a number of theoretical underpinnings in favour of accruals, made this probably the single most conclusive literature to date supporting the conventional wisdom that accrual-based earnings are superior to operating cash flows.

Ashiq Ali (1994) concluded that prior studies into the incremental information content of working capital and cash flow from operations had provided inconclusive information. Based on the nonlinear relationship between unexpected earnings and abnormal returns documented by Freeman and Tse (1992), Ali hypothesized that the cash flow relationship might similarly be characterised by a nonlinear relationship where response coefficients decline as the magnitude of the unexpected variable increases.

This research paper used raw returns as the dependant variable and used the same explanatory variables as Bowen et al. (1987), all deflated by beginning-of-period share price. These variables were net income before extraordinary items and discontinued operations (E), working capital from operations (WCFO) and cash flow from operations (CFO). The sample period extended from 1974 to 1988 and resulted in a pooled sample of 8820 firm years.

Ali (1994) estimated the regression coefficients for the following linear regression equation for each of the 15 years as well as a pooled sample:

$$RET_{it} = \alpha_{0t} + \alpha_{1t} E_{it} + \alpha_{2t} WCFO_{it} + \alpha_{3t} CFO_{it} + \upsilon_{it}$$

Equation 3.17

A summary of the results is presented below in table 3.6.

Table 3.6

Mean Regression Coefficients of Linear Model (Ali, 1994)						
	Intercept	ΔE_{it}	$\Delta WCFO_{it}$	ΔCFO_{it}	*Adj.* R^2	*N*
Cross sectional Regressions						
Mean	0.09	0.26	0.1	0.01	8.01	588
t-Statistic	1.95	5.24	3.39	0.7	N/A	N/A
Pooled Cross sectional time series regressions						
	-0.03	0.06	0.09	0	2.58	8820
t-Statistic	-9.31	6.89	7.52	0.54	N/A	N/A

Further, the same process was followed using a nonlinear model as detailed below:

$$RET_t = \alpha_{0t} + \alpha_{1t} E_t + \alpha_{12t} DE_{it} \times E_t + \alpha_{21t} WCFO_t + \alpha_{22t} DWCFO_{it} \times WCFO_t + \alpha_{31t} CFO_t + \alpha_{32t} DCFO_{it} \times CFO_t + \upsilon_t$$

Equation 3.18

In this nonlinear model, DE_{it} ($DWCFO_{it}$,$DCFO_{it}$) were dummy variables that toggled between zero and one depending on the magnitude of the change in E (WCFO, CFO). Thus the response coefficients for changes in magnitude of explanatory variables that were relatively large (DE_{it} , $DWCFO_{it}$, $DCFO_{it}$ = 1) were separately estimated from those that were considered small (DE_{it} , $DWCFO_{it}$, $DCFO_{it}$ = 0). The results are presented in the table 3.7 below.

Table 3.7

Mean Regression Coefficients of Nonlinear Model (Ali, 1994)								
	α_0	ΔE_{it}	$\Delta DE_{it} \times \Delta E_{it}$	$\Delta WCFO_{it}$	$\Delta DWCFO_{it} \times \Delta WCFO_{it}$	ΔCFO_t	$\Delta DCFO_{it} \times \Delta CFO_{it}$	*Adj.* R^2
Cross sectional Regressions								
Mean	0.08	2.63	-2.38	0.90	-.80	0.24	-0.23	9.72
t-Statistic	1.70	6.33	-5.56	2.62	-2.26	2.37	-2.25	N/A
Pooled Cross sectional time series regressions								
	-0.04	2.35	-2.29	0.85	-0.77	0.27	-0.27	4.00
t-Statistic	-12.40	8.17	-7.96	3.94	-3.54	2.84	-2.83	N/A

Inspection of these regression coefficients and their test statistics showed that:

- The nonlinear model better specified the relationship between these explanatory variables and returns.

- It illustrated that there was a stronger association between returns and earnings than any of the other explanatory variables.

- It supported the evidence in Freeman and Tse (1992) that as the magnitude of earnings increased its response coefficient declined.

- In an entirely new finding, Ali's (1994) research showed that as the magnitude of changes in WCFO and CFO increased, returns became less persistent. He suggested that this new insight into the cash flow - security return relationship should be used in further research into the incremental information content of cash flows.

Ashiq Ali (1994) followed his very own advice and, sensing that this topic may have been exhausted in the United States, undertook, in collaboration with Peter F. Pope (1995), to investigate the incremental information content of earnings, fund flows, and cash flow in the United Kingdom. Not only did the refinements include linear as well as nonlinear specifications of the earnings/cash flow-return models, but the paper also used both actual and changes in explanatory variables (deflated by beginning-of-period market value), based on the evidence presented by Easton and Harris (1991) and Ohlson (1991). The assumption of constant response coefficients was relaxed in one variation of the explanatory model, and the parameters were allowed to vary over time.

They used precisely the same performance measurement variables as Bowen et al. (1987) and Ali (1994) used. These were earnings (E), working capital from operations (WCFO) and cash flow from operations (CFO). As noted above, these were deflated by beginning-of-period market value of equity. Returns were adjusted as in Dechow (1994), but a simple average rather than value weighted market return was used. This study utilised a 12-month event window. The sample contained 247 firms over a 7-year period from 1984-1990. Examination of the sample showed no clear industry bias.

Ali and Pope (1995) reported the following results. All actual as well as unexpected performance measures had significant positive response coefficients. The results further illustrated that each variable had incremental information content beyond the others. The results are more conclusive when actual, rather than unexpected, explanatory variables were

used. The most conclusive results were achieved when the relationship was specified by a nonlinear model that allowed for time varying parameters.

Cheng, Liu and Schaeffer (1996) investigated whether the incremental information content of cash flows was conditional on the permanence of earnings. They hypothesized that when earnings were transitory, the value relevance of cash flows would increase. The authors stated that transitory elements are introduced into earnings by accruals such as losses on restructuring, once-off changes in accounting policies and perhaps even by self-serving managers attempting to manipulate earnings. The presence of transitory items was tested by observing the relative magnitude of both changes in earnings relative to beginning-of-period price ($|\Delta E_{jt}/P_{jt-1}|$) and earnings relative to price ($|E_{jt}/P_{jt}|$).

A nonlinear model similar to Ali (1994) was specified as set out below:

$$AR_{jt} = \varphi_{0t} + \varphi_{1t}\Delta E_{jt} + \varphi_{2t}\Delta CF_{jt} + \varphi_{3t}E_{jt} + \varphi_{4t}CF_{jt} + \varphi_{5t}\Delta E_{jt} \times D_{jt} + \varphi_{6j}\Delta CF_{jt} \times D_{jt} + \varphi_{7j}E_{jt} \times D_{jt} + \varphi_{8j}CF_{jt} \times D_{jt} + \omega_{jt}$$

Equation 3.19

AR_{jt} was the annual abnormal return for firm j from the 4th month of year t to the end of the third month of year t+1. ΔE_{jt} represented the change in current year earnings and similarly ΔCF_{jt} represented the change in current year cash flow. Current year levels of earnings and cash were also used to characterise this relationship which were represented by E_{jt} and CF_{jt} respectively. This followed the methodology set out by Ohlson and Shroff (1992) and Ali and Zarowin (1992).

D_{jt} was a dummy variable; when earnings were transitory (permanent), as evidenced by $|\Delta E_{jt}/P_{jt-1}|$ being greater (less) than the median sample value, D_{jt} = 1 (0).

The same equation was estimated where the measure of earnings permanence was E_{jt}/P_{jt} and a nonlinear equation was estimated assuming no increase in the incremental information content of cash flows when earnings were transitory. This acted as a benchmark and is specified below:

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

Equation 3.20

The sample included 1479 NYSE and ASE listed companies and extended from 1988 to 1992. This generated some 5120 firm-years in the pooled regressions

A summary of some of the finding are presented in table 3.8 below.

Table 3.8

Regression coefficients for standard and contexual models of the incremental information content of earningsand cash flow from operations

$AR_{it} = \varphi_{0t} + \varphi_{1t}\Delta E_{jt} + \varphi_{2t}\Delta CF_{jt} + \varphi_{3t}E_{jt} + \varphi_{4t}CF_{jt} + \varphi_{5t}\Delta E_{jt}\times D_{jt} + \varphi_{6t}\Delta CF_{jt}\times D_{jt} + \varphi_{7t}E_{jt}\times D_{jt} + \varphi_{8t}CF_{jt}\times D_{jt} + \omega_{jt}$

$AR_{it} = \varphi_{0t} + \varphi_{1t}\Delta E_{jt} + \varphi_{2t}\Delta CF_{jt} + \varphi_{3t}E_{jt} + \varphi_{4t}CF_{jt} + \omega_{jt}$

	Coefficients (t-statistics)									
	intercept	ΔE_{jt}	ΔCF_{jt}	E_{jt}	CF_{jt}	$\Delta E_{jt}\times D_{jt}$	$\Delta CF_{jt}\times D_{jt}$	$E_{jt}\times D_{jt}$	$CF_{jt}\times D_{jt}$	*Adj* R-*squared*
Information content of cash flows conditioned on the permanence of earnings measured by the magintude of (change in										
mean	-0.07	4.32	-0.11	-0.16	0.34	-3.64	0.09	-0.03	0.08	0.13
	(-7.02)	(6.76)	(-3.05)	(-1.36)	(9.31)	(-5.49)	(2.60)	(-0.19)	(2.15)	N/A
pooled	-0.07	4.21	-0.1	-0.15	0.32	-3.54	0.08	-0.03	0.11	0.12
	(-8.98)	(7.03)	(-1.30)	(-1.21)	(5.15)	(-5.90)	(0.98)	(-0.24)	(1.61)	N/A
Information content of cash flows conditioned on the permanence of earnings measured by the magintude of Ejt/Pjt										
mean	-0.12	1.11	0.11	1.30	0.07	-0.49	-0.17	-1.58	0.42	0.15
	(-7.35)	(7.55)	(1.75)	(29.78)	(0.57)	(-2.59)	(1.97)	(-14.77)	(4.15)	N/A
pooled	-0.12	1.05	0.12	1.23	0.07	-0.43	-0.18	-1.51	0.41	0.14
	(-14.15)	(12.18)	(2.01)	(8.78)	(1.29)	(-4.60)	(2.70)	(-10.22)	(6.41)	N/A
Information content of cash flow - a control										
mean	-0.07	0.69	-0.02	-0.18	0.39					0.12
	(-4.29)	(15.01)	(-2.31)	(-2.49)	(7.16)					
pooled	-0.07	0.68	-0.02	-0.18	0.4					0.12
	(-9.64)	(20.57)	(-0.76)	(-5.24)	(12.63)					

From these results, the authors concluded that the transitory earnings were shown to have smaller marginal response coefficients to abnormal returns and the incremental information content of cash flows increased as earnings became less permanent.

Garrod and Hadi (1998) again tested the value relevance of cash flow information in a British context. This study focused mainly on the information relevance of cash flow disclosures mandated by FRS1 (Accounting Standards Board, 1991), namely cash inflow from operations (OCF), net cash outflow from return of investment in servicing of finance (RIF), cash outflow from taxation (TCF), net cash outflow from investments (ICF), net cash inflow from financing (FCF) and net cash increase in cash (CC). This research was primarily

a critique of the usefulness of this new piece of reporting legislation. It also looked at the information content of cash flow per share, a metric whose disclosure was expressly prohibited by US reporting regulation (FASB 9, paragraph 33) and discouraged by ED 54 (Accounting Standards Committee, 1990) in the UK.

The cash flow return model was specified by the following regression equation:

$$CAR = \alpha_0 + \alpha_1 OCF + \alpha_2 RIF + \alpha_3 TCF + \alpha_4 ICF + \alpha_5 FCF + \alpha_6 CC + Accruals + e$$

Equation 3.21

Abnormal returns were accumulated over a twelve-month period lagged by four months, reflecting the average time it takes for financial results to be released in the United Kingdom. Unexpected levels of the explanatory variables were used, scaled by beginning-of-period price. The sample period extended from1977 to 1991 and included 156 companies. Prior to 23 March 1992, as the disclosures outlined in FRS 1 were not yet mandated, proxies were constructed using funds flow data. The proxies calculated were based on 1991-1992 figures and the corresponding comparatives from 1992-1993 financial statements were used to assess the reasonableness of these proxies. Correlation coefficients for the variables ranged from 95.5% to 99.9%, and the authors considered these acceptable.

All the regression coefficients except cash flow from tax and financing (CFTF) were found to be relevant at a 1% significance level. Furthermore, a model based on cash flow per share did not demonstrate any incremental information content beyond cash flows as they conveyed the same information. The authors concluded that the level of disaggregation set out in FRS 1 is a positive move towards a more optimal disclosure pattern.

Quirin and O'Bryan (1999) investigated capital market responses to cash flows and earnings, focusing primarily on cases where earnings and cash flow surprises are corroborative. By using dummy variables as in Ali (1994) and Cheng et al. (1996), Quirin and O'Bryan (1999) were able to separate instances where earnings and cash flow surprises were both positive, both negative, and where one explanatory variable was positive and the other negative.

The unexpected, or surprise portion, of the explanatory variable was the actual level less that predicted by a random walk model for earnings and prior period working capital from operations for the cash flow from operations variable. This was the best model for future cash flows as advocated by Bowen et al. (1996). Explanatory variables were scaled by

beginning of period share price (Christie 1987). Abnormal returns were calculated over a 12-month period starting three months after the prior year-end. Raw returns were adjusted using the market model with betas based on a minimum of 24 months, and a maximum of 60 months, of historical returns.

The results of the separate response coefficients illustrated that security returns did not react more negatively when the direction of earnings and cash flow surprises were both negative. When earnings and cash flow surprises were both positive however, security returns did respond more significantly than when the sign of these two explanatory variables conflicted.

The asymmetrical corroborative relationship illustrated by this model was not robust to changes in the specifications of the cash flow variable. When a random walk model was used for operating cash flows, inconsistent results were obtained.

Charitou and Clubb (1999) reviewed prior research and were of the opinion that, particularly in a British context, very little evidence had been found for the *incremental* information content of accruals. Studies in the 1980s in the United States provided evidence of both cash flows possessing information as well as *incremental* information content beyond earnings. The evidence in the United Kingdom was less compelling (Ali and Pope, 1994) and this motivated their research.

The theoretical basis for this research was that earnings are made up of both a cash flow and accrual component; the cash flow component is absolute, whereas the accrual component is subject to management's judgement. Management has the ability to manipulate earnings through a number of discretionary accruals. These accruals might be prompted by private information that managers may possess that would increase the usefulness of earnings. On the other hand, managers may manipulate earnings through discretionary accruals to manage investor relations or when they have performance-linked compensation contracts or other such vested interests. This latter type of accrual diminishes the value relevance of reported earnings. Cash flows are susceptible creative accounting to a lesser degree than accrual-based earnings, but they do suffer from timing and matching problems. Over longer periods, this deficiency of cash flows should by tempered, and they should have greater information relevance.

This view was supported by the findings of Dechow (1994). Consequently, this study employed a long return interval of between one and four years.

The sample included 520 companies and the sample period stretched from 1985 to 1992. Earnings, as well as a multitude of cash flow variables, were used to explain returns. These were cash flow from operations (CFO), change in cash and cash equivalents (ΔCE), equity cash earnings (ECE), investments (INV), loan capital issued (ΔL) and equity cash flows (ECF). ECE was a measure defined by Lawson (1980 and 1981) and equals CFO less net capital investment, interest, and tax payments. All these variables were total firm values rather than per share values and were scaled by beginning-of-period market capitalisation. Where the return interval extended beyond one year, non-overlapping periods were used.

Initially, for the purposes of inter-study comparability univariate models were estimated to test the information content of earnings and CFO. These variables were confirmed to be strongly associated with returns. The explanatory power of these models was significantly increased by the extension of the return window from one to four years. This could be seen by the increase in the coefficient of determination from 18.6% to 38.0% with earnings and 2.2% to 28.1% with CFO. The results of these regression models are presented in table 3.9 below:

Table 3.9

Univariate Regression Results, all Firms, 1985-1992

Model: $R_T=\alpha_0+\alpha_1 AE_T/P_0+\upsilon_T$						
Interval	α_0	*t-statistic*	α_1	*t-statistic*	*R-squared*	*N*
1 year	-0.594	-5.021	2.083	28.539	0.186	3516
2 year	-0.032	-1.032	1.626	21.396	0.208	1739
4 year	0.110	1.591	1.143	22.497	0.380	825
Model: $R_t=\alpha_0+\alpha CFO/P_0+\upsilon_t$						
Interval	α_0	*t-statistic*	α_1	*t-statistic*	*R-squared*	*N*
1 year	0.133	11.924	0.33	8.861	0.022	3516
2 year	0.216	7.417	0.514	11.751	0.074	1739
4 year	0.119	1.516	0.825	17.756	0.281	825

In a multivariate model using all the explanatory variables listed above, the coefficient of determination increased from 23.3% to 47.1% when the return window was extended from one year to four. The response coefficient of earnings decreased whereas the response coefficient of cash flows increased as the return window was extended. The authors

concluded that the incremental information content of cash flows increases relative to accrual-based earnings as the length of the return window increases.

The incremental information content of cash flows and earnings has recently been re-evaluated in an Australian context by Hodgson and Stevenson-Clarke (2000). This study was not only motivated by the fact that Australian evidence has not been presented in this debate, but the authors also supported a view that firm size characteristics may influence the structure of the earnings /cash flow-return association. This contextual viewpoint was tested.

This study also tested recent innovations in research design and insights into the aforementioned earnings/cash flow-return association. More specifically it tested whether this relationship is better specified by a nonlinear model (Ali, 1994; Freeman and Tse, 1992). The implication of this nonlinear model was that the incremental information content of cash flows increased (decreased) as the magnitude of earnings changes increased (decreased) because such transitory earnings are unlikely to be repeated.

The sample consisted of data from 121 Australian firms from the period 1989 to 1996. Raw returns were used as the dependant variable rather than abnormal returns. The explanatory variables were actual, as well as unexpected earnings and cash flow per share, deflated by beginning-of-period share price. A standard linear as well as a nonlinear model as specified in Ali (1994) was used.

In order to test for a relationship with firm size, the pooled sample was also split into portfolios of above and below average firms.

The results showed that the nonlinear model had greater explanatory power. The addition of cash flows to the earnings model did not increase its explanatory power in the case of small firms. In this context, the authors find that cash flows did not exhibit incremental information content beyond earnings. Within large firms, however, cash flows added significant explanatory power to both the linear and nonlinear model specification. The explanatory power of the nonlinear model, as measured by the adjusted R^2 increases from 20.3% to 27.3% with the addition of the cash flow variables. The explanation proposed for this was that larger firms engage in more accrual activity and smaller firms operate more on a cash basis, thus earnings diverge more from cash flows in larger firms. Therefore, the

combination of these two variables tended to provide more varied information in larger firms, and thus they had incremental information content beyond each other.

Graham and Knight (2000) focused primarily on one industry in order to reassess the incremental information content of cash flows conditional on earnings. They examined 37 equity real estate investment trusts (REITs) over the period 1989-1995 to test whether a multivariate specification of the earnings/cash flow and security return relationship was superior to a univariate earnings-return model.

In this context, funds from operation (i.e., cash flows) were consistently shown to be superior to earnings in explaining returns. They had information content, and in some specifications of the model used, accrual-based earnings failed to possess any information not already captured in cash flows.

Barth, Beaver, Hand, and Landsman (2000) tested the differential ability of the accrual and cash flow components of earnings to forecast future abnormal earnings and their valuation relevance with respect to equity values. Their research design utilised the framework set out by Ohlson (1999) which built on Ohlson (1995).

They attempted to answer the following questions

1. Do accruals and cash flows aid in forecasting future abnormal earnings incremental to abnormal earnings and equity book values?

2. Do accruals and cash flows provide explanatory power for equity market value incremental to equity book value and abnormal earnings?

3. Is there evidence to suggest that valuation multiples of accruals and cash flows vary?

The conditioning or controlling variables beyond which incremental information content was being tested in these models was neither accrual-based earnings nor cash flows. Thus, if incremental information was exhibited, it was due to information content beyond that already contained in either of the following two primary explanatory variables: abnormal earnings and the book value of equity.

Abnormal earnings were defined as earnings less a normal return on equity book value. The accrual component of earnings was calculated as the difference between earnings (income before extraordinary items and discontinued operations) and the cash flow component of

earnings, namely cash flow from operations. The sample contained 15'405 firm years from the period 1987 to 1996, and all tests were conducted separately on an industry level.

The first test was specified by the following regression equation:

$$NI^{a}_{it} = \omega_{10} + \omega_{11} NI^{a}_{it-1} + \omega_{12} \chi_{it-1} + \omega_{13} BV_{it-1} + \varepsilon_{1it}$$

Equation 3.22

NI^{a} represented abnormal earnings, χ represented either the accrual or cash flow component of earnings and BV was the book value of equity. The results of these regressions are presented in tables 3.10 and 3.11 below.

Table 3.10

Industry Regression Coefficients of Accrual based Abnormal Earnings model (Barth et al. 2000)

Accruals: $NI_{it} = \omega_0 + \omega_1 NI_{it-1} + \omega_2 ACC_{it-1} + \omega_3 BV_{it-1} + \varepsilon_{it}$

	ω_1		ω_2		ω_3		$\omega_{12} + \omega_{13} = 0$	
Industry	coef	*t*-stat	coef	*t*-stat	coef	*t*-stat	*p*-value	Adj. R squared
Mining + Construction	0.40	9.82	-0.06	-1.67	-0.47	-7.20	<0.01	0.40
Food	0.86	28.25	-0.45	-11.85	-0.03	-6.41	<0.01	0.76
Textiles + printg/pubg	0.27	11.82	-0.11	-4.07	-0.05	-11.05	<0.01	0.28
Chemicals	0.63	15.44	-0.22	-4.38	-0.06	-6.59	<0.01	0.29
Pharmaceuticals	0.94	28.74	-0.75	-12.20	-0.02	-1.90	<0.01	0.89
Extractive industries	0.59	16.59	-0.26	-10.68	-0.06	-12.38	<0.01	0.33
Durable manufacturers	0.55	50.58	-0.24	-22.51	-0.05	-24.72	<0.01	0.41
Computers	0.38	10.00	-0.10	-2.72	-0.07	-7.99	<0.01	0.14
Transportation	0.88	37.73	-0.17	-8.82	-0.03	-6.03	<0.01	0.65
Utilities	0.36	16.18	-0.04	-3.15	-0.01	-4.13	<0.01	0.15
Retail	0.67	36.22	-0.11	-8.86	-0.01	-4.23	<0.01	0.43
Financial institutions	0.69	26.11	-0.02	-2.58	-0.01	-5.06	<0.01	0.36
Insurance + real estate	0.83	39.27	-0.29	-8.94	-0.01	-4.22	<0.01	0.43
Services	0.69	32.31	-0.10	-7.07	-0.03	-7.49	<0.01	0.41
Mean	0.62	25.65	-0.25	-7.82	-0.07	-7.81		0.42

Table 3.11

Industry Regression Coefficients of CFO based Abnormal Earnings model (Barth et al., 2000)

Cash Flows: $NI_{it} = \omega_0 + \omega_1 NI_{it-1} + \omega_2 CFO_{it-1} + \omega_3 BV_{it-1} + \varepsilon_{it}$

	ω_1		ω_2		ω_3		$\omega_{12} + \omega_{13} = 0$	
Industry	coef	*t*-stat	coef	*t*-stat	coef	*t*-stat	*p*-value	Adj. R squared
Mining + Construction	0.43	10.82	0.10	2.86	-0.06	-7.14	<0.01	0.42
Food	0.16	3.49	0.52	15.92	-0.09	-10.72	<0.01	0.76
Textiles + printg/pubg	0.23	9.54	0.10	3.87	-0.06	-8.85	<0.01	0.29
Chemicals	0.18	4.12	0.27	5.89	-0.10	-7.28	<0.01	0.26
Pharmaceuticals	0.26	6.19	0.66	13.67	-0.07	-5.58	<0.01	0.90
Extractive industries	0.19	4.89	0.26	11.49	0.09	-12.77	<0.01	0.32
Durable manufacturers	0.26	20.68	0.25	23.87	0.07	-28.24	<0.01	0.40
Computers	0.21	6.65	0.08	2.13	0.07	-5.90	<0.01	0.13
Transportation	0.76	34.87	0.16	9.38	0.05	-7.40	<0.01	0.66
Utilities	0.25	11.76	0.03	2.50	0.01	-3.39	<0.01	0.14
Retail	0.57	31.08	0.12	9.83	-0.02	-7.47	<0.01	0.43
Financial institutions	0.65	24.48	0.02	2.85	-0.01	-5.03	<0.01	0.36
Insurance + real estate	0.47	16.81	0.31	8.57	-0.05	-8.09	<0.01	0.43
Services	0.53	22.62	0.10	7.28	-0.04	-8.09	<0.01	0.41
Mean	0.37	14.86	0.21	8.58	-0.06	-9.00		0.42

These results prompted the authors to conclude that accruals and cash flows have a significant, yet differing ability, to predict future abnormal earnings. The coefficients of accruals and cash flows were negative and positive respectively, indicating that abnormal earnings responded less when accruals were larger and more when the cash component of earnings was larger in magnitude. There was also a larger degree of inter industry variation in the structure of this relationship.

The incremental ability of accruals and cash flows to explain equity values was modelled by the following multivariate equation:

$$MVE_{it} = i_0 + i_1 BV_{it} + \alpha_1 NI^{a}_{it} + \alpha_2 \chi_{it} + \upsilon_{it}$$

Equation 3.23

MVE was the market value of equity and again χ represented either the accrual or cash-flow component of earnings. Although these regressions were run on an industry basis, in the interest of brevity, only the mean regression coefficients are presented in table 3.12 below:

Table 3.12

Mean Regression Coefficients for the Incremental Information Content Market Value of Equity Model (Barth et al., 2000)

Accruals: $MVE_{it} = i_0 + i_1 BV_{it} + \alpha_1 NI^{a}_{it} + \alpha_2 ACC_{it} + \upsilon_{it}$

Cash Flows: $MVE_{it} = i_0 + i_1 BV_{it} + \alpha_1 NI^{a}_{it} + \alpha_2 CFO_{it} + \upsilon_{it}$

	i_1		α_1		α_2		p-value		
	coef	t-stat	coef	t-stat	coef	t-stat	$i_1 = 1$	$\alpha_1+\alpha_2=0$	Adj. R squared
Accruals	1.87	39.12	8.95	23.69	-1.94	-7.18	<0.01	<0.01	0.82
Cash Flows:	1.62	23.24	7.09	15.60	2.05	7.74	<0.01	<0.01	0.82

These regression statistics again confirmed that cash flows and accruals both have significant incremental explanatory power beyond abnormal earnings and the book value of equity in explaining security prices.

By examining the correlation of accrual and cash-flow response coefficients across industries, the authors found that these coefficients did not vary substantially across industries, but they did vary based on the persistence of the earnings components as predicted by the Ohlson (1999) model.

3.3.5 The combined South African Literature

In a Master's thesis submitted to the University of Stellenbosch in 1992, Marita van Niekerk tested four cash flow variables for both the information content and the incremental information content in predicting security prices, security returns, dividends and corporate failure. This study employed univariate regressions to model the information content of earnings and cash flows and multivariate regressions to model the incremental information content.

Firstly, earnings and cash flows were shown to have significant associations with all the dependent variables. Two of the four cash flows measures, namely cash from operating activities and cash utilised for investments, had incremental information content in modelling dividends and share prices, but not changes in share prices (i.e., returns). Cash flows were also shown to improve the explanatory power of corporate failure prediction models.

In the same year, Jacques Fourie (1992), in a research report submitted to the University of Cape Town, attempted to evaluate whether cash flows affect the value of a firm. Fourie (1992) used a myriad of cash flow variables to model 12-month cumulative abnormal returns. The sample consisted of 35 JSE listed companies between 1987-1991. Expected levels of cash flow were calculated assuming a random walk process. Percentage changes were used as the independent variable in this cash flow-abnormal return model. Fourie's (1992) study concluded that cash flows do affect the value of a firm because they were significantly associated with abnormal share returns.

Pryce (1993) extended the work of Bowen et al. (1986) in a South African context. This University of Cape Town research paper examined whether cash flows or earnings are better at modelling future cash flows on a sample of 109 industrial companies listed on the JSE over the period 1987-1992.

Univariate models using net income after tax and cash available from operating activities were used to explain next period cash available from operating activities. Stepwise multiple regression was used to establish whether the inclusion of either the cash flow or earnings variables added significant explanatory power to the model. Initially a problem existed when the actual levels of the explanatory variables were used because these two variables were highly correlated. This problem of multicollinearity was removed by using the first

differences of these explanatory variables, which reduced the sample period by one year. Both earnings and cash flows were found to be very good at explaining future cash flows, with earnings dominating. They also both possessed incremental information content beyond each other. These results are summarised in the table 3.13 below.

Table 3.13

Explanatory Power of Cash and Earnings ability to predict returns in Univariate and Multivariate regression models (Pryce, 1993)

	Adjusted R-squared	
	1990-1991	1991-1992
Cash	14.64%	49.25%
Earnings	23.50%	30.51%
Both	29.72%	65.64%

Although both cash flow and earnings are individually significant, the results for the two years presented are ambiguous and Pryce (1993) was unable to conclude which was superior at modelling future cash flows.

Wessels, Smith and Gevers (1993)of the University of Stellenbosch Business School produced one of the first published studies on the usefulness of cash flow information in a South African context. Their paper, entitled 'The association between cash flow variables and market risk on the Johannesburg Stock Exchange: an empirical analysis' appeared in the *South African Journal of Business Management* in 1993.

This comparison of cash flow based accounting betas and earnings based betas was a South African replication of Ismail and Kim (1989); market model betas were calculated for 50 industrials on the JSE from 1973-1987. These formed the dependent variable in a regression model where the authors attempted to explain the variation in these betas using accounting based betas as the independent variables. The following accounting based betas were calculated and used as explanatory variables:

- Earnings,
- Earnings + depreciation,
- Earnings + depreciation + deferred tax (WCFO), and

- Earnings + depreciation + deferred tax + non-cash working capital changes (CFO).

These betas were calculated on both current-year values as well as a smoothed 3-year moving average. A Bayesian adjustment was made to these betas as set out by Vasicek (1973). This adjusted them downwards and increased the correlation between the accounting betas and the market betas. The Bayesian adjustment further increased the significance of the results observed.

Smoothed CFO (3-year moving average) was shown to be significant in explaining the market risk of firms. Since none of the multiple regression models were significant, no conclusion was drawn as to the incremental explanatory power of the cash flow based betas over earnings based betas. These findings contrast Ismail and Kim (1989) and suggest that further research should be done with a larger sample. This could be done by either increasing the sample period or by relaxing the use of coinciding year-ends.

Kobus (1995) tested whether WCFO has information content individually as well as incrementally beyond earnings in the South African context. His methodology was based loosely on Ali (1994) and a linear as well as nonlinear model was used to specify the earnings/cash flow – return relationship. Kobus' (1995) evidence, based on a regression of WCFO and earnings against share returns for companies between 1988 and 1995, showed that WCFO was inferior to earnings and had no incremental information content beyond that already contained in earnings.

Wapenaar (1996), in a simple study of association, showed that cash flow variables are not correlated with future returns. The author highlighted numerous limitations that may have diminished the quality of these results and warned that 'this should not be taken to imply that cash flow information is of no use to investment analysts' (Wapenaar, 1996).

De Jager (1997) used factor analysis to determine which traditional and cash flow ratios best served as explanatory variables in predicting corporate success or failure. This study served as the basis for future research into predicting corporate failure. De Jager (1997) found that of more than sixty ratios the two most important ones were financial leverage and cash flow return rather than traditional accrual-based profitability ratios.

In an unpublished conference paper, Nicholas Ogle and Enrico Uliana (1999) replicated Dechow (1994) in a South African context. The authors felt that the South African reporting

environment has somewhat different accounting practices and is a more risky economic environment. For this reason, they suspected a replication in the South African environment might give somewhat different results. The following hypotheses were tested:

1. Earnings have a stronger association with returns than cash flows over a one-year interval.

2. As the magnitude of accruals increases, the response coefficient of cash flows will decline because of the increased information that these larger accruals provide.

3. Short-term accruals are more important than long-term accruals in mitigating the timing and matching problems of cash flows.(Ogile and Uliana, 1997)

As in Dechow (1994), raw returns, reduced by market returns, were regressed against earnings and cash flow variables. The sample was constructed from 162 companies over the period 1994 to 1998. Earnings per share was used as the earnings variable and the following three cash flow variables were used: cash flow from operations, equity cash flow, and net cash flows. The explanatory power of these variables are presented and compared to Dechow in table 3.14 below.

Table 3.14

Explanatory Power of independent variables: A comparison with Dechow (1994). (Ogle et al. ,1999)

N=648	***Earnings***	***Cash flow from operations***	***Equity cash flow***	***Net cash flow***
Adjusted R-squared	14.45%	1.29%	0.17%	2.10%
Dechow (1994)	16.20%	3.18%	-	2.47%

These results were consistent with Dechow (1994) and categorically illustrated the superiority of the association of earnings, rather than the various measures of cash flow, to returns.

The results for hypothesis two, however, deviated from Dechow (1994) as illustrated in table 3.15 below.

Table 3.15

Explanatory Power of Earnings and Net Cash Flow as the magnitude of Accruals increases: A comparison with Dechow (1994). (Ogle et al. 1999)

	Adjusted R-squared			
	Net Cash flow		Earnings	
	South Africa	USA	South Africa	USA
Quintile 1	15.70%	16.20%	16.58%	16.84%
Quintile 2	4.73%	12.23%	3.36%	15.44%
Quintile 3	6.50%	8.76%	7.53%	14.49%
Quintile 4	4.78%	6.51%	14.38%	14.82%
Quintile 5	2.89%	0.24%	31.79%	21.98%

The conclusion that, as the magnitude of accruals increased, earnings increased in its ability to explain returns, remained unchanged. However, initially the explanatory power of earnings declined as the magnitude of accruals increased. The authors suggested that the seemingly anomalous findings for earnings in quintiles 2 through 4 might have been evidence that the market mistrusts earnings in these quintiles because managers manipulate earnings through the use of accruals.

Similarly, by ranking the sample into quintiles based on the magnitude of absolute changes in working capital, cash flow from operations was hypothesized to decrease as the magnitude of short-term accruals increased. The comparative results are presented in table 3.16 below.

Table 3.16

Explanatory Power of Earnings and Net Cash Flow as the magnitude of changes in Working Capital increases: A comparison with Dechow (1994). (Ogle et al. 1999)

	Adjusted R-squared			
	Cash flow from operations		Earnings	
	South Africa	USA	South Africa	USA
Quintile 1	0.05%	7.72%	2.87%	14.24%
Quintile 2	0.08%	8.69%	3.71%	15.73%
Quintile 3	8.93%	8.24%	18.57%	16.54%
Quintile 4	6.69%	7.34%	16.16%	19.08%
Quintile 5	0.01%	0.79%	29.45%	18.19%

These results showed that earnings associated with returns increased as the magnitude of short-term accruals increased and that accruals do mitigate the timing and matching problems associated with cash flows from operations.

3.4 Related Capital Market Literature

In a paper presented at the Batten Institute/Association for Investment Management and Research/Emerging Markets Review conference entitled "Introduction to Valuations in Emerging Markets", Bruner, Conroy, Estrada, Kritzman and Li (2002) highlight a number of factors present in the valuations of companies that are unique to developing countries. Two of the numerous factors that are relevant to the South African market and this research study are the inflationary and devaluation effects present in emerging markets and the cost of capital in emerging markets. This research study only investigates South African listed companies and the effect of inflation on returns over time is pervasive yet uniform. Furthermore, for the purposes of this study, the effect of inflation is eliminated by scaling all explanatory variables by beginning of period price. The significance of the cost of capital in emerging markets and specifically the deficiencies experienced by market practitioners in using the conventional CAPM model to explain security returns is highly relevant. This paper does not present specific South African evidence but highlights a number of alternative methods employed by a number of parties.

Bowie and Bradfield (1993) perform a review of systematic risk estimation on the JSE Securities Exchange and detail the following considerations that need to be taken into account when estimating beta coefficients on the JSE Securities Exchange: the thinly traded nature of the JSE, the choice of appropriate market proxy, the inclusion of prior beliefs about the systematic risk measures, the distribution of security returns and the time varying elements of systematic risk.

Bowie and Bradfield (1998) later go on to specifically investigate the robustness of beta estimation on the JSE Securities Exchange which they identify as being thinly traded. They find that conventional OLS (Ordinary Least squared) estimation does not generate beta estimations that are as robust as those generated by down-weighting outlying residuals and outlying market returns.

In more recent years the trading volumes on the JSE Securities Exchange have increased which may give reason to suggest that the thin trading phenomenon might be better characterised as firm size effect where smaller firms are traded less frequently. Van Rensburg and Robertson (2003) investigate the effect of firm size, price-to-earnings and beta on the JSE Securities exchange and conclude that there is a distinct size and price-to-earnings effect

and they also find that there is clear evidence suggesting that beta fails to accurately predict security returns.

3.5 Summary

Beginning in the 1960 a number of academics argued for a revision in the contemporary reporting framework to include a variety of cash based performance metrics and statements. The main proponents for this system of reporting came from the United Kingdom although similar sentiments were later echoed across the Atlantic in the United States. This normative debate slowly disappears from academic literature as the statement of funds flow and later cash flow statements became commonplace and there is a shift towards empirical testing of the usefulness of cash flow disclosures.

At first these empirical investigations were limited by the availability of cash flow information but this measurement problem was overcome by using crude approximations and reconstructions of cash flow numbers based on earnings and changes in account balances between balance sheet dates included in published financial statements. Later, as the universe of published cash flow information grew, the ability to investigate the information content of cash flows versus accrual based earnings improved and the methodologies employed developed from simple studies of association to contextual models which have enabled a deeper understanding of this relationship.

Early studies of association are heavily limited by the availability true cash flow data and their findings are inconclusive and ambiguous about the relative association of earnings and cash flows to security returns. Later some researchers shifted their focus away from the capital market's appraisal of financial disclosures and looked at the ability of cash flows and accrual based earnings to explain future disclosed cash flows. These studies showed significant improvement in the measurement of cash flows and indicated that earnings and cash flows were clearly distinct measurements. However their results remain ambiguous with Bowen et al (1986) concluding that cash flows are superior while Greenberg (1986) concludes otherwise. It emerges from the literature at this point that both of these might be useful and the individual components of earnings, namely cash flows plus the accrual components, are tested separately for explanatory power.

Early information content studies recognised that, in line with studies investigating the ability of earnings and cash flows to predict future earnings, both earnings and cash flows are

useful. These studies attempted to determine which of these two variables was superior. The results of these studies tend to suggest that earnings are superior. These studies also saw significant methodological refinements which reduced measurement error and reduced the return window in an attempt to increase the explanatory power of the security return prediction models. Some studies went on to find unique non-statistical methods to control for the alternative explanatory variables.

As the availability of cash flow data increased and the balance of research found in favour of earnings as an explanatory variable, methodologies shifted towards identifying the relative market relevance of earnings and cash flow variables and towards contextual studies which explained the varying nature of this relationship. The focus of these studies tended to shift away from rationalising the contemporary financial reporting framework but more towards valuation implications in capital markets.

In general the incremental information content studies find that earnings dominate cash flows but cash flow information does possess information not contained in earnings numbers. Contextual studies, both linear and non-linear, go on to investigate the reason for this and identify factors that influence the relative incremental information content of the two explanatory variables. These include the following:

- Firm size
- Geography of market (e.g. UK, US, Australia, South Africa, Finland)
- Industry
- Life cycle of firm
- Time[12]
- Length of reporting period
- Length of firm operating cycle
- Magnitude and direction of accruals

[12] Changing economic factors over time may influence the value relevance of cash flows and accrual based earnings.

- Persistency of earnings and cash flows over time

The South African literature is limited and there is little consistency in methodology allowing few general conclusions to be drawn. The lack of a critical number of data points, the lack of market efficiency and the documented thin trading effect present on the JSE Securities Exchange also hindered researchers. Some research into the usefulness of earnings and cash flows in South Africa has focused on corporate failure, whilst others have looked at future cash flows in replications of foreign studies. Surprisingly, most replicated studies in South Africa do not support the same findings as those found elsewhere. This suggests that a more contextual investigation may reveal unique South African peculiarities. A chief candidate for the failure of replicated studies to support the same findings as elsewhere may be the documented deficiencies of CAPM in explaining returns on the JSE Securities exchange. This study goes on investigate the particular role that industry classification plays in the incremental information content of cash flows and accrual based earnings numbers in explaining security returns on the JSE Securities Exchange whilst also looking at the role of trading volumes.

Chapter 4

DEFINITION OF THE PROBLEM

4.1 Introduction

This study examines the incremental information content of accrual-based earnings as measured by EPS and cash flows from operations (CFO) in modeling abnormal returns of JSE Securities Exchange listed shares both on a pooled basis and across a range of industry classifications. The methodology used in this study sets out to answer a number of questions which, although couched in different theoretical terms, can be tested in the form of statistical hypotheses as set out later in this chapter. These various research questions are listed below:

1. Does the conventional wisdom, that the cash basis of preparing accounts is inferior to the accrual basis at predicting future cash flows[13], hold true?

2. Are investors' decisions, as reflected in the movement in share prices, based on a fixation on earnings or do they reward quality earnings that are backed by strong cash inflows from operations?

3. Is differential decision useful information contained in cash flows that is not contained in earnings or is earnings simply a more meaningful number?

4. Since the difference between accrual and cash based earning are both short and long-term accruals made by the accountant, this study looks at the information relevance of these judgement based accruals and appraises the relevance of the expensive accounting process. This is particularly true of the examination of the industry effect as the role of the accountant in determining which type of accruals to make can be very industry dependant. These might include such accruals as policyholder liabilities in the insurance industry, proven reserves in mining, resources and extractive industries or the capitlisation of research costs in the pharmaceutical industry.

[13] and therefore is inferior at predicting security return

4.2 Hypotheses

In order to test the differential information content or statistical explanatory power of earnings and cash flows at modelling abnormal returns in a number of contexts[14] the following stepwise multiple regression model was specified:

$$CAR_{i,j} = \beta_0 + \beta_1 CF_{i,j} + \beta_2 EPS_{i,j} + \varepsilon_{i,j}$$

$CARi,j$ = cumulative abnormal return for firm j in peroid i

β_0 = y intercept

β_1 = regression coefficient for cash flow variable

β_2 = regression coefficient for earnings variable

$\varepsilon i,j$ = residual term

$uCFi,j$ = cash flow per share scaled by beginning of period share price for firm j in period i

$uEPSi,j$ = earnings per share scaled by beginning of period share price for firm j in period i

Equation 4.1

Rather than testing the statistical significance of the response coefficients of the explanatory variable and thereby comparing the strength of the association of earnings and cash flows with abnormal returns, the statistical significance of the explanatory power of earnings and cash flows is compared using the coefficient of determination. After statistically conditioning for the most significant explanatory variable, a stepwise regression then separately measures the additional explanatory power of the second less significant explanatory variable.

The null hypothesis is expressed as follows:

H_0: Adj. R^2_1 = Adj. R^2_2 = Multiple $R^2 = 0$

Versus

H_1: Adj. $R^2_1 \neq$ Adj. $R^2_2 \neq$ Multiple $R^2 \neq 0$

Where, explanatory variable 1 and 2 are either Earnings per share or Cash flow per share (scaled by beginning of period share prices), in order of statistical explanatory power.

Rejecting the null hypothesis in favour of the alternative that the coefficient of determination is significantly different from zero, allows us to conclude that either earnings

[14] Including industry effects, effect of outliers, persistence across time and the effect of trading volume on the differential information content of accrual-based earnings and cash flows.

or cash flows, individually or in conjunction, explain a portion of the variation in contemporaneous abnormal returns. Where both earnings and cash flows are significant in explaining the variation in abnormal return in a stepwise regression, a conclusion can be drawn that they possess incremental information content beyond each other.

In the interest of a better understanding of the results presented in chapter 6, the implications of the uses of a *stepwise* regression are highlighted below:

Firstly, a comparison between the explanatory power or strength of association of the earnings and cash flow variables cannot be made by simply comparing their coefficients of determination or response coefficients respectively. One variable is conditional upon the other and therefore the variable with the most significant explanatory power is identified first, and it is regressed against abnormal returns. If the second less significant variable still exhibits an association with, or contains explanatory power for, abnormal returns, this will be evidenced by a statistically significant regression coefficient or coefficient of determination respectively. Secondly, where the averages of the regression results across industries or years are included in the tables presented, it is important to remember that these are simple averages of regressions where the primary explanatory variable is not consistent, and it is therefore not as informative as the results of the pooled regressions. These are presented primarily for the purpose of inter-study comparability of the average multiple R^2 or multiple coefficient of determination.

Supplementary tests of association between the direction of cash flow and earnings surprises and cumulative abnormal returns are also performed to test if capital markets are discerning and reward quality earnings that crystallise into cash flows. If this were the case on the JSE Securities Exchange, then one would expect companies with positive earnings and cash flow surprises to achieve abnormal returns greater than those with only positive earnings surprises. Similarly, companies exhibiting negative earnings surprises that are married to cash outflows should achieve negative abnormal returns. A variety of tests are performed to examine the different association between the direction of earnings and cash flow surprises and abnormal returns. The statistical significance of this is tested in the form of an analysis of variance which allows us to infer about the different strength of association of abnormal returns with these accrual-based earnings and cash flows.

Expressed as a formal hypothesis thus:

H_0: $\mu = 0$ Versus H_1: $\mu \neq 0$

for each of the 4 combinations of signals from earnings and cash flow surprises as documented in the methodology in Chapter 5.

4.3 Assumptions

The assumptions made in this research study fall into two categories, namely, express assumptions on which the research design is based and implied assumptions that are inherent in the conventional tools used.

4.3.1 Express Assumptions

This research is fundamentally reliant on the notion of market efficiency. The JSE Securities Exchange is assumed to be informationally efficient at the semi-strong level, consistent with the Efficient Market Hypothesis (EMH). Since excessively thinly traded shares are removed from the sample,[15] this assumption is valid and is supported by Affleck-Graves (1983), Firer et al (1987) and Bowie and Bradfield (1992). Further, the robustness of results are tested for the effect of trading volume.

Given the time taken for financial results to be audited and published, it was assumed to take three months for this information to arrive at the market. This is consistent with the regulatory requirement for listed companies in South Africa[16] as well as the listing requirements of the JSE Securities Exchange.

The pooling of year-by-year data in the regression analysis assumes that the structure of the regression model is static over time. The robustness of this assumption is tested by examining the year-on-year consistency of results.

Cash flows from operations have been used as a measure of cash-based performance akin to earnings prepared on a cash basis. Cash flows from operations do not include the cost of financial capital (Financing activities) or the cost of maintenance of productive capital (Investing activities). The lack of availability of such information, the difficultly in reconstructing such a comparative measure, inter-study comparability,[17] and the vast amounts of electronically available cash flow from operations data motivated the use of cash flow from operations as a proxy for cash based earnings.

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[15] Refer to discussion of specific sample exclusions in Appendix VIII.

[16] COMPANIES ACT NO. 61 OF 1973, section 302& section 304

[17] As documented in the chapter 3: Review of the relevant literature, most studies used CFO as a proxy for cash based earnings.

4.3.2 Implied Assumptions

The following assumptions of the Capital Asset Pricing Model (Bodie, Kane and Marcus, 1996, p.236) are inherent in the research methodology:

1. There are many investors, with individual insignificant wealth compared to the total wealth of all investors. Investors can not affect share prices through their own trading activities. That is to say, they are price takers.

2. All investors only plan for one identical holding period. This conduct is said to be myopic.

3. Investments are limited to the universe of publicly traded securities such as shares and bonds.

4. It is also assumed that all investors have the ability to borrow and lend at the risk free rate.

5. This model ignores the effects of transaction costs and taxes

6. Investors are all rational mean-variance optimisers. That is to say that a high return/low risk position dominates a high return /high risk (or low return/low risk) position which in turn dominates a low return/high risk.

7. All investors share the same information set. Thus no individual has superior information.

A number of these restrictions are rather unreasonable and points to possible pitfalls in the use of the CAPM as a model for expected returns. This is particularly noteworthy in the context of the JSE Securities Exchange, which historically suffers from a thin trading phenomenon, high transaction costs and asymmetric information dissemination. This is explored later in the findings of this study.

The following assumptions are implicit in the use of regression analysis (van den Honert, 1997, p.77):

1. The residual term, ε, is a random variable with an expected value of zero.

2. The variance of the residual, ε, is σ^2, and is the same for all of the values of the independent variable

3. Each residual term is independent of the actual value of the independent variables ands is also independent of all other residual terms

4. The residual term is normally distributed. The response variable is also normally distributed since the coefficients of the independent variables are constants and it is a linear function of ε.

Chapter 5

METHODOLOGY

5.1 Sample Selection

All JSE Securities Exchange shares, both listed and delisted, with financial years endings between January 1988 and December 2002 were included in the initial sample. For a detailed listing refer to Appendix I. These were then filtered using the following criteria for exclusion:

1. All 'N' shares were excluded. Refer to Appendix II.
2. All companies with insufficient price history to calculate at least a 24-month Beta were excluded. Refer to Appendix III.
3. Companies without EPS figures available from McGregor BFA over the sample period were excluded. Refer to Appendix IV
4. Companies without Cash flow per share data available from McGregor BFA over the sample period were excluded. Refer to Appendix V.
5. Firm years in which there was a change in year end, resulting in a reporting period longer or shorter than 12 months, were excluded. Refer to appendix VI.
6. Where a company's industry classification was unclear or unavailable from McGregor BFA, or a clear industry classification could not be independently determined, it was excluded from the sample. Refer to Appendix VII.
7. Specific exclusions due to unique company specific factors were excluded. Refer to Appendix VIII for a listing and reasons for these exclusions.

This resulted in a sample containing 3163 valid firm years broken down as follows:

Table 5.1

Breakdown of valid cases by industry classification and year

Industry	*Observations*
Computers	*127*
Electronic and Electrical equipment	*158*
Financial Services	*221*
Food, Beverages and Drugs	*286*
Industrial	*406*
Insurance and Real Estate	*415*
Mining and Resources	*469*
Retail	*310*
Services	*409*
Textiles	*148*
Transportation	*214*
Total	***3163***

Calendar Year	*Observations*
1988	*37*
1989	*87*
1990	*144*
1991	*180*
1992	*189*
1993	*201*
1994	*216*
1995	*223*
1996	*230*
1997	*253*
1998	*255*
1999	*274*
2000	*281*
2001	*300*
2002	*293*
Grand Total	***3163***

5.2 Data Sources and Variable Definition

All data was obtained electronically from MacGregorBFA Station and Blink applications unless otherwise noted. Published financial statements information was used and not McGregorBFA standardized[18] financial statements. The following information was obtained for all companies included in the sample

Annual data:

- Mnths = Months Covered by Financial Statements (Variable 115)
- YE =Month of Financial Year End (Variable 116)
- EPS = Earnings per share (Variable 305)
- CF = Cash flow per share from operations
- WANOS = Shares in issue Weighted Average (Variable 206)
- TV = Annual trading volume

Monthly data:

- SP = Price or market value per share
- m =ALSI level
- FX = Average monthly Exchange rate (various)
- r_f = Risk-free rate: 3 Month Treasury bill tender rate

Static data:

- Ind = Industry Classification[19]

[18] MacGregorBFA produce standardised company financial statements for greater inter-company comparison. Because this study specifically looks at the effect of industry, standardisation is not desirable.

[19] Industry classification at 30 June 2002: Due to changes in industry classification on 3 occasions during the sample period and migration over time, all companies were assumed to have remained in the same industry throughout the sample period. Nature of business in published in JSE Handbooks was also used to classify companies into the correct industries.

5.3 Research Methodology

Consistent with refinements in research design found in more recent studies such as Easton and Harris (1991) and Dechow (1994), levels of earnings and cash flows were used rather than changes in these variable. Earnings and Cash flows were scaled by beginning of period market value per share, consistent with Ohlson (1991) as this avoids the serial correlation problem associated with general price increases. These two variables[20] were used as the explanatory variables in a stepwise regression of cumulative abnormal annual return (CAR), lagged by three months as specified below:

$$CAR_{i,j} = \beta_0 + \beta_1 CF_{i,j} + \beta_2 EPS_{i,j} + \varepsilon_{i,j}$$

$CARi,j$ = cumulative abnormal return for firm j in peroid i

β_0 = y intercept

β_1 = regression coefficient for cash flow variable

β_2 = regression coefficient for earnings variable

$\varepsilon i,j$ = residual term

$uCFi,j$ = cash flow per share scaled by beginning of period share price for firm j in period i

$uEPSi,j$ = earnings per share scaled by beginning of period share price for firm j in period i

Equation 5.1

The cumulative annual abnormal return, CAR, was calculated as follows:

Each firm's abnormal return for a given year was calculated by subtracting the expected return generated by the Capital Asset Pricing Model and the actual return achieved over that period. Because annual financial results have to be audited, they are only released some time after the financial year-end. The abnormal return was calculated for the 12-month period starting three months after year-end. This is consistent with other long window event studies and the observations of Ball and Brown (1968) that up to 90% of all information has been impounded into share prices by the date of the annual report.

Monthly returns were calculated using the following equation:

[20] A number of JSE security exchange listed companies report their results in currencies other than the South Africa Rand (ZAR) in these case, these variables were converted into Rands at the average rate for the reporting period calculated using average monthly exchange rates.

$$R_{i,j,k} = \frac{SP_{i,j,k} - SP_{i,j,k-1}}{SP_{i,j,k-1}}$$

$SP_{i,j,k}$ = month end share price for company j in year i for the month of k

Equation 5.2

Expected monthly returns were calculated using the Capital Asset Pricing Model (CAPM) specified below:

$$E(r_{i,j,k}) = r_{f,i,k} + \beta_{i,j,k}(r_{M,i,k} - r_{f,i,k})$$

$E(r_{i,j,k})$ = expected monthly return for share j in month k of year i

$r_{f,i,k}$ = monthly risk - free rate for month k of year i

$\beta_{i,j,k}$ = Beta coefficient for share j in month k of year i based on the minimum of 24 months fo historic reutrns (max 60)

$r_{M,i,k}$ = Return on the ALSI for the k^{th} of year i

Equation 5.3

Beta used in the calculation of expected returns above was calculated individually for each month which controls for the time varying properties of beta. The monthly returns for the immediately preceding 24-60 month period (depending on availability of data: minimum 24 months, maximum 60 months) were used in calculating the beta. This was done as follows::

$$\beta_{i,j,k} = \frac{Cov\ (r_{i,j,k-1}, r_{M,i,k-1})}{Var\ (r_{M,i,k-1})}$$

$Cov\ (r_{i,j,k-1}, r_{M,i,k-1})$ = covariance between share j and the market for 24 month period (i-2,k-1) to (i,k-1)

$Var\ (r_{M,i,k-1})$ = population variance of the market for 24 - 60 month period (i-2,k-1) to (i,k-1) depending on data availability

Equation 5.4

Unexpected monthly returns were calculated as set out below:

$$U(r) = R_{i,j,k} - E\ (r_{i,j,k})$$

$U(r)$ = unexpected return

Equation 5.5

The cumulative abnormal return for the year end *i* was calculated by compounding the monthly abnormal/unexpected return for the 12 month period i-1,k+3 to i,k+3 as illustrated below:

$$CAR = \prod_{i-1,j,k+3}^{i,j,k+3}(1+U(r_{i,j,k}))$$

Equation 5.6

For each firm-year, these Cumulative Abnormal Returns were the dependent variable in the regression analysis.

Using stepwise regression, Scaled EPS and CFPS were used to explain a firm's Cumulative Annual Abnormal returns. This identifies the individual variable that is the most statistically significant explanatory variable by measuring how significantly different the coefficient of determination is from zero. In the next step, the second less significant variable, either EPS or CFPS, is then added as a further explanatory variable to identify whether or not it adds explanatory power to the regression model, which would be evidenced by an increase in the Adjusted Coefficient of determination. An increase in Adjusted R-squared confirms that the second explanatory variable also possesses the ability to increase the explanatory power of the prediction model and therefore must contain incremental information content.

Initially, a pooled universe of firm years was used to judge the individual decision usefulness of the two explanatory variables. This included firm years for the period extending from January 1988 to December 2002. A complete listing of these can be found in appendix I.

All three variables were then winsorised to their 95% confidence limits in order to control for outliers. Other authors have suggested that these extreme observations might be of particular interest and should not be winsorised (Kinnunen and Niskanen, 1993). All tests were also performed on unwisorised data in order to identify the effect of these 'special cases'. In addition, plots of all regression equations were inspected to visually identify any outliers and the validity of these cases was appraised. These cases are listed in Appendix IX.

Inherent in using a universe of all JSE Security Exchange listed equity shares is the problem of thin trading identified earlier in the review of relevant capital market literature. Due to the significant concentration of corporate ownership in the past, the JSE Securities Exchange has historically been very illiquid. Because the foundations of this methodology are based on

the efficient market hypothesis, that is to say, that market prices adjust to reflect available information, a very thin market does not provide the mechanism for prices to reflect market consensus.

In order to overcome this potential problem, a metric was developed to measure the comparative turnover of individual shares. The number of shares traded during the year and the weighted average numbers of shares (WANOS), are available from MacGregor BFA and these were used to calculate the percentage of the share capital traded during a given year as follows:

$$ShareCapTurnover = {}^{TV}/_{WANOS}$$

where

TV = Annual trading volume, and

WANOS = Shares in issue Weighted Average (Variable206)

Equation 5.7

The results of the regression analysis was presented separately for both the top and bottom half of the universe of firm years in order to test the impact of trading volume on the pervasiveness of the findings. This methodological refinement is similar to that used by Ali (1994) to test for the effect of firm size.

The pooled regression was also split along industry lines to test whether the importance of earnings and cash flows varies across industries, as suggested by Barth et al. (1999) and Ogle and Uliana (1999). Specialised industry has resulted in industry specific transactions and accounting treatment that, to a large extent, governs a company's ability to make long-term accruals or recognise gains/losses in income or equity. All else being equal, different accounting conventions and the varied nature of industry could potentially result in varied industry specific market-relevance for earnings and cash flows.

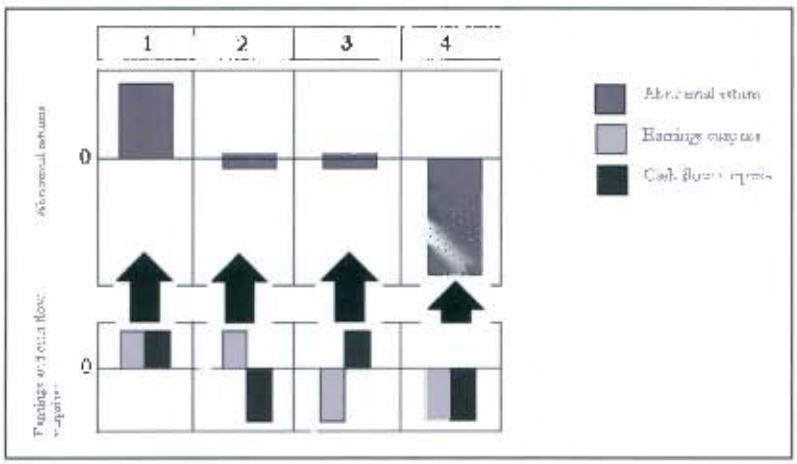
A year-on-year, as well as a pooled, analysis was performed for all the tests detailed above. This was done in order to test the persistence of any findings and to possibly provide evidence to support general conclusions beyond the specific sample period. This resulted in further disaggregation of results with a resultant decrease in the statistical significance of the findings. Although all results are presented in the Appendix XII, only those statistically significant results are analysed further.

5.4 Supplementary testing

For the purpose of inter-study comparison, all the statistical characteristics of the data used in this study are included in Appendix XI.

The universe of abnormal returns was also grouped according to the direction of earnings and cash flow surprises around earnings announcement dates. That is to say, based on a random-walk model, those companies that had an increase in earnings or cash flows over the prior year are deemed to have had a positive surprise, and those with a decrease in earnings or cash flows have experienced a negative surprise. This is illustrated graphically in figure 5.1 below

Figure 5.1 *Continuum of Earnings and Cash flow market signals*



The magnitude of the average abnormal return was compared along the following continuum of earnings and cash flows market signals:

1. Earnings and cash flow

    - Unambiguous positive surprise: Positive earnings and cash flow surprise
    - Ambiguous surprise: Positive earnings surprise and negative cash flow surprise
    - Ambiguous surprise: Positive cash flow surprise and negative earnings surprise

- Unambiguous negative surprise: Negative earnings and cash flow surprise

2. Earnings

    - Positive earnings surprise
    - Negative earnings surprise

3. Cash flow

    - Positive cash flow surprise
    - Negative cash flow surprise

An analysis of variance was performed to test if these populations of abnormal returns were statistically different across these categories. This test of association between the direction of earnings and cash flow surprises provides evidence about the different association between earnings and cash flows, and abnormal returns.

Chapter 6

RESULTS AND ANALYSIS

6.1 Results

The results of the regression analysis modeling abnormal returns are tabulated below. Statistically significant results are presented in red.

6.1.1 Pooled results

Table 6.1 details the results of the stepwise pooled regression of all qualifying firm-years during the sample period. These results are based on raw regression data, without conditioning for outliers. Only Earnings are statistically significant in explaining abnormal returns. Earnings per share explain only 1.37% [table 6.1, row 1, column e] of the variation in three-month lagged abnormal. As anticipated, positive earnings result in an increase in the contemporaneous cumulative annual abnormal return. In the unwinsorised pooled regression, the cash flow variable, Cash flow from operations does not have a statistically significant association with abnormal returns and does not add any explanatory power in the stepwise regression model of abnormal earnings.

Table 6.1

Pooled Regression results of entire universe of share returns: non-winsorised

	Unwinsorised Pooled results	***Beta***	***p level***	***Mean***	***Std Dev***	***Adj R2***	***p level***
		a	*b*	*c*	*d*	*e*	*f*
1	*Earnings*	**13.48**	**0.0000**	**0.1983**	**0.8279**	**1.37%**	**0.0000**
2	*Cash flow from operations*	-2.93	0.1864	0.3515	0.14244	0.05%	0.1864
3	Model					**1.42%**	**0.0000**

Table 6.2 presents the results of the same regression analysis after winsorising the data to its 95% confidence levels.

Table 6.2

Pooled Regression results of entire universe of share returns: Winsorised

	Winsorised Pooled results	***Beta***	***p level***	***Mean***	***Std Dev***	***Adj R2***	***p level***
		a	*b*	*c*	*d*	*e*	*f*
1	*Earnings*	17.87	0.0000	0. 1922	0.4544	5.49%	0.0000
2	*Cash flow from operations*	6.93	0.0163	0.3212	07334	0.17%	0.0163
3	Model					5.66%	0.0000

The results of winsorising the data suggest that a few significant outliers distorted both the results and explanatory power of the regression model. Once again, consistent with expectations and prior research, the relationship between earnings and abnormal returns is stronger than the relationship between cash flows and abnormal returns, and earnings dominates cash flows in its ability to explain the variation in abnormal returns. After winsorisng the regression inputs, Cash flows do exhibit statistically significant (p=0.0163 [table 6.2, row 2, column f]) explanatory power beyond that of earnings (an additional .17% [table 6.2, row 2, column e] or a 3% increase). The Durban-Watson statistic, which measures the degree of serial correlation ranges from 1.56– 2.19 with and avetage of 1.86. This suggests that there is not a significant degree of serial autocorrelation. Refer to Appendix X for detailed regression statistics.

A number of authors suggest that outliers might be of particular interest, particularly with respect to instances where earnings and cash flows differ significandy (where significant accruals have been made). For this reason, all winsorised data items were also inspected for reasonability. These cases have been included in Appendix IX.

6.1.2 Results by Industry

Table 6.3 below, presents the results of the industry specific regression model using unwinsorised underlying data. Eight out of eleven industry regression models are statistically significant ($p \leq 0.05$) in explaining the variation in abnormal returns. The adjusted coefficient of determination, which measures the percentage of variation explained, ranges from 2.98%[table 6.3, row 10, column m] (Financial Services) to 22.92%[table 6.3, row 4, column m] (Services). Interestingly, cash flows dominate earnings in explaining abnormal returns in seven of these eight occurrences.

Further analysis of the direction and strength of the statistically significant relationships between cash flows and abnormal returns suggests that a number of these occurrences might

be the result of unwinsorised outliers. It is counterintuitive that there should be a statistically significant negative relationship between cash flows and abnormal returns as is the case in Services (β=-52.46, p=0.00 [table 6.3, row 4, column g,h]) and Mining and Resources (β=-37.08, p=0.00 [table 6.3, row 6, column g,h]) as detailed in Table 6.3 below as it would normally be expected that, all else being equal, positive abnormal returns would be associated with cash inflows which add value to a firm. This is confirmed by the analysis of winsorised industry regression models presented in Table 6.4.

The direction of the relationship with earnings and cash flows in the winsorised industry results presented below is more consistent with expectations; one expects abnormal returns to be positively associated with earnings.

These inconsistent results provide further motivation for winsorising the regression inputs.

Table 6.3

Industry Regression results: non-winsorised

		Earnings							Cash Flow from operations					Whole Regression model		
		Beta	p level	Mean	Std Dev	Adj R2	p level	Beta	p level	Mean	Std Dev	Adj R2	p level	Multi R^2	p level	N
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
1	Electronics and Electrical	10.26	0.72	0.2816	1.1694	0.09%	0.715	20.24	0.47	0.4253	1.3263	1.08%	0.193	1.17%	0.40	158
2	Computers	12.09	0.29	0.0996	0.533	0.87%	0.286	15.07	0.18	0.0453	0.9261	5.18%	0.010	6.05%	0.02	127
3	Textiles	6.35	0.84	0.1791	0.739	0.02%	0.843	37.73	0.24	0.3504	0.8888	9.97%	0.000	10.00%	0.00	148
4	Services	47.93	0.00	0.2436	0.7098	6.85%	0.000	-52.46	0.00	0.2731	1.4502	16.07%	0.000	22.92%	0.00	409
5	Retail	-7.37	0.72	0.3301	1.3692	0.04%	0.719	12.59	0.54	0.5466	1.6565	0.30%	0.333	0.35%	0.59	310
6	Mining and Resources	44.71	0.00	0.1627	0.3954	2.25%	0.001	-37.08	0.00	0.2341	0.5984	4.92%	0.000	7.16%	0.00	469
7	Insurance and Real Estate	13.71	0.04	0.1159	0.784	0.90%	0.036	28.23	0.00	0.2665	1.3967	14.52%	0.000	15.43%	0.00	415
8	Industrial	6.32	0.23	0.1591	0.7907	0.32%	0.229	30.05	0.00	0.4006	0.7615	10.80%	0.000	11.12%	0.00	406
9	Food, Beverages and Drugs	-10.02	0.30	0.1297	0.9821	0.34%	0.304	36.72	0.00	0.3279	0.9149	8.17%	0.000	8.51%	0.00	286
10	Financial Services	13.1	0.03	0.242	0.5992	2.74%	0.014	5.1	0.46	0.5354	3.4227	0.24%	0.464	2.98%	0.04	221
11	Transportation	-2.75	0.87	0.2905	0.6884	0.01%	0.868	13.89	0.40	0.517	0.7879	1.30%	0.097	1.31%	0.25	214
12	**Average**	**9.37**	**0.37**	**0.2031**	**0.7964**	**1.31%**	**0.37**	**10.01**	**0.21**	**0.3566**	**1.2845**	**6.60%**	**0.10**	**7.91%**	**0.12**	
13	*All Shares*	**13.48**	**0.00**	**0.2905**	**0.6884**	**1.37%**	**0.000**	**-2.93**	0.19	0.3515	1.1244	0.05%	0.186	**1.42%**	**0.00**	3'163

Table 6.4

Industry Regression results: Winsorised

		Earnings							*Cash Flow from operations*					*Whole Regression model*		
		Beta	*p level*	*Mean*	*Std Dev*	*Adj R2*	*p level*	*Beta*	*p level*	*Mean*	*Std Dev*	*Adj R2*	*p level*	*Multi R²*	*p level*	*N*
		a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*
1	*Electronics and Electrical*	13.13	0.31	0.2086	0.459	0.05%	0.005	11.35	0.38	0.3539	0.6495	0.47%	0.382	5.39%	0.01	158
2	*Computers*	17.62	0.22	0.1061	0.4666	0.07%	0.003	10.73	0.46	0.0834	0.7018	0.42%	0.456	7.27%	0.01	127
3	*Textiles*	29.18	0.33	0.2022	0.4995	0.10%	0.000	3.23	0.91	0.3562	0.7219	0.01%	0.914	10.44%	0.00	148
4	*Services*	31.19	0.00	0.2054	0.4977	0.07%	0.000	6.93	0.32	0.2804	0.7831	0.23%	0.316	7.10%	0.00	409
5	*Retail*	14.33	0.32	0.2784	0.648	0.04%	0.000	7.16	0.62	0.4954	1.0261	0.08%	0.617	4.46%	0.00	349
6	*Mining and Resources*	18.27	0.02	0.1574	0.3551	0.01%	0.061	-11.99	0.12	0.2341	0.5984	0.51%	0.121	1.26%	0.05	469
7	*Insurance and Real Estate*	12.25	0.03	0.1284	0.3117	0.01%	0.026	14.45	0.01	0.2067	0.6123	4.17%	0.000	5.31%	0.00	415
8	*Industrial*	19.6	0.01	0.1926	0.4349	0.10%	0.000	16.37	0.03	0.3926	0.7144	1.10%	0.000	11.45%	0.00	406
9	*Food, Beverages and Drugs*	14.04	0.18	0.1679	0.405	0.01%	0.178	19.85	0.05	0.3315	0.6947	10.03%	0.000	10.60%	0.00	286
10	*Financial Services*	-5.8	0.62	0.2447	0.5231	0.00%	0.617	34.04	0.00	0.3271	0.7527	8.55%	0.000	8.65%	0.00	221
11	*Transportation*	18.72	0.19	0.2509	0.4059	0.07%	0.000	8.58	0.55	0.4972	0.6615	0.16%	0.548	7.08%	0.00	214
12	Average	16.59	0.20	0.1948	0.4551	0.05%	0.08	10	0.31	0.3235	0.7197	2.34%	0.30	7.18%	0.01	
13	*All Shares*	17.87	0.00	0.1922	0.4544	0.05%	0.000	6.93	0.02	0.3212	0.7334	0.17%	0.016	5.66%	0.00	3'163

Table 6.4 above, present the results of the industry regression analysis after winsorising the data to its 95% confidence limits. The effect of winsorising the data to its 95% confidence limits results in statistically significant industry regression models with adjusted coefficients of determination ranging from 1.26%[table 6.4, row 6, column m] (Mining and Resources) to 11.45%[table 6.4, row 8, column m] (Industrial). In all but three instances (Insurance and Real estate, Food, Beverages and Drugs and Financial Services), earnings dominate cash flows in explanatory power, which is more consistent with both expectations, prior research findings and the results for the pooled winsorised regression analysis.

Likewise, in all circumstances where regression coefficients are statistically significant at least at a 5% level, the response coefficients to abnormal earnings are positive as anticipated.

Table 6.5

Regression results of pooled analysis: Top half of winsorised universe by trading volume

	High Trading volume	***Beta***	***p level***	***Mean***	***Std Dev***	***Adj R2***	***p level***
		a	*b*	*c*	*D*	*e*	*f*
1	*Earnings*	**14.90**	**0.00**	**0.1796**	**0.4249**	**4.23%**	**0.000**
2	*Cash Flow*	**7.54**	**0.04**	**0.2940**	**0.7077**	**0.25%**	**0.044**
3	*Model (1564 observations)*					**4.47%**	**0.000**

Table 6.5 above and 6.6 below present the results of the regression analysis performed on pooled winsorised firm year data divided between top and bottom half based on a metric that measures the turnover of shares as a percentage of the weighted average number of shares in issue over the contemporaneous firm year. Table 6.5 presents the regression statistics for top half of firm years by trading volume.

By dividing the universe of abnormal returns between those shares that are traded frequently versus those that are traded relatively infrequently, we test the consistency of results between heavily and thinly traded shares. This provides evidence about the assumption that the market efficiently reflects publicly available information (Weak form -Efficient Market Hypothesis).

Table 6.6 presents the regression statistics for those firm years that fall into the bottom half of the universe of firm years based on trading volumes.

Table 6.6

Regression results of pooled analysis: Bottom half of winsorised universe by trading volume

	Low Trading volume	***Beta***	***p level***	***Mean***	***Std Dev***	***Adj R2***	***p level***
		a	*b*	*c*	*d*	*e*	*f*
1	*Earnings*	**23.14**	**0.00**	**0.2030**	**0.4841**	**7.15%**	**0.000**
2	*Cash Flow*	4.27	0.35	0.3531	0.7620	0.05%	0.347
3	*Model (1564 observations)*					**7.20%**	**0.000**

The more significant results evidenced by the top half of the universe determined by trading volume show that both Earnings and Cash flows are significant in explaining that the variation is abnormal returns although Earnings significantly dominated cash flows. Earnings are also more strongly associated with abnormal returns (β= 14.90, p=0.00 [table 6.5, row 1, column a,b] versus β=7.54, p=0.04 [table 6.5, row 2, column a,b]). The less authoritative results from the thinly traded shares in Table 6.6 only provide evidence that earnings are statistically significant in explaining abnormal returns (p=0.000 [table 6.6, row 1, column f]).

Further investigation into these ancillary findings might also provide a basis for concluding that as companies are traded less frequently, cash flows tend to become less important as myopic 'penny stock' investors are more fixated by earnings. To a certain degree, thinly traded shares are usually too small to attract the attention and accompanying scrutiny of institutional investors.

The lack of consistency between these results, with each regression having at least 1564 observations, suggests that the JSE securities exchange is subject to a thin trading phenomenon.

Table 6.7 and 6.8 below expand the results of the analysis by trading volume to an industry level. More important than comparing the consistency of the top and bottom half, is the consistency of the results between the top half by trading volume presented in Table 6.7 and the results of the winsorised industry analysis presented in Table 6.4 upon which most conclusion are to be drawn. We have already established that a thin trading phenomenon exists and results in the different regression results in a pooled top half/bottom half by trading volume comparison.

Table 6.7

Industry Regression results of pooled analysis: Top half of winsorised universe by trading volume

		Earnings							*Cash Flow from operations*					*Whole Regression model*		
		Beta	*p level*	*Mean*	*Std Dev*	*Adj R2*	*p level*	*Beta*	*P level*	*Mean*	*Std Dev*	*Adj R2*	*p level*	*Multi R2*	*p level*	*N*
		a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*I*	*j*	*k*	*l*	*m*	*n*	*o*
1	Electronics and Electrical	2.44	0.87	0.2106	0.4089	0.04%	0.874	11.98	0.44	0.3431	0.5722	1.82%	0.262	1.86%	0.529	71
2	Computers	-0.1	-0.45	0.1529	0.4494	0.00%	0.997	26.91	0.24	0.1511	0.6469	**7.19%**	**0.011**	**7.19%**	**0.040**	89
3	Textiles	8.84	0.89	0.1567	0.5142	4.38%	0.133	12.29	0.85	0.294	0.7264	0.04%	0.893	4.42%	0.323	53
4	Services	**29.17**	**0.00**	**0.1899**	**0.4503**	**6.82%**	**0.000**	-8.08	0.31	0.2202	0.6998	0.44%	0.308	**6.46%**	**0.001**	227
5	Retail	4.78	0.83	0.2525	0.5606	0.03%	0.833	9.55	0.67	0.3796	0.9553	1.97%	0.080	2.00%	0.212	157
6	Mining and Resources	12.06	0.18	0.1161	0.2481	**1.56%**	**0.056**	0.64	0.94	0.1868	0.4773	0.00%	0.944	1.56%	0.162	234
7	Insurance and Real Estate	3.9	0.59	0.1252	0.2627	0.14%	0.591	**14.95**	**0.04**	**0.2327**	**0.6418**	2.56%	0.023	2.70%	0.065	203
8	Industrial	16.71	0.07	0.1866	0.4299	**1.49%**	**0.066**	**17.17**	**0.06**	**0.4045**	**0.7452**	**8.16%**	**0.000**	**9.66%**	**0.000**	210
9	Food, Beverages and Drugs	5.77	0.78	0.1563	0.4993	0.07%	0.783	28.73	0.17	0.3109	0.721	**11.45%**	**0.001**	**11.53%**	**0.003**	97
10	Financial Services	-6.53	0.68	0.1954	0.3715	0.12%	0.683	**30.96**	**0.05**	**0.2693**	**0.6144**	**6.45%**	**0.003**	**6.56%**	**0.010**	138
11	Transportation	21.69	0.48	0.3218	0.5973	**10.19%**	**0.003**	10.89	0.72	0.5756	0.9219	0.14%	0.721	**10.33%**	**0.011**	85
12	**Average**	**8.98**	**0.45**	**0.1876**	**0.4357**	**2.19%**	**0.456**	**14**	**0.41**	**0.3062**	**0.702**	**3.66%**	**0.295**	**0.06**	**0.123**	
13	All Shares	14.9	0.00	0.1796	0.4249	4.23%	0.000	7.54	0.04	**0.291**	0.7077	0.25%	0.044	4.47%	0.000	1'564

Table 6.8

Industry Regression results of pooled analysis: Bottom half of winsorised universe by trading volume

		Earnings						Cash Flow from operations						Whole Regression model		
		Beta	p level	Mean	Std Dev	Adj R2	p level	Beta	P level	Mean	Std Dev	Adj R2	p level	Multi R2	p level	N
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
1	Electronics and Electrical	34.18	0.14	0.2069	0.4985	11.63%	0.001	0.00	1.00	0.3627	0.7096	0.00%	0.997	11.63%	0.006	87
2	Computers	28.04	0.19	-0.0036	0.4933	7.38%	0.099	-1.00	0.95	-0.0751	0.8033	0.01%	0.948	7.40%	0.261	38
3	Textiles	48.71	0.20	0.1836	0.487	15.34%	0.000	-10.00	0.79	0.3372	0.7268	0.07%	0.794	15.41%	0.001	87
4	Services	31.85	0.02	0.2249	0.5518	8.05%	0.000	4.00	0.75	0.3554	0.8722	0.05%	0.752	8.10%	0.001	182
5	Retail	19.26	0.33	0.305	0.7277	7.03%	0.001	8.00	0.69	0.6142	1.0842	0.10%	0.691	7.13%	0.004	153
6	Mining and Resources	45.39	0.00	0.206	0.4513	0.71%	0.227	-43.00	0.00	0.3139	0.73	4.64%	0.002	5.35%	0.003	269
7	Insurance and Real Estate	17.1	0.06	0.1315	0.3529	6.79%	0.000	13.00	0.14	0.1818	0.5832	0.96%	0.142	7.74%	0.000	212
8	Industrial	25.29	0.06	0.199	0.4412	13.50%	0.000	13.00	0.33	0.3798	0.6816	0.42%	0.333	13.92%	0.000	196
9	Food, Beverages and Drugs	17.82	0.15	0.1739	0.3481	9.40%	0.000	16.00	0.20	0.3421	0.6826	0.78%	0.204	10.18%	0.000	189
10	Financial Services	-5.38	0.77	0.3267	0.7019	0.10%	0.768	41.00	0.03	0.4233	0.935	13.07%	0.001	13.17%	0.004	83
11	Transportation	20.19	0.08	0.2043	0.1858	5.65%	0.007	5.00	0.64	0.4456	0.4044	5.81%	0.644	11.46%	0.023	129
12	**Average**	**25.68**	**0.18**	**0.1962**	**0.4763**	**7.78%**	**0.100**	**3.00**	**0.50**	**0.3346**	**0.7466**	**2.36%**	**0.501**	**10.13%**	**0.027**	
13	All Shares	23.14	0.00	0.203	0.4841	7.15%	0.000	4.27	0.35	0.3531	0.762	0.05%	0.347	7.20%	0.000	1'565

In only four of eleven industries are earnings (Services, Mining and Resources, Industrial and Transportation) and cash flows (Computers, Industrial, Food, Beverages and Drugs, and Financial Services) significant in explaining the variation in abnormal returns, whereas in the results presented in Table 6.4, eight earnings (Electrical and Electronics, Computers, Textiles, Services, Retail, Insurance and Real estate, Industrial and Transportation) and four cash flow variables (Insurance and Real estate, Industrial, Food, Beverages and Drugs, and Financial Services) were statistically significant in explaining the variation in abnormal returns as measured by the Adj R^2 (Adjusted coefficient of determination).

These results and the inconsistencies across industries and between thinly and heavily traded shares will be analysed later in this chapter with particular attention being paid to the specific nature of these industries and the resultant value implications for cash flows and earnings in order to establish a more contextual understanding of the earnings/cash flow/abnormal return relationship.

Table 6.9 below, presents the results of the regression analysis on an annual basis over the sample period 1988 to 2002. These results are based on data winsorised to their 95% confidence limits. This tests the consistency of results across time. A consistent result suggests that the findings of this research are not simply period-specific. If the generality of these findings can be established, this will allow broader conclusions and inferences to be drawn that extend beyond the sample period alone. Further detailed results, broken down to an industry and calendar year level, are presented, where statistically significant, in Appendix XII.

In all but three of the fifteen years from 1988 to 2002, abnormal returns can be modeled to a statistically significant degree by a combination of earnings and cash flows. As the number of observations increases from year to year, the frequency of non-significant models decreases (1988: 37 observations, 1989: 87 observations, 1998: 255 observations).

Table 6.9

Year on year Regression results of pooled analysis: Winsorised universe

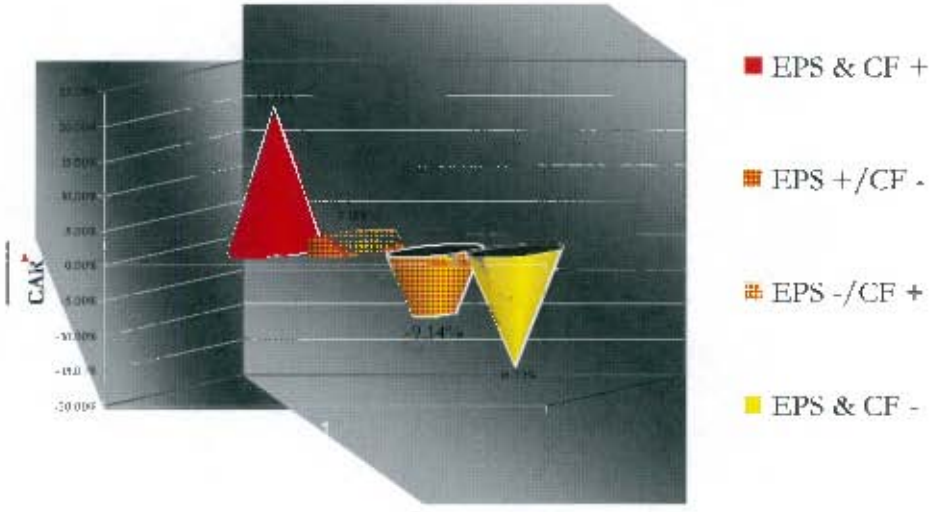
		Earnings						*Cash Flow from operations*						*Whole Regression model*		
		Beta	p level	Mean	Std Dev	Adj R2	p level	Beta	p level	Mean	Std Dev	Adj R2	p level	Multi R2	p level	N
		a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*	*m*	*n*	*o*
1	1988	0.75	0.3601	0.3316	0.471	1.35%	0.494	0.38	0.4444	0.4898	0.7698	1.71%	0.444	3.06%	0.5900	57
2	1989	1.01	0.9632	0.6282	0.741	0.00%	0.963	22.02	0.3140	0.9392	1.2124	5.24%	0.033	5.24%	0.1041	87
3	1990	13.20	0.6760	0.511	0.7648	0.11%	0.676	25.71	0.4161	0.7591	1.1974	14.83%	0.000	14.93%	0.0000	144
4	1991	27.06	0.0316	0.3964	0.6661	15.32%	0.000	14.49	0.2475	0.6635	1.056	0.64%	0.247	15.96%	0.0000	180
5	1992	4.85	0.6734	0.2639	0.5381	0.09%	0.673	15.11	0.1900	0.4354	0.7853	3.57%	0.009	3.66%	0.0313	189
6	1993	7.24	0.6242	0.2414	0.5481	0.11%	0.624	26.61	0.0730	0.4158	0.857	10.93%	0.000	11.04%	0.0000	201
7	1994	21.02	0.0256	0.2732	0.4997	7.64%	0.000	9.31	0.3205	0.4498	0.8671	0.43%	0.320	8.07%	0.0001	216
8	1995	17.96	0.2509	0.1892	0.3695	3.26%	0.007	9.11	0.9942	0.2807	0.548	0.00%	0.994	3.26%	0.0261	223
9	1996	22.41	0.1080	0.1432	0.3268	1.01%	0.108	52.82	0.0002	0.2297	0.4627	10.76%	0.000	11.77%	0.0000	230
10	1997	15.40	0.0618	0.0954	0.2379	3.59%	0.002	5.4	0.5115	0.1808	0.384	0.17%	0.511	3.75%	0.0084	253
11	1998	2.87	0.7759	0.072	0.2536	0.03%	0.776	8.92	0.3768	0.117	0.4536	1.25%	0.075	1.28%	0.1973	255
12	1999	7.89	0.2177	0.0692	0.307	0.54%	0.218	17.31	0.0065	0.1259	0.4593	4.17%	0.001	4.71%	0.0015	274
13	2000	45.73	0.0000	0.1063	0.2754	14.44%	0.000	-16.2	0.0099	0.1538	0.5636	2.03%	0.010	16.47%	0.0000	281
14	2001	15.41	0.0211	0.1034	0.2963	1.62%	0.021	21.06	0.0017	0.231	0.5372	8.84%	0.000	10.46%	0.0000	300
15	2002	31.56	0.0001	0.1401	0.4123	5.72%	0.000	-10.26	0.1994	0.2946	0.7314	0.65%	0.157	6.37%	0.0001	293
16	Average	12.64	0.3193	0.2376	0.4472	3.66%	0.30	13.00	0.27	0.3844	0.7257	4.35%	0.19	8.00%	0.0639	
17	All Shares	17.87	0.00	0.1922	0.4544	5.49%	0.000	6.93	0.02	0.3212	0.7334	0.17%	0.016	5.60%	0.00	3'163

There is little evidence to suggest that the earnings/cash flow/abnormal return relationship is consistent over the sample period, based on the results presented in Table 6.9. As the number of observations generally increases over time, the finding seems to suggest a more powerful relationship between earnings and cash flows and abnormal returns. They do not, however, support the pooled findings that earnings are superior at modeling the variation in abnormal earnings. This suggests that the increase in the explanatory power of the models and individual explanatory variables is purely a result of the increased number of observations used. It also suggests that a more refined research methodology modeling abnormal returns using earnings and cash flows might provide more consistent results.

By comparison with other studies, the significant coefficient of determination of earnings and cash flows models, which range from 3.26% [table 6.9, row 8, column m] to 16.47% [table 6.9, row 13, column m] falls with in the range of those documented in 'On the Usefulness of Earnings and Earnings research: Lessons from 2 decades of empirical research' by Baruch Lev (1989).

Figure 6.1 presents the results of the supplementary testing comparing the direction of earnings and cash flow surprises and the contemporaneous cumulative abnormal return described earlier. The complete analysis of the supplementary testing is detailed in Appendix XIII.

Figure 6.1 *Direction of earnings and cash flow surprises versus abnormal returns*



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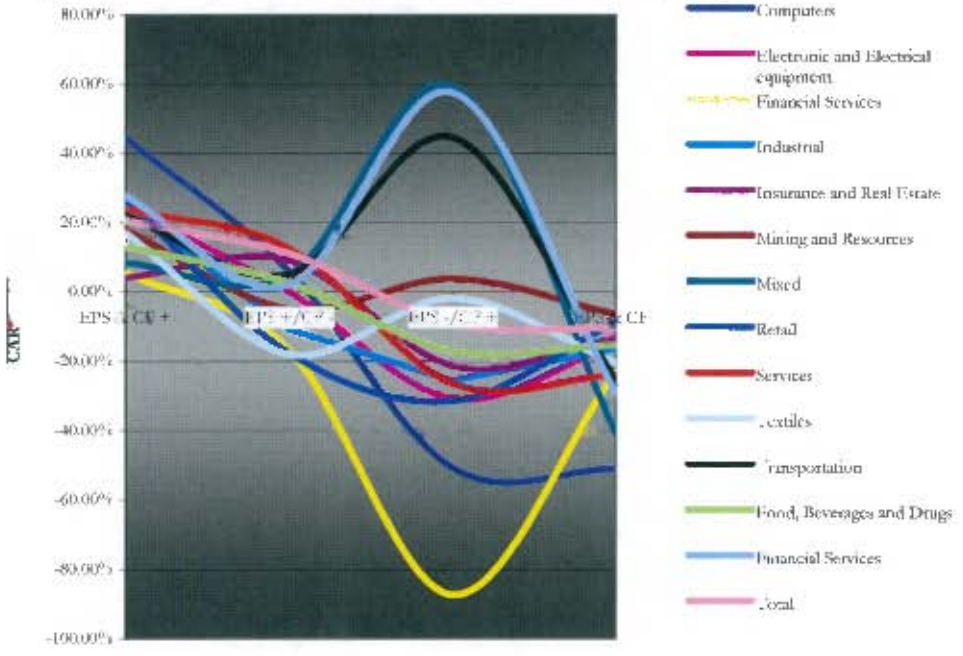
Based on the premise that earnings surprises are more strongly associated with abnormal returns, of the two ambiguous signals, EPS+/CF- and EPS-/CF+, the former is expected to result in a higher abnormal return. This is confirmed by the above results. The results of this same test across various industries and from 1988-2002 are presented graphically in Figure 6.2 and 6.3 respectively below:

Figure 6.2 *Direction of earnings and cash flow surprises versus abnormal returns by industry*



Although results are not consistent across all industries, particularly with respect to the variation in abnormal returns around the ambiguous EPS-/CF+ signal, in all industries, there is a decline in the abnormal return moving along the continuum from the positive surprise signal EPS and CF positive to EPS and CF negative. Likewise, in Figure 6.3 below, although there is once again variation in the ambiguous signal categories, the general trend is a decline in the abnormal return as one moves down the earnings/cash flow surprise spectrum. The relevant statistical properties of these tests are presented in detail in Appendix XIII.

Figure 6.3 *Direction of earnings and cash flow surprises versus abnormal returns by year*

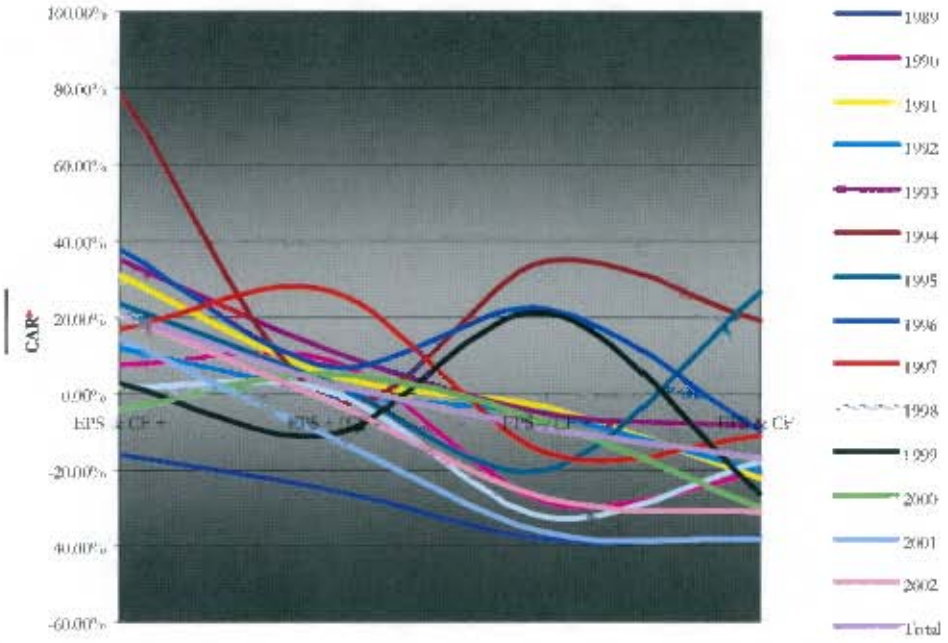


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Figure 6.4 *Direction of EP versus abnormal returns*

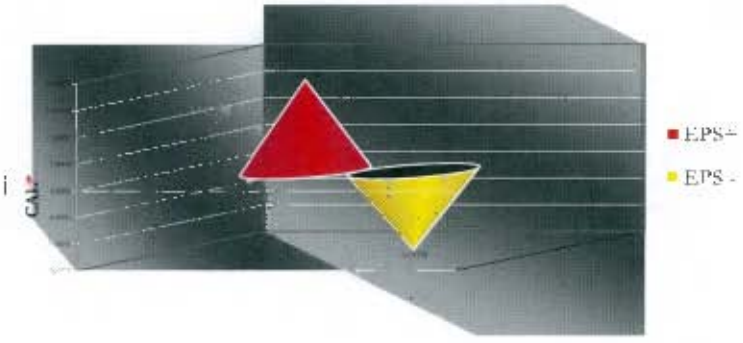

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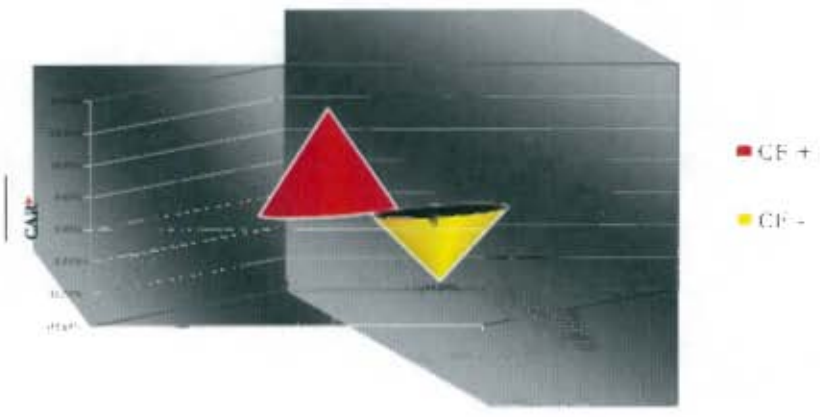
Figure 6.4 depicts the results of the supplementary tests of the direction of earnings surprise as a specifier of abnormal returns (Average CAR: EPS+ = 17.67%, EPS-=-14.83%). Figure 6.5 below, details the same results for the cash flow surprises (Average CAR: CF+ = 16.02%, CF-=-10.96%). It is evident from these graphs that the direction of earnings and cash flow surprises is associated with the direction and magnitude of abnormal returns. It is

also apparent from the figures that the earnings surprises are a better specifier of abnormal returns. These results however, are not statistically significant.

Figure 6.5 *Direction of CF versus abnormal returns*



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6.2 Analysis

6.2.1 Review of descriptive statistics[21]

Consistent with conventional thinking CFO scaled by beginning of period price is more volatile than its accrual counterpart[22] (STD dev of 0.454 vs. 0.733). This is consistent between the bottom and top half of the universe of firm years when grouped by trading volume. Refer to the descriptive statistics in Appendix XI.

The mean EPS is lower than the mean CFO (0.192 vs. 0.321). This is consistent across the entire sample period. Wilson (1987) speculated that this relationship might not always persist as the nature of operating, working capital accruals change based on the contemporaneous economic conditions. In anticipation of demand, increases in inventory will result in a reduction in the net cash inflows from operations for instance. Earnings also reflect the cost of debt financing which is not always reflected in cash flow from operations but sometimes in financing activities.

This relationship persists between the top and bottom half of firm years by trading volume. This is, however, not persistence across all industries, the only exception being the computer industry where the mean EPS exceeds the mean CFO by 27.2% (0.106 vs. 0.834).

The Computer industry classification is made up of software and computer related service companies rather than computer hardware companies, which falls within the electrical and electronics industry classification. During the late 1990s, this had an increasing weighting of information technology companies. This sector experienced supernatural growth attributed to the internet boom of the late 1990's and early 2000. The accounting profession grappled with the seeming inadequacy of historic cost accounting to recognise the value of these companies as appraised by the euphoric market. The increased recognition of intangibles in an attempt to move away from historic cost accounting and closer to fair value accounting may have resulted in an increase in earnings, all else being equal. The failure of these overstated earnings to crystallise into cash flows might too have contributed to the resultant dramatic burst of this internet bubble and later impairment of many of these intangibles.

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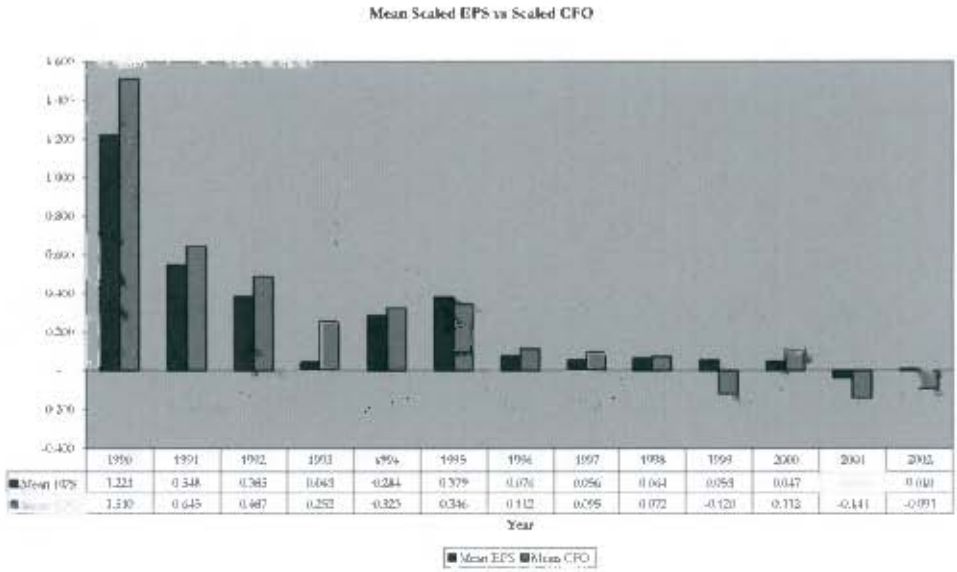
[21] Based on winsorised data unless otherwise stated.

[22] EPS scaled by beginning of period price

Figure 6.6



The mean CAR was 2.67%. If the Capital Asset Pricing Model specified expected returns perfectly, one would anticipate a mean CAR of 0.0%. The expected return of the top half by trading volume would be better specified as the assumption of an efficient market is more realistic. By comparison, the bottom half had a mean turnover of only 3.47% whereas the top half has a mean turnover of 95.58%. This vast difference, albeit not to the same extent, is reflected in the difference between the mean CAR of 3.49% vs. 1.84%.

The mean CAR across industries ranges from -4.13% (Insurance and Real Estate) to 7.53% (Financial Services) and across the sample period, it ranges from -13.92% (2000) to 44.19% (1994). This alarmingly large divergence from a CAR of zero points to the inadequacy of the CAPM, as applied in this context, as an expectation model for annual returns. For this reason, future research might consider using the contemporaneous market return to deflate annual firm-specific returns as used in Dechow (1994) and Ogle et al. (1999).

Table 6.10

	EPS[23]	CFO[24]	Cases
Ogle and Uliana (1999)			
Mean	*0.0954*	*0.1111*	*648*
Std dev.	*0.1745*	*0.4605*	*648*
Adj R2	*14.43%*	*1.29%*	*648*
This Study			
Industry classification: Industrial: 1995-1998			
Mean	*0.1180*	*0.2256*	*126*
Std dev.	*0.1867*	*0.4007*	*126*
All industries, 1995-1998			
Mean	*0.1224*	*0.1987*	*961*
Std dev.	*0.3014*	*04659*	*961*
All industries: Entire Sample period			
Mean	*0.1922*	*0.3212*	*3163*
Std dev.	*0.4544*	*0.7333*	*3163*

The apparent difference between the descriptive statistics of Ogle and Uliana (1999) as documented above and the comparable subsection of the pooled sample universe are a result of the filtering techniques used and the industry classifications. Ogle at al. (1999) examined 162 industrial companies between 1995 and 1998 giving a pooled sample of 648 observations. Using the more restrictive industrial industry classification over the same sample period only results in 126 observations as a number of these firm years have been excluded or classified into more specific industry classifications. Further, the industry classification used in this study is based on a company's industry classification in 30 June 2002 and ignores any migration that has taken place between industries over the sample period.

6.2.2 Analysis of regression models: Pooled and industry models

1.42% of the variation in CARs is explained in the Raw data model of CAR (1.37% by EPS and a further 0.05% by CFO). However, after winsorising all cases to their 95% confidence limits, this increases to 5.66% (5.49% by EPS and an additional 0.17% by CFO). Thus, despite Bowen et al. (1986) commenting that extreme observations may be of particular interest, it is evident that these outliers do not increase the ability of EPS and CFO to explain CAR on a pooled basis. A number of individual industry models change significantly

[23] Scaled by beginning of period share price

[24] Scaled by beginning of period share price

after winsorising; all models are significant at least a 5% significance level with the Multiple R^2 ranging from 1.26% to 10.60%. Both Services and Mining and Resources are exceptions decreasing from 22.92% to 7.1% (Services) and 1.26% to 1.16% (Mining and Resources). These are the results of a few significant outliers as documented in Appendix IX and their exclusion is, therefore, merited.

On the balance, EPS dominates CFO with a mean Adj. R^2 of 4.65% vs. 2.34%. Also, eight industries exhibit significant[25] Adj. R^2 for EPS vs. four CFO. In one of those eight cases (Industrial), CFO exhibits and additional 1.10% of explanatory power beyond EPS (an increase of 10.63%)

In all significant cases, a positive response coefficient is evident which supports the view that the market rewards positive EPS and CFO. On a pooled basis, the market rewards EPS more handsomely with a response coefficient of 17.87 vs. 6.93.

Despite the anomalous relationship between EPS and CFO in the computer industry as documented above, EPS is the only significant explanatory variable explaining 6.86% of the variation in CAR. This suggests that the accrual process performed by accountants is value relevant as appraised by the market consensus. Likewise, EPS is the only significant explanatory variable in explaining the variation of CAR in the following industries:

Table 6.11

Industry models with EPS dominating: winsorised

Industry	*Adj R^2 of EPS*	*P level*
Textiles	10.43%	0.000
Transport	6.92%	0.000
Services	6.87%	0.000
Computer	6.86%	0.003
Electrical and Electronics	4.92%	0.005
Retail	4.38%	0.000

In the Industrial industry classification EPS is dominant but CFO exhibits statistically significant explanatory power beyond EPS; 10.35% (p=0.000) is explained by EPS and a further 1.10% (p=0.000) is explained by CFO.

[25] p =< 0.05

In the following rather interesting cases, CFO dominates EPS as follows:

Table 6.12

Industry models with CFO dominating: winsorised

Industry	*Adj R^2 of EPS*	*P level*
Food, Beverages and Drugs	10.03%	0.000
Financial Services	8.55%	0.000
Insurance and Real estate	4.16%	0.000

In the Insurance and Real estate industry, the market values companies by focusing on their balance sheets rather than their income statements. Investors focus on the timing of future cash inflows and outflows to ensure that there is an adequate and profitable duration matching of assets and liabilities. For this possible reason, or the resultant indifference to short-term profitability, cash flows appear to dominate earnings in explaining CAR.

Food, Beverages and Drugs[26] is predominantly a mature industry with stable profitability. This is confirmed by the below average EPS and CFO volatility (EPS: 40.42 vs. 45.44 and CFO: 69.35 vs. 73.33). As a result, investors are focused on harvesting a smooth stream of cash flows as they sweat their assets. This results in similar CFO and EPS profiles and could be the reason behind the apparent superiority of CFO at modeling CAR.

The Financial Services industry, which to a large degree is structured to earn income from the interest differential between savings and loans, and increasingly through service fees, in a sense is in the business of trading money. It is surprising that CFO dominates EPS at explaining CAR as significant accruals are necessary to convert cash inflows and outflows to accrual-based earnings in this particular industry.

An examination of the year-on-year consistency of this relationship suggests that it might be as a result of the significant anomalous year 2002, which evidences this same relationship.

6.2.3 Analysis of regression models: Effect of trading volume

The more liquid top half has a multiple R^2 of only 4.47% and this is almost entirely explained by EPS (EPS = 4.23% and CFO = 0.25%). On an Industry level, a somewhat different

[26] This constructed industry classification has a very small weighting in pharmaceutical companies.

picture emerges: Only 3 of 11 industries have CARs which are better modeled by EPS as documented below in Table 6.13:

Table 6.13

Industry models with EPS dominating: winsorised/Top half by Trading volume

Industry	*Adj R^2 of EPS*	*P level*
Transport	10.19%	0.000
Services	6.02%	0.056
Mining and Resources	1.56%	0.003

The industrial sector, although previously evidencing only incremental information content in CFO, is now dominated by CFO, and EPS shows an incremental 1.49% beyond CFO (8.16%), giving a total multiple R^2 of 9.66%

All of the industries in Table 6.14 below continued to be dominated by cash flows, which confirm the results documented above:

Table 6.14

Industry models with CFO dominating: winsorised/Top half by Trading volume

Industry	*Adj R^2 of EPS*	*P level*
Food, Beverages and Drugs	11.45%	0.003
Financial Services	6.45%	0.003
Insurance and Real estate	2.56%	0.023

The Computer industry appears to be dominated by CFO in the more liquid top half by trading volume. This inconsistency casts doubt about the prevalence of the findings on the entire industry. We can concluded that both appear to be very closely associated at explaining CAR, but neither possesses significant incremental information content beyond the other explanatory variable.

6.2.4 Analysis of regression models: Persistence across sample period

In 6 of 15 years studied, EPS dominates CFO at explaining CAR and likewise in 6 years CFO dominates EPS (in 1988, 1989 and 1998 neither have statistically significant explanatory power). This inconsistency of results across time unfortunately prevents any

conclusions from being drawn about the pervasive nature of this relationship between CARs and EPS and CFO beyond the sample and period studied.

6.3 Results of supplementary testing

The portfolio based supplementary analysis tests the direction of earnings and cash flows surprises and their association with abnormal returns.

An analysis of variance in Table 6.15 below confirms that the four portfolios:

1. Corroborative: Positive Earnings and Cash flow surprise,
2. Ambiguous: Positive Earnings and negative Cash flow surprise,
3. Ambiguous: Negative Earnings and positive Cash flows surprise,
4. Corroborative: Negative Earnings and Cash flows surprise,

are differently associated with CARs.

Table 6.15

ANOVA: Summary

Groups			*Count*	*Sum*	*Mean*	*Variance*
Corroborative: EPS Pos AND CFO Pos			1640	340.230367	20.75%	0.79269
Ambiguous: EPS Pos AND CFO Neg			405	8.84285316	2.18%	0.82555
Ambiguous: EPS Neg AND CFO Pos			308	-28.159945	-9.14%	1.29071
Corroborative: EPS Neg AND CFO Neg			923	-154.42331	-16.73%	0.40298
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	90.73	3	30.2419	**41.2206002**	**0.00000**	**2.6076**
Within Groups	2 400.54	3272	0.7337			
Total	2 491.26	3275				

The results of t-tests, which are documented in Appendix XIII, comparing the separate portfolios, confirm that the mean cumulative abnormal returns of the above portfolios 1-4 are statistically different at varying levels:

$CAR^{1(p=0.000)} > CAR^{2(p=0.075)} > CAR^{3(p=0.133)} > CAR^{4}$

A conclusion cannot be drawn about the superiority of the mean CAR of portfolio 3 to portfolio 4, but portfolio 2 is statistically different to portfolio 4 at a 0.000% level. (Refer to Appendix XIII).

Although the signal of EPS appears to be better at dividing the universe of CARs between positive and negative CARs this cannot be confirmed statistically. The results of these tests are documented below in Table 6.16:

Table 6.16

Results of supplementary t-tests

	Positive surprise		Negative surprise	
	mean	p: t-test	mean	p: t-test
EPS	17.07%		-14.83%	
CFO	16.02%	0.360	-10.96%	0.100

6.4 Comparison with Barth et al.

Barth et al. (2001)employed an entirely different methodology to independently model the Market Value of Equity (MVE) using cash flows and accrual-based earnings. For this reason, a direct comparison of Adj R^2 is not comparable. Industries have been ranked in descending order of Adj R^2 below in Table 6.17:

Table 6.17

Earnings Adj Coefficient of Determination Accruals:

Industry	Adj. R squared
Pharmaceuticals	0.89
Food	0.76
Transportation	0.65
Retail	0.43
Insurance + real estate	0.43
Durable manufacturers	0.41
Services	0.41
Mining + Construction	0.40
Financial institutions	0.36
Extractive industries	0.33
Chemicals	0.29
Textiles + printg/pubg	0.28
Utilities	0.15
Computers	0.14
Mean	0.42

Earnings Adj Coefficient of Determination Cash Flows:

Industry	Adj. R squared
Pharmaceuticals	0.90
Food	0.76
Transportation	0.66
Retail	0.43
Insurance + real estate	0.43
Mining + Construction	0.42
Services	0.41
Durable manufacturers	0.40
Financial institutions	0.36
Extractive industries	0.32
Textiles + printg/pubg	0.29
Chemicals	0.26
Utilities	0.14
Computers	0.13
Mean	0.42

These coefficients of determination are significantly higher than those documented by other authors as they include a number of other variables to model the MVE in addition to earnings and cash flows.

Table 6.18

Adj R-sqr of significant industries: Total model 5.66% (p=0.000)

	EPS			CFO	
	Adj R2	p level		Adj R2	p level
Textiles	10.43%	0.000	Food, Beverages and Drugs	10.03%	0.000
Industrial	10.35%	0.000	Financial Services	8.55%	0.000
Transportation	6.92%	0.000	Insurance and Real Estate	4.17%	0.000
Services	6.87%	0.000			
Computers	6.86%	0.003			
Electronics and Electrical	4.92%	0.005			
Retail	4.38%	0.000			

The significant Adj. R^2s of the pooled and industry models[27] are tabulated in Table 6.18 above. These are in line with those documented by Lev (1989) below. These models of earnings and stock returns use a variety of explanatory variables and are also not directly comparable with the findings in Table 6.19.

Table 6.19

Comparable Coefficient of determination of other earningsreturn studies

Author/ Reference	*Year*	*Independent variable*	R^2
Bowen et al.	1987	Annual Earnings and Cash flow components	0.02-0.05
Freeman	1983	EPS	0.07-0.10
Jacobson	1987	Residual ROI	0.05
Lustgarten	1982	Earnings and Replacement cost and Sales	0.02-0.09
Beaver et al	1982	Net income and cash flows or inflationary gains	0.14-0.15
Lipe	1986	EPS and 6 earning components	0.15
Rayburn	1986	Components of earnings and cash flow	0.000-0.28
Beaver et al	1982	Net income and inflationary gains	0.03-0.30
Sepe	1982	Various ratios: risk and inflation adjusted measures	0.30
Magliolo	1986	Reserve recognition for oil and gas companies	0.10-0.062
Ogle et al.	1999	Components of earnings and cash flow	0.013-0.0145
		Global range	0.00-0.30
		Range for this study	0.013-0.115

[27] Based on winsorised data

Chapter 7

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

7.1 Conclusions

Based on the analysis above, the following specific conclusions can be drawn about the relationship between cumulative abnormal returns and the explanatory variables earnings per share and cash flow per share over the sample period studied:

EPS dominates CFO in explaining the variation of cumulative abnormal returns over the sample period 1988-2002. CFO does have statistically significant incremental information content beyond EPS.

This conclusion is unaffected by the trading volume of the shares studied or the winsorising of extreme outliers.

This relationship does not persist for all years in this sample period and the above conclusion can only be made on a pooled basis. For this reason, the generality of this conclusion cannot be inferred beyond the specific sample period.

The relationship between these two explanatory variables varies significantly across industries as follows (Mining and Resources omitted due to lack of significance):

Table 7.1

	Superior explanatory variable
Textiles	EPS
Industrial	EPS
Transport	EPS
Services	EPS
Computer	EPS
Electrical and Electronics	EPS
Retail	EPS
Food, Beverages and Drugs	CFO
Financial Services	CFO
Insurance and Real estate	CFO

These are not robust to tests of trading volume. The only relationships that persist when controlling for thinly traded share are tabulated below in Table 7.2. The others are either statistically insignificant or the dominant explanatory variable flip-flops.

Table 7.2

Superior expl variable: Trading volume Large	
Transport	EPS
Services	EPS
Food, Beverages and Drugs	CFO
Financial Services	CFO
Insurance and Real estate	CFO

Examination of the descriptive statistics of the explanatory variable suggests that CAPM is poor at modeling expected returns in this study.

Supplementary tests of association show that the signs of surprises in earnings and cash flows are strongly associated with abnormal returns, particularly when they are corroborative. No statistically significant conclusion can be drawn about the different association of earnings and cash flow surprises to abnormal returns.

A number of more general observations are also worth noting:

The results are not always robust to the effects of trading volumes. The cumulative abnormal returns of shares that are less frequently traded tend to be better modeled by accrual-based earnings. A possible explanation for this is that 'penny stock' investors are more fixated by earnings than institutional investors whose analysis involves looking through and concluding on the quality of an enterprise's earnings.

The winsorising of outliers to their 95% confidence limits results in findings that are more consistent with expectations. The most notable effect of this is that in a number of years and industries, this has the effect of removing the presence of negative earnings and cash flow response coefficients. Prior researchers have proposed that outliers may be of particular interest. The findings of this research suggest that few limited extreme outliers distort the ability of earnings and cash flows ability to model abnormal returns.

When the universe of abnormal returns is divided by trading volume, the cumulative abnormal return of less frequently traded shares is better modeled by earnings. This

statistically significant finding suggests that investors of "penny stock" are fixated by earnings and, in comparison to more actively traded shares, virtually ignore cash flows.

This lack of consistency of results also confirms the documented thin trading effect on the JSE Securities Exchange.

7.2 Suggestions for future research

Future research into this field could take on two broad possibilities:

1. Firstly, refinements to the current methodology, including extending the sample size, but ultimately testing the security market relevance of cash flows versus earnings, could be made.

2. Secondly, a similar methodology, possibly including refinements, could be used to investigate related fields.

Suggested methodological refinements:

- The use of a multifactor model such as the APT to specify normal returns rather than the single factor CAPM model as this failed, in the calculation of cumulative annual abnormal returns, to produce expected abnormal returns with a mean of zero. Alternatively, the market return could be used as a deflator for all return figures as employed by numerous other researchers.

- The use of a short return window rather than an annual return window. This would probably require a decrease in sample size due to the more exacting methodology required to identify actual annual result release date.

- More refined industry classifications, possibly relaxing the assumption that companies do not migrate from one classification to another.

- The use of companies with contemporaneous year-ends so that their results are from the same calendar year and are affected by the same contemporaneous movements in the economic cycle.

- The use of a non-linear regression model or the inclusion of other earnings or cash flow variables in the modeling of abnormal security returns.

- The use of true cash based income rather than Cash flows from operating income as a proxy for cash based earnings numbers.

Other related areas of possible future research:

- An investigation of the incremental information content of the uniquely South Africa measure of core or revenue earnings, Headline earnings per share (HEPS) versus published earnings per share.

- Although an extremely exacting and more refined methodology would be required, possibly with a reduced sample, over a short return window, an investigation in to the merits of the preparation of cash flow figures on the direct versus the indirect method. Significant effort is expended to prepare figures on the preferred direct method. A similar number could be arrived at on an indirect basis using the current and prior period balance sheet and income statement and the value relevance of this direct versus the indirect cash flow numbers could be appraised in a capital market context.

- The observed difference between the valuation implications of cash flows and accrual-based earnings between liquid and less liquid shares warrants further investigation into the observed effects of the thin trading phenomenon on the JSE. Future research should draw a conclusion on whether the result of this research, which suggests cash flows have less information content in smaller, less frequently traded companies, is a result of the document thin trading phenomenon alone or rather that investors in these 'penny stocks' do not place as much importance on cash flow information.

- Further research into the observed difference between the valuation implications of accounting disclosures across different industries may provide further insight to both accounting standard setting authorities that attempt to produce decision useful standards (e.g. Insurance industry - Accounting for Insurance contracts, Mining and Exploration industry - Environmental Liabilities, Pharmaceutical industry - Research and Development), and to the users of financial statements that attempt to distil important industry specific aspects of overwhelmingly detailed accounting disclosures.

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APPENDIX I

Listing of firms included in initial sample

Share Name	Code	Start year	End year	Total
AST GROUP	AAA	1999	2002	3
ABI	ABI	1988	2002	14
ABIL	ABL	1995	2002	7
AFBRAND	ABR	1998	2000	2
ACCORD	ACR	1999	2000	1
ACUITY	ACY	1999	2002	3
ADVTECH	ADH	1997	2001	4
ADMIRAL	ADL	1996	2002	6
ADONIS	ADO	1988	2002	14
ADCORP	ADR	1988	2001	13
ADVSOURCE	ADS	1988	1999	11
ADVANCED	ADT	1988	1999	11
ANBEECO	AEC	1988	2002	14
AVENG	AEG	1999	2002	3
ALEXFBS	AFB	1996	2002	6
AECI	AFE	1988	2002	14
AFLIFE	AFI	1990	2002	12
AFR-LEASE	AFL	1988	2001	13
AFGRI	AFR	1997	2002	5
AFROX	AFX	1988	2002	14
AGI	AGI	1999	2002	3
ANGLO	AGL	1988	2002	14
AHEALTH	AHH	1988	2002	14
AFHARV	AHV	1997	2002	5
AVMIN	AIN	1988	2002	14
ANAMINT	AIT	1988	1998	10
AMLAC	ALC	1996	2000	4
ALUDIE	ALD	1995	2002	7
APPLETON	ALE	2000	2002	2
ALLJOY	ALJ	1999	2002	3
ALIANCE	ALN	1997	2002	5
ALEXNDR	ALR	1988	1999	11
ALTECH	ALT	1988	2002	14
ALEXWYT	ALX	1988	2002	14
ALACRITY	ALY	1995	2002	7
AMAPS	AMA	1996	2002	6
AMB	AMB	1998	2002	4
AME	AME	1997	2001	4
AMGOLD	AMG	1988	1998	10
ANGLOPLAT	AMS	1988	2002	14
ANGOLD	ANG	1988	2002	14
APSTECH	APE	1999	2001	2
AUTOPGE	APG	1988	2000	12
ASTRAPAK	APK	1998	2002	4

APLITEC	APL	1998	2002	4
ASPEN	APN	1988	2002	14
AMBPEP	APP	1999	2002	3
ABCPLUS	APS	2000	2002	2
APEX	APX	1991	2000	9
AQUILA	AQL	1997	2002	5
AQUA	AQU	2000	2002	2
ARIES	ARE	1988	2000	12
AMAPROP	ARO	1988	1999	11
ARGENT	ART	1994	2002	8
ABSA	ASA	1988	2002	14
ASSMANG	ASG	1988	2002	14
ASSORE	ASR	1988	2002	14
ALTRON	ATN	1988	2002	14
ATLAS	ATS	1988	2002	14
AVGOLD	AVG	1991	2002	11
A-V-I	AVI	1988	2002	14
AVIS	AVS	1996	2002	6
AWETHU	AWT	1998	2002	4
BRAIT	BAT	1988	2002	14
BARWORLD	BAW	1988	2002	14
BOWCALF	BCF	1988	2002	14
BUILDMAX	BDM	1997	2002	5
BRIDGESTN	BDS	1998	2001	3
BEIGE	BEG	1998	2002	4
BELL	BEL	1995	2002	7
BICAF	BIC	1988	2001	13
BHPBILL	BIL	1997	2002	5
BJM	BJM	1998	2002	4
BILBOARD	BLL	1999	2000	1
BOLTONS	BLT	1988	2000	12
BONATLA	BNT	1998	2002	4
BARNEX	BNX	1989	2001	12
BOE	BOE	1988	2001	13
BOUMAT	BOU	1988	1999	11
BARPLAT	BPL	1988	2002	14
BRANDCO	BRC	1988	2002	14
BEARMAN	BRM	1988	2002	14
BOTREST	BRS	1988	1998	10
BRIMSTON	BRT	1998	2001	3
BRYANT	BRY	1999	2002	3
BUSBY	BSB	1998	2002	4
BASREAD	BSR	1988	2002	14
BTG	BTG	1988	2002	14
BURLINGTN	BUR	1988	2001	13
BEVCON	BVC	1990	1999	9
BIDVEST	BVT	1988	2002	14
BOLWEAR	BWR	1988	2000	12
CAPEMP	CAE	1999	2002	3
CBD-FUND	CBD	1988	2001	13
CCH	CCH	1998	2000	2
COMPCLEAR	CCL	1999	2002	3

CONNECT	CCT	1998	2002	4
CREDCOR	CDR	1999	2000	1
CADIZ	CDZ	1999	2001	2
CENPROP	CEN	1988	2001	13
CHESTER	CES	1997	2001	4
CHEMSERVE	CHE	1988	2002	14
CHILLRS	CHL	1997	1997	0
CROOKES	CKS	1988	2002	14
CLINICS	CLC	1988	2000	12
CLIENTELE	CLE	1999	2002	3
CITYLDG	CLH	1992	2002	10
CULTEL	CLT	1993	1998	5
CLYDE	CLY	1988	2001	13
COMMAND	CMA	1999	2002	3
CENMAG	CMG	1988	2002	14
CMH	CMH	1988	2002	14
CEMENCO	CMT	1988	2001	13
CONCOR	CNC	1988	2002	14
CONFED	CNF	1988	2002	14
CONTROL	CNL	1988	2002	14
CONSHU	CNS	1988	1998	10
CONAFEX	CNX	1988	2002	14
CENTURY	CNY	2000	2000	0
CHOICE	COI	1990	1998	8
COMAIR	COM	1998	2002	4
CORE	COR	1999	2001	2
COATES	COT	1988	1999	11
CORPCAP	CPA	1988	2002	14
CORPBANK	CPB	1999	2000	1
CAPITAL	CPL	1988	2001	13
CORPCOM	CPM	1998	2000	2
CAPTALL	CPT	1988	2002	14
COMPAREX	CPX	1995	2002	7
CARGO	CRG	1988	2002	14
COROHLD	CRH	1988	2002	14
CORNICK	CRK	1988	1998	10
CERAMIC	CRM	1988	2002	14
CORWIL	CRW	1988	2002	14
CRUX	CRX	1999	2001	2
CASHBIL	CSB	1988	2002	14
CSHOLDING	CSH	1999	2002	3
CAPSTAR	CST	1988	2001	13
CASEY	CSY	1999	2002	3
CULLINAN	CUL	1988	2002	14
CAXTON	CXT	1988	2002	14
CYBERHOST	CYB	1999	2000	1
CYCAD	CYD	1999	2002	3
DAEWOO	DAE	1988	2001	13
DAWN	DAW	1988	2002	14
DEBEERS	DBR	1988	2000	12
DCENTRIX	DCT	1999	2002	3
DIDATA	DDT	1988	2002	14

DECILLION	DEC	1999	2001	2
DELTA	DEL	1988	2002	14
DIGICOR	DGC	1999	2002	3
DELCORP	DLC	1988	1999	11
DELFOOD	DLF	1991	1999	8
DELHOLD	DLH	1990	1999	9
DALYS	DLS	1988	2000	12
DORBYL	DLV	1988	2002	14
DNA SUP	DNA	1992	2002	10
DYNAMO	DNM	1988	1999	11
DON	DON	1988	2002	14
DISTELL	DST	1988	2002	14
DISCOVERY	DSY	2000	2002	2
DATATEC	DTC	1995	2002	7
DUIKERS	DUK	1988	1999	11
DBN-DEEP	DUR	1988	2002	14
DYNAMIC	DYM	1989	2001	12
ECHOLD	ECH	1999	2002	3
EDCON	ECO	1988	2002	14
EDATA	EDT	1999	2002	3
ELLERINE	ELH	1988	2002	14
ELBGROUP	ELR	1988	2002	14
ELEXIR	ELX	1998	2002	4
ENERGY	ENR	1996	2002	6
ENSERVE	ENV	1996	2002	6
EOH	EOH	1999	2002	3
EXPLORER	EPL	1999	2001	2
EMPOWER	EPW	1997	1998	1
ERM	ERM	1997	2001	4
ERP.COM	ERP	2000	2002	2
EERSLNG	ESL	1988	2002	14
EUREKA	EUR	1988	2002	14
EXCELL	EXL	1998	2002	4
FRAME	FAM	1988	2000	12
FBCFID	FBF	1988	2000	12
FEDICS	FCS	1998	1999	1
FEDSURE	FDS	1988	2000	12
FIT	FIT	1988	1998	10
FALCON	FLC	1993	2002	9
FURNCO	FNC	1988	1998	10
FORIM	FOM	1988	2002	14
FORTUNE	FOR	1995	2001	6
FOSCHINI	FOS	1988	2002	14
FORZA	FOZ	2000	2001	1
FREDDEV	FRE	1988	2002	14
FRONTRNGE	FRO	1998	2002	4
FRANSAF	FRS	1993	1999	6
FARITEC	FRT	1999	2002	3
FASIC	FSC	1988	2000	12
FASHAF	FSH	1988	2002	14
FIRSTRAND	FSR	1989	2002	13
FUSION	FUS	1996	1999	3

GARDIAN	GAR	1988	1999	11
GLODINA	GDA	1988	2002	14
GOODCAP	GDC	1999	2002	3
GOLDREEF	GDF	1991	2001	10
GUNDLE	GDL	1988	2000	12
GOLDSTEIN	GDS	1988	2000	12
GFIELDS	GFI	1988	2002	14
GFSA	GFS	1988	2000	12
G5HOLD	GHO	1988	2000	12
GILBOA	GLB	1988	2002	14
GOLDEDGE	GLE	2000	2002	2
GLOVIL	GLL	1999	2002	3
GLOTEC	GLT	1999	2001	2
GLENMIB	GMB	1998	2002	4
GENCOR	GMF	1988	2002	14
GRINDROD	GND	1988	2002	14
GRINTEK	GNK	1990	2002	12
GFNAMIB	GNM	1988	1998	10
GEN-OPTIC	GOC	1988	2000	12
GROPROP	GPR	1988	2000	12
GROUP-5	GRF	1988	2002	14
GROWPNT	GRT	1988	2002	14
GRAYPROP	GRY	1988	2002	14
GENSEC	GSC	1996	1999	3
GUBINGS	GUB	1988	2002	14
HARMONY	HAR	1988	2002	14
HOMECHOIC	HCH	1996	2001	5
HCI	HCI	1988	2002	14
HERCOL	HCL	1999	2002	3
HUDACO	HDC	1988	2002	14
HLH	HLH	1988	2002	14
HICORL	HOR	1990	2001	11
HIVELD	HVL	1988	2002	14
HEAVEN	HVN	1997	2002	5
HOWDEN	HWN	1996	2002	6
HIXTECH	HXT	1999	1999	0
HYPROP	HYP	1988	2001	13
ICH	ICH	1988	1999	11
INCENT	ICT	2000	2002	2
IDION	IDI	1999	2002	3
INDEQTY	IDQ	1999	2002	3
INDNEWS	IDW	1994	1997	3
IFANET	IFA	2000	2002	2
IFUSION	IFS	1988	2000	12
INFOWAVE	IFW	1999	2002	3
ILIAD	ILA	1998	2002	4
ISOLUTION	ILT	1999	2002	3
ILLOVO	ILV	1991	2002	11
IMPLATS	IMP	1988	2002	14
IMR	IMR	2000	2002	2
INFINITI	INF	1998	1998	0
INHOLD	INH	1988	2001	13

INVLTD	INL	1989	2002	13
INMINS	INM	1988	2002	14
INSURE	INS	2000	2002	2
IOTA	IOT	1988	2001	13
IMPERIAL	IPL	1989	2002	13
IPROP	IPR	1988	2002	14
I-&-J	IRV	1988	1999	11
ISCOR	ISC	1988	2002	14
IST	IST	1999	2002	3
ITLTILE	ITE	1989	2002	13
ITITECH	ITI	1998	1999	1
INTRADING	ITR	1999	2002	3
INTERVID	ITV	2000	2002	2
INVICTA	IVT	1988	2002	14
JCI	JCD	1996	2002	6
JOHNCOM	JCM	1988	2002	14
JDGROUP	JDG	1988	2002	14
JIGSAW	JGS	1988	2002	14
JOHNNIC	JNC	1988	2002	14
JASCO	JSC	1988	2002	14
KERSAF	KER	1988	2002	14
KGMEDIA	KGM	1989	2002	13
KH-PROPS	KHO	1991	2000	9
KAIROS	KIR	1988	2002	14
KELGRAN	KLG	1991	2002	11
KLIPTON	KLT	1988	1999	11
KING	KNG	1997	2002	5
KOLOSUS	KOS	1995	2002	7
KPM	KPM	1999	2000	1
KTL	KTL	1988	2001	13
KWV-BEL	KWV	1988	2002	14
LABAT	LAB	1988	2002	14
LONAFRIC	LAF	1998	2002	4
LA-GROUP	LAR	1988	2002	14
LIBINT	LBT	1999	2002	3
LANGEBERG	LGB	1991	1998	7
LIBERTY	LGL	1988	2002	14
LENCO	LNC	1988	2000	12
LONFIN	LNF	1988	2002	14
LONMIN	LON	1988	2002	14
LASER	LSR	1988	2002	14
LESRNET	LST	1994	1999	5
LITECH	LTH	1988	1998	10
M-&-F	MAF	1988	2002	14
MASONITE	MAS	1988	2001	13
MBTECH	MBT	1998	2001	3
MCCAR	MCC	1992	2002	10
MEDCLIN	MDC	1988	2002	14
MDMGROW	MDG	1988	2000	12
MACADAM	MDM	1988	1999	11
MIDAS	MDS	1988	2002	14
MAXTEC	MEC	1999	2002	3

METTLE	MEL	1999	2002	3
MESSINA	MES	1988	2001	13
METLIFE	MET	1988	2000	12
MAGNUM	MGF	2000	2000	0
MGX	MGX	1996	2002	6
MIHH	MHH	1995	2002	7
MASHOLD	MHL	1988	1996	8
MILPROP	MIL	1996	2001	5
MICOR	MIR	1988	2000	12
MALBAK	MLB	1988	2002	14
MILLAIR	MLL	2000	2002	2
MARLIN	MLN	1988	2000	12
MACMED	MMD	1988	1999	11
MMG	MMG	1999	2001	2
MMWTECH	MMW	1998	1999	1
MLNHOLD	MNH	1990	2000	10
MINORCO	MNR	1988	1998	10
MNET-SS	MNS	1990	2002	12
MONEYWB	MNY	2000	2002	2
MOBILE	MOB	1988	2001	13
MOLOPE	MOL	1998	1999	1
MRPRICE	MPC	1990	2002	12
METPROL	MPL	1999	2002	3
MORIBO	MRB	1988	2001	13
MICROLOGX	MRX	1999	2001	2
MARSHALLS	MSS	1988	2001	13
MUSTEK	MST	1997	2002	5
METAIR	MTA	1988	2002	14
METCASH	MTC	1988	2002	14
METKOR	MTK	1988	1999	11
MRCANTIL	MTL	1998	2002	4
MATHOMO	MTO	1996	2002	6
MARTPROP	MTP	1996	2002	6
MTROPLS	MTR	1999	2001	2
METOREX	MTX	1988	2002	14
MOULDMED	MUM	1998	2002	4
M&R-HLD	MUR	1988	2002	14
MVELA RES	MVL	1988	2002	14
MAXTEL	MXT	1988	1997	9
METJE-&-Z	MZG	1988	2002	14
NAIL	NAI	1993	2001	8
NUCLICKS	NCL	1988	2002	14
NICTUS	NCS	1988	2002	14
NATCHIX	NCX	1996	2001	5
NANDOS	NDS	1997	2002	5
NEDCOR	NED	1988	2002	14
NEIHOLD	NEH	1988	1999	11
NEI-AFR	NEI	1988	2000	12
NETACT	NET	1999	2002	3
NAMFISH	NFH	1988	2002	14
NORTHAM	NHM	1988	2002	14
NIBH	NIB	1999	2001	2

NINIAN	NIN	1988	2001	13
NAMSEA	NMS	1988	2002	14
NAMPAK	NPK	1988	2002	14
NASPERS	NPN	1994	2002	8
NETCARE	NTC	1997	2002	5
NUWORLD	NWL	1988	2002	14
NEW-WITS	NWT	1988	1999	11
OAI	OAI	2000	2000	0
OCEANA	OCE	1988	2002	14
OCTODEC	OCT	1991	2002	11
ODMHOLD	ODM	1988	1999	11
OAKFLDS	OKF	1989	2002	13
OMEGA	OMA	1988	2000	12
OLDMUTUAL	OML	1999	2002	3
OMNIA	OMN	1988	2002	14
OSI	OSI	1999	2002	3
OTRMINE	OTR	1998	2001	3
OZZ	OZZ	1988	2002	14
PARAGON	PAG	1998	2001	3
PALS	PAL	1988	2002	14
PALAMIN	PAM	1988	2001	13
PANPROP	PAP	1988	2002	14
PARACON	PCN	1999	2002	3
PRADTECH	PDH	2000	2001	1
PARADIGM	PDM	1998	2000	2
PEPKOR	PEP	1988	2002	14
PETMIN	PET	1988	2002	14
PROPFIN	PFN	1990	2002	12
PS!GOLD	PGD	1999	2001	2
PSGBANKH	PGH	2000	2002	2
PERGRIN	PGR	1999	2002	3
PICKNPAY	PIK	1988	2002	14
PRISM	PIM	2000	2002	2
POLIFIN	PIN	1995	1999	4
PLASGRP	PLG	1999	1999	0
PRIME	PMA	1994	2002	8
PRIMEGRO	PMG	2000	2001	1
PREM-GRP	PML	1988	1999	11
PREMIUM	PMM	1995	2002	7
PRIMESERV	PMV	1999	2002	3
PINNACLE	PNC	1999	2002	3
PIONEER	PNR	1988	2001	13
PENTACOM	PNT	1999	1999	0
PENNY	PNY	1999	2000	1
PROFURN	PON	1988	2001	13
PORTHLD	POR	1988	2000	12
POWTECH	POW	1988	2001	13
PPC	PPC	1988	2002	14
PUTPROP	PPR	1988	2002	14
PARAPROP	PRA	1988	2002	14
PERSBEL	PRB	1988	2000	12
PRIMA	PRM	1988	2002	14

PRIMATOY	PRT	1998	2000	2
PASDEC	PSC	1988	2002	14
PSG	PSG	1988	2002	14
PUTCO	PTC	1988	2002	14
PTH	PTH	1996	2001	5
PROSPUR	PUR	1998	1999	1
QUYN	QUY	1999	2001	2
RAD	RAD	1998	2000	2
RAG	RAG	1997	2001	4
RA-HOLD	RAH	1995	2002	7
RAI	RAI	1995	2001	6
REBSERV	RBV	1997	2002	5
RAINBOW	RBW	1989	2002	13
RICHEMONT	RCH	1989	2002	13
RARECO	RCO	1993	2002	9
REDEFINE	RDF	2000	2002	2
RADIOSPR	RDS	1998	1999	1
REFCORP	REF	1998	2002	4
REGAL	RGL	1999	2000	1
RICHWAY	RHW	1995	2001	6
REUNERT	RLO	1988	2002	14
RELYANT	RLY	1988	2002	14
RMBH	RMH	1992	2002	10
RMSPROP	RMR	1988	1998	10
RANGOLD	RNG	1993	2001	8
RENAISAN	RNS	1998	2000	2
RENTSUR	RNT	1988	2002	14
ROMATEX	ROM	1988	1998	10
RLSPROPS	RPR	1991	2002	11
REX-TRUE	RTO	1988	2002	14
SAB	SAB	1988	2002	14
SA-EAGLE	SAE	1988	2002	14
SALLIES	SAL	1988	2002	14
SAMROC	SAM	1995	2001	6
SAPPI	SAP	1989	2002	13
STANBANK	SBK	1988	2001	13
SABLE	SBL	1988	2002	14
SAAMBOU	SBO	1988	2002	14
SABVEST	SBV	1988	2002	14
SACHROME	SCE	1988	2002	14
SCHARIG	SCG	1988	2000	12
STOCHOT	SCH	1997	1999	2
SCHAMIN	SCN	1993	2002	9
SECDATA	SDA	1999	2000	1
SA-DRUG	SDG	1988	1998	10
SEARDEL	SER	1988	2002	14
SEARTEC	SET	1995	2000	5
SASFIN	SFN	1988	2002	14
SAFREN	SFR	1988	1999	11
SOFTLINE	SFT	1997	2002	5
SFW	SFW	1989	2000	11
SAGEGRP	SGG	1989	2002	13

STEINHOFF	SHF	1999	2002	3
SHOPRIT	SHP	1988	2002	14
SEAHARV	SHV	1992	1999	7
SIB	SIB	1988	1999	11
SIMMERS	SIM	1988	2002	14
SAIL	SIR	1988	2002	14
SISA	SIS	1988	2002	14
S&JLAND	SJL	1988	2002	14
SEKUNJALO	SKJ	1999	2002	3
STELLA	SLL	1999	2002	3
SANLAM	SLM	1998	2002	4
SOLUTNS	SLU	2000	2002	2
SMC	SMC	1998	2002	4
STREAMWRK	SMK	2000	2002	2
SAMRAND	SMR	1988	2002	14
SYNERGY	SNG	2000	2002	2
SONDOR	SNR	1988	2000	12
SANTAM	SNT	1988	2001	13
SASOL	SOL	1988	2002	14
SOVFOOD	SOV	1996	2002	6
SPANJAARD	SPA	1988	2002	14
SPEARHD	SPE	2000	2002	2
SUPRGRP	SPG	1988	2002	14
SPICER	SPI	1988	2000	12
SPESCOM	SPS	1988	2002	14
SQONE	SQE	2000	2001	1
SERVEST	SRV	1988	2002	14
SENTRY	SRY	1998	2000	2
SASANI	SSA	1988	2002	14
S&SHOLD	SSH	1988	1999	11
STEERS	STE	1995	2002	7
STILFTN	STI	1988	2002	14
SILTEK	STK	1988	2000	12
SETHOLD	STO	1998	2002	4
STRAND	STR	1988	2000	12
STOCKS	STS	1992	1999	7
STANTRN	STT	1988	1999	11
SPURCORP	SUR	2000	2002	2
SHAWCELL	SWL	1999	2001	2
SYCOM	SYC	1988	2001	13
THEBEFIN	TBE	1994	2000	6
TIGBRANDS	TBS	1988	2002	14
THABEX	TBX	1996	2002	6
TRADEK	TDK	1999	2002	3
TRIDELTA	TDL	1998	1999	1
TIGON	TGN	1996	2002	6
THUKANI	THK	2000	2001	1
TIWHEEL	TIW	1993	2002	9
TELTRON	TLT	1996	1999	3
TREMATON	TMT	1998	2002	4
TMX	TMX	1990	1998	8
TONGAAT	TNT	1988	2002	14

TOP-TECH	TOT	1999	2000	1
TOYOTA	TOY	1988	2000	12
TRNPACO	TPC	1988	2002	14
TRENCOR	TRE	1988	2001	13
TERFIN	TRF	1999	2001	2
TOURVST	TRT	1997	2002	5
TRUWTHS	TRU	1998	2002	4
TEREXKO	TRX	1997	2002	5
TISEC	TSC	1999	2002	3
TRNSHEX	TSX	1988	2002	14
TAUFIN	TUF	2000	2000	0
TWEEFONTN	TWE	1988	1999	11
UAM	UAM	1999	2001	2
UCS	UCS	1998	2002	4
UNIGRO	UNG	1988	2000	12
UNION	UNN	1988	1995	7
UNISPIN	UNS	1988	2000	12
UNISERV	USV	1988	2002	14
UNITRAN	UTR	1988	2002	14
VALCAR	VCR	1988	2002	14
VILLAGE	VIL	1988	2002	14
VIKING	VKG	1998	2001	3
VALUECOM	VLC	1999	2000	1
VALUE	VLE	1999	2002	3
VALAUTO	VLT	1991	2002	11
VOLTEX	VLX	1988	2001	13
VENFIN	VNF	1988	2002	14
VENTRON	VNT	1988	2000	12
VOGELS	VOG	1988	1999	11
VESTA	VST	1999	2002	3
VENTEL	VTL	1992	2001	9
VESTCOR	VTR	1988	2002	14
WACO	WAC	1988	1999	11
WANKIE	WAN	1988	2001	13
WES-AREAS	WAR	1988	2001	13
WBHOLD	WBH	1988	2002	14
WBHO	WBO	1991	2002	11
WESCO	WES	1988	2001	13
WETHLYS	WET	1998	2002	4
WOOLIES	WHL	1997	2002	5
WOOLTRU	WLO	1988	2002	14
WINBEL	WNB	1988	2000	12
WINECORP	WNE	1998	2002	4
WINHOLD	WNH	1988	2002	14
WIPHOLD	WPH	1999	2002	3
W-R-CONS	WRC	1988	1998	10
WESCAP	WSC	1988	2000	12
WHETSTN	WTS	1999	2000	1
YTHRK	YHK	1998	2002	4
YORKCOR	YRK	1988	2001	13
Z-C-I	ZCI	1988	2001	13
ZELTIS	ZLT	1988	2002	14

ZENITH	ZNT	1996	2002	6
ZAPTRONIX	ZPT	1999	2002	3
ZARARA	ZRR	1988	2001	13
Total firm years in initial sample				**5027**

APPENDIX II

Listing of "N" shares excluded from initial sample

Name	Code
MAXTEL-N	**MXN**
STEERS-N	**SSN**
GROUP5-N	**GPN**
BOECORP-N	**BCN**
LEFIC-N	**LFN**
BOWCAL-N2	**BFN**
FRALEX-N	**FRN**
ADCOCK-N	**ADN**
SUB-N	**SBN**

APPENDIX III

Listing of firms with less than 24 months of returns excluded as insufficient data to calculate Beta

Name	Code
ABACUS	**ABC**
ACUCAP	**ACP**
ACUMEN	**AUM**
ADCOCK	**ADC**
ADCOCK-N	**ADN**
ADVSOURCN	**ARN**
AFGEM	**AFG**
AMAPROP-LS	**ARD**
AMMGROUP	**AGR**
APEXHIA	**APA**
A-PROP	**ARP**
ARMGOLD	**AOD**
AST	**AST**
ASTRAL	**ARL**
AUTOQIP	**ATQ**
AVIHOLD	**AIH**
AXIAM	**AXA**
BARPROP	**BPP**
BATECOR	**BTR**
BATEPRO	**BTO**
BENCO	**BNC**
BYNX	**BYX**
CADSWEP	**CAS**
CAPITEC	**CPI**
CARSON	**CRS**
CGS-FOOD	**CSF**
CGSMITH	**CGS**
CHARIOT	**CHT**
CHARLAND	**CAL**
CHET	**CET**
CIH	**CIH**
COASTAL	**CTL**
COMPASS	**CPS**
CORPCAP	**CPC**
DECHOLD	**DCL**
DIALMOV	**DLM**
DUNLOP	**DNL**
EDUCOR	**ECR**
ELSEC	**ESC**
EQUIKOR	**EQR**
EQUINOX	**EQX**
ESSENT	**ESS**
ETS	**ETS**
FAIRVEST	**FVT**
FESQUARED	**FEQ**
FINTECH	**FIN**
FRIDGEM	**FGM**
FURNCAP	**FRC**
GEFCO	**GEF**
GEM	**GEM**
GLOCASH	**GCH**
GLOHOLD	**GLH**
GLOPVT	**GPT**
GRAY	**GRA**
GRAYVEST	**GRV**
GRINAKER	**GRC**
HARWILL	**HRL**
IBAGLCAS	**AAG**
IFOUR	**IFR**
IGAMING	**IMG**
I-G-I	**IGI**
IMPERILOG	**IPG**
INTRUST	**ITT**
INVPLC	**INP**
IVS	**IVS**
JCG	**JCG**
JEMTECH	**JMH**
KAROS	**KAR**
KUMBA	**KMB**
LIFESTYLE	**LFS**
L-T-A	**LTA**
LYONS	**LYS**
MAC	**MAC**
MARANDA	**MAR**
MASSMART	**MSM**
M-C-M	**MCM**
MCUBED	**MCU**
MONEX	**MNX**
MSAULI	**MSI**
M-WEB	**MEB**
NAC	**NAC**
NATRAWL	**NTR**
NATURAL	**NTL**
NEWPORT	**NPT**
NEXVEST	**NXT**
NIMBUS	**NMB**
NOBLE	**NBL**
NRB	**NRB**
NSI	**NSI**
OHAGANS	**OHA**
OXBRIDGE	**OXB**
PARTNER	**PTR**
PENROSE	**PEN**
PEPGRO	**PEG**
PHUMELELA	**PHM**
PLATE-GL	**PGS**
PROPER	**PRO**
PSGNOBLE	**PSB**
QMART	**QMT**
QUICKCO	**QCK**
RECTRON	**RCT**
REFMARK	**RFK**
REMBR-BEH	**RMB**
REMGRO	**REM**
RETCORP	**RTC**
ROADCOR	**RDP**
SARETAIL	**SRL**
SEMPRES	**SEM**
SHOPS	**SFA**
SHOREDITS	**SHO**
SMACSOFT	**SMT**
SMGHOLD	**SMH**
SOTTA	**SOT**
SPECTRUM	**SUM**
SPORT	**SPR**
SPUR	**SPU**
SPURHLD	**SPH**
ST-HELENA	**STH**
STORECO	**STC**
STRATCORP	**STA**
TEGKOR	**TEG**
TELJOY	**TLJ**
TIB	**TIB**
TLC	**TLC**
TOCO	**TOC**
TOLARAM	**TRM**
TRADEH	**TDH**
UNIFER	**UNF**

UNIHOLD	**UHS**	VELOCITY	**VLY**	WIT-G-M	**WKN**
U-STPI	**STPI**	WENTECH	**WTC**		

APPENDIX IV

Listing of firms without EPS data

Name	Code	EDUCOR	**ECR**	M-C-M	**MCM**
ACUCAP	**ACP**	E-R-P-M	**ERA**	MSIHOLD	**MSH**
ADCOCK-N	**ADN**	ETS	**ETS**	PHUMELELA	**PHM**
ADVSOURCN	**ARN**	FAIRVEST	**FVT**	QALA	**QLA**
AMALIA	**AML**	FESQUARED	**FEQ**	QMART	**QMT**
AMAPROP-LS	**ARD**	FRALEX-N	**FRN**	RANDFONTN	**RFN**
AMMGROUP	**AGR**	GROUP5-N	**GPN**	REFMARK	**RFK**
A-PROP	**ARP**	IBAGLCAS	**AAG**	SARB	**SRB**
ARCAY	**ARC**	IFOUR	**IFR**	SEMPRES	**SEM**
ARMGOLD	**AOD**	IGAMING	**IMG**	SHOPS	**SFA**
AST	**AST**	INVPLC	**INP**	SPECTRUM	**SUM**
AVIHOLD	**AIH**	KALGOLD	**KGL**	STEERS-N	**SSN**
BOECORP-N	**BCN**	KUMBA	**KMB**	ST-HELENA	**STH**
BOWCAL-N2	**BFN**	LEFIC-N	**LFN**	STORECO	**STC**
CARSON	**CRS**	LIFESTYLE	**LFS**	STRATCORP	**STA**
CHARLAND	**CAL**	L-T-A	**LTA**	TECHCOM	**TCM**
DECOMAC	**DOC**	MAC	**MAC**	TILEAFRIKA	**TLF**
DIALMOV	**DLM**	MAXTEL-N	**MXN**	U-STPI	**STPI**

APPENDIX V

Listing of firms without Cash flow per share data

Name	Code				
ACUCAP	**ACP**	EDUCOR	**ECR**	M-C-M	**MCM**
ADCOCK-N	**ADN**	ETS	**ETS**	MSIHOLD	**MSH**
ADVSOURCN	**ARN**	FAIRVEST	**FVT**	PHUMELELA	**PHM**
AMAPROP-LS	**ARD**	FESQUARED	**FEQ**	QALA	**QLA**
AMMGROUP	**AGR**	FRALEX-N	**FRN**	QMART	**QMT**
A-PROP	**ARP**	GROUP5-N	**GPN**	REFMARK	**RFK**
ARCAY	**ARC**	IBAGLCAS	**AAG**	SARB	**SRB**
ARMGOLD	**AOD**	IFOUR	**IFR**	SEMPRES	**SEM**
AST	**AST**	IGAMING	**IMG**	SHOPS	**SFA**
AVIHOLD	**AIH**	INVPLC	**INP**	SPECTRUM	**SUM**
BOECORP-N	**BCN**	KUMBA	**KMB**	STEERS-N	**SSN**
BOWCAL-N2	**BFN**	LEFIC-N	**LFN**	STORECO	**STC**
CARSON	**CRS**	LIFESTYLE	**LFS**	STRATCORP	**STA**
DECOMAC	**DOC**	L-T-A	**LTA**	TECHCOM	**TCM**
DIALMOV	**DLM**	MAC	**MAC**	TILEAFRIKA	**TLF**
		MAXTEL-N	**MXN**	U-STPI	**STPI**

APPENDIX VI

Firm years excluded as the reporting periods is not equal to 12 months

Name	Code	Year	Rep period
ABCPLUS	**APS**	2000	15
ABIL	**ABL**	1998	15
ACUITY	**ACY**	1999	15
ACUITY	**ACY**	2002	15
ADMIRAL	**ADL**	1996	18
ADVANCED	**ADT**	1997	22
ADVSOURCE	**ADS**	1993	17
ADVSOURCE	**ADS**	1996	13
ADVSOURCE	**ADS**	1997	16
ADVTECH	**ADH**	1997	10
AFBRAND	**ABR**	1999	13
AFHARV	**AHV**	1998	13
AHEALTH	**AHH**	1999	19
ALLJOY	**ALJ**	2001	18
ALUDIE	**ALD**	1997	16
ALUDIE	**ALD**	2000	18
ALUDIE	**ALD**	2002	15
AMAPROP	**ARO**	1998	21
AMAPS	**AMA**	1997	5
AMAPS	**AMA**	2000	18
AMGOLD	**AMG**	1991	13
AMGOLD	**AMG**	1998	21
ANAMINT	**AIT**	1998	21
ANBEECO	**AEC**	1990	16
ANBEECO	**AEC**	2001	15
ANGLO	**AGL**	1998	21
ANGLOPLAT	**AMS**	1998	18
APEX	**APX**	1991	17
APLITEC	**APL**	1998	13
APPLETON	**ALE**	2001	16
ARGENT	**ART**	1998	15
ASPEN	**APN**	1995	10
ASPEN	**APN**	1998	14
ASSMANG	**ASG**	1993	18
AST GROUP	**AAA**	1999	3
ATLAS	**ATS**	1988	4
AVGOLD	**AVG**	1991	7
BARNEX	**BNX**	1999	18
BARPLAT	**BPL**	1992	9
BASREAD	**BSR**	1994	18
BEARMAN	**BRM**	1992	16
BEARMAN	**BRM**	2001	9
BEIGE	**BEG**	2000	8
BELL	**BEL**	1997	22
BICAF	**BIC**	1988	18
BOUMAT	**BOU**	1996	15
BRANDCO	**BRC**	1988	15
BRIDGESTN	**BDS**	1999	22
BRIMSTON	**BRT**	2001	15
BRYANT	**BRY**	1999	16
BTG	**BTG**	2000	17
BUILDMAX	**BDM**	1997	15
BUILDMAX	**BDM**	1999	9
CAPEMP	**CAE**	2002	10
CAPTALL	**CPT**	1996	11
CASHBIL	**CSB**	1993	8
CASHBIL	**CSB**	1996	16
CBD-FUND	**CBD**	1991	15
CEMENCO	**CMT**	1998	15
CENMAG	**CMG**	1988	5
CENTURY	**CNY**	2000	11
CERAMIC	**CRM**	1993	17
CHESTER	**CES**	1997	9
CITYLDG	**CLH**	1994	11
CLINICS	**CLC**	1988	13
CLYDE	**CLY**	1988	17
COMMAND	**CMA**	2002	15
COMPCLEAR	**CCL**	1999	11
CONSHU	**CNS**	1994	9
CONTROL	**CNL**	1998	18
CORPBANK	**CPB**	1999	15
CORPCAP	**CPA**	1990	15
CORPCAP	**CPA**	1997	17
CORWIL	**CRW**	1988	6
CRUX	**CRX**	1999	11
CULLINAN	**CUL**	1997	15
CULTEL	**CLT**	1994	21
CYBERHOST	**CYB**	1999	17
DAEWOO	**DAE**	1990	16
DAEWOO	**DAE**	1995	20
DATATEC	**DTC**	1995	8
DATATEC	**DTC**	1997	13
DAWN	**DAW**	1990	13
DAWN	**DAW**	1996	15
DAWN	**DAW**	1999	18
DELCORP	**DLC**	1991	18
DELCORP	**DLC**	1992	15
DELCORP	**DLC**	1997	13
DELFOOD	**DLF**	1991	18
DELFOOD	**DLF**	1992	15

DELFOOD	**DLF**	1997	13	GOODCAP	**GDC**	2002	18
DELHOLD	**DLH**	1991	18	GRAYPROP	**GRY**	1998	9
DELHOLD	**DLH**	1992	15	GRINTEK	**GNK**	1990	18
DELHOLD	**DLH**	1997	13	GROUP-5	**GRF**	1988	18
DIDATA	**DDT**	1993	9	GROWPNT	**GRT**	1988	11
DNA SUP	**DNA**	1995	13	GROWPNT	**GRT**	1993	17
DNA SUP	**DNA**	1999	15	GROWPNT	**GRT**	2002	15
DON	**DON**	1995	16	HERCOL	**HCL**	1999	15
DORBYL	**DLV**	1996	18	HICORL	**HOR**	1992	22
DYNAMIC	**DYM**	1998	16	HICORL	**HOR**	1997	15
DYNAMIC	**DYM**	1999	16	HOWDEN	**HWN**	1997	20
DYNAMO	**DNM**	1995	22	HYPROP	**HYP**	1988	14
DYNAMO	**DNM**	1996	22	IDION	**IDI**	2000	22
DYNAMO	**DNM**	1998	18	IFUSION	**IFS**	1998	8
ECHOLD	**ECH**	2000	16	IFUSION	**IFS**	2000	16
ECHOLD	**ECH**	2002	18	ILIAD	**ILA**	1998	17
EDATA	**EDT**	2000	15	ILLOVO	**ILV**	2000	6
EDATA	**EDT**	2002	9	IMR	**IMR**	2000	17
ELLERINE	**ELH**	1988	8	INDNEWS	**IDW**	1994	9
EMPOWER	**EPW**	1997	4	INTERVID	**ITV**	2001	16
EMPOWER	**EPW**	1998	17	INVICTA	**IVT**	1990	13
ENERGY	**ENR**	1999	13	INVICTA	**IVT**	1991	21
ENERGY	**ENR**	2000	6	INVICTA	**IVT**	1995	15
ENSERVE	**ENV**	1998	18	IOTA	**IOT**	1998	14
EXCELL	**EXL**	2000	9	ISOLUTION	**ILT**	1999	8
FALCON	**FLC**	1993	1	ITLTILE	**ITE**	1989	11
FALCON	**FLC**	1998	18	ITLTILE	**ITE**	1993	16
FASHAF	**FSH**	1999	15	JCI	**JCD**	1998	9
FASHAF	**FSH**	2001	8	JDGROUP	**JDG**	1988	18
FASIC	**FSC**	1988	15	JDGROUP	**JDG**	1994	18
FBCFID	**FBF**	1999	18	JDGROUP	**JDG**	2000	14
FORIM	**FOM**	1991	14	JOHNNIC	**JNC**	1999	9
FORTUNE	**FOR**	1999	18	KAIROS	**KIR**	1988	11
FORZA	**FOZ**	2000	17	KAIROS	**KIR**	1996	15
FOSCHINI	**FOS**	1992	15	KAIROS	**KIR**	1999	17
FREDDEV	**FRE**	1999	9	KELGRAN	**KLG**	1995	16
FURNCO	**FNC**	1998	7	KGMEDIA	**KGM**	1998	16
G5HOLD	**GHO**	1988	5	KOLOSUS	**KOS**	1997	16
GENCOR	**GMF**	1988	8	KOLOSUS	**KOS**	1998	7
GENCOR	**GMF**	1994	10	LABAT	**LAB**	1990	13
GENSEC	**GSC**	1998	18	LABAT	**LAB**	1999	11
GFNAMIB	**GNM**	1988	18	LA-GROUP	**LAR**	1996	8
GFNAMIB	**GNM**	1998	18	LA-GROUP	**LAR**	1998	6
GILBOA	**GLB**	1996	18	LASER	**LSR**	1991	9
GILBOA	**GLB**	1999	18	LASER	**LSR**	2001	18
GLOTEC	**GLT**	2001	18	LENCO	**LNC**	1988	14
GOLDREEF	**GDF**	1991	18	LENCO	**LNC**	1995	13
GOLDREEF	**GDF**	1992	15	LONFIN	**LNF**	1998	6
GOLDREEF	**GDF**	1995	17	M-&-F	**MAF**	1998	18
GOLDREEF	**GDF**	1998	14	MACADAM	**MDM**	1993	22
GOLDREEF	**GDF**	1999	18	MACMED	**MMD**	1991	17
GOODCAP	**GDC**	1999	18	MACMED	**MMD**	1994	15

MALBAK	**MLB**	1998	7	PEPKOR	**PEP**	1996	16
MARLIN	**MLN**	1992	18	PETMIN	**PET**	1993	17
MARTPROP	**MTP**	1996	5	PETMIN	**PET**	2000	16
MARTPROP	**MTP**	1998	17	PINNACLE	**PNC**	1999	18
MASHOLD	**MHL**	1995	22	PIONEER	**PNR**	1991	15
MAXTEL	**MXT**	1996	16	PORTHLD	**POR**	1990	11
MBTECH	**MBT**	1998	3	PORTHLD	**POR**	1996	17
MESSINA	**MES**	1990	6	PREM-GRP	**PML**	1992	13
MESSINA	**MES**	2000	18	PREMIUM	**PMM**	1995	9
METCASH	**MTC**	1992	10	PRIMA	**PRM**	1991	15
METKOR	**MTK**	1996	18	PRIMATOY	**PRT**	2000	18
METLIFE	**MET**	2000	15	PRIMESERV	**PMV**	2001	16
MGX	**MGX**	1997	16	PROFURN	**PON**	1990	16
MICOR	**MIR**	1999	8	PROSPUR	**PUR**	1999	18
MICOR	**MIR**	2000	16	PSG	**PSG**	1990	10
MICROLOGX	**MRX**	1999	15	PSG	**PSG**	1991	10
MIDAS	**MDS**	1995	16	PTH	**PTH**	1997	22
MIDAS	**MDS**	1998	9	PTH	**PTH**	1999	14
MILPROP	**MIL**	1996	9	PUTPROP	**PPR**	1988	4
MINORCO	**MNR**	1994	18	QUYN	**QUY**	1999	15
MLNHOLD	**MNH**	1992	18	RA-HOLD	**RAH**	1995	10
MMG	**MMG**	1999	22	RAI	**RAI**	1995	14
MOBILE	**MOB**	2001	18	RAINBOW	**RBW**	1991	9
MORIBO	**MRB**	1994	18	RANGOLD	**RNG**	1997	18
MRCANTIL	**MTL**	1998	15	RARECO	**RCO**	1996	18
MRPRICE	**MPC**	1997	13	REDEFINE	**RDF**	2000	6
MTROPLS	**MTR**	1999	9	RELYANT	**RLY**	1999	15
MVELA RES	**MVL**	2001	18	RENAISAN	**RNS**	2000	15
NAIL	**NAI**	2000	15	ROMATEX	**ROM**	1997	9
NAMFISH	**NFH**	2002	16	S&JLAND	**SJL**	1993	15
NAMSEA	**NMS**	1990	15	SABLE	**SBL**	1989	16
NEDCOR	**NED**	1998	15	SACHROME	**SCE**	1988	7
NETCARE	**NTC**	1997	13	SACHROME	**SCE**	2002	13
NICTUS	**NCS**	1996	9	SA-DRUG	**SDG**	1992	17
NUCLICKS	**NCL**	1989	8	SAGEGRP	**SGG**	1991	15
NUCLICKS	**NCL**	1992	14	SAIL	**SIR**	1998	18
NUCLICKS	**NCL**	1996	10	SALLIES	**SAL**	1999	6
OAKFLDS	**OKF**	1990	17	SAMRAND	**SMR**	1996	22
OCTODEC	**OCT**	1991	18	SAMRAND	**SMR**	1999	15
ODMHOLD	**ODM**	1992	15	SAMROC	**SAM**	1996	22
OMEGA	**OMA**	1991	21	SANTAM	**SNT**	1998	15
OMEGA	**OMA**	1995	15	SAPPI	**SAP**	1989	14
OMNIA	**OMN**	2001	15	SAPPI	**SAP**	1995	19
OSI	**OSI**	1999	13	SASANI	**SSA**	1992	15
OTRMINE	**OTR**	2001	18	SASANI	**SSA**	1997	15
PANPROP	**PAP**	1988	13	SCHAMIN	**SCN**	1998	15
PARACON	**PCN**	2000	9	SCHARIG	**SCG**	1990	18
PARAGON	**PAG**	1998	18	SCHARIG	**SCG**	1998	15
PARAPROP	**PRA**	2000	19	SEAHARV	**SHV**	1993	15
PASDEC	**PSC**	1992	16	SECDATA	**SDA**	1999	14
PASDEC	**PSC**	1996	20	SEKUNJALO	**SKJ**	1999	18
PENTACOM	**PNT**	1999	14	SHOPRIT	**SHP**	1992	8

SHOPRIT	**SHP**	1996	16	UNISERV	**USV**	1988	8
SOFTLINE	**SFT**	1998	13	UNISERV	**USV**	1995	11
SONDOR	**SNR**	1990	9	UNISPIN	**UNS**	1989	15
SONDOR	**SNR**	1999	21	UNISPIN	**UNS**	1996	15
SPESCOM	**SPS**	1990	14	UNITRAN	**UTR**	1992	15
SPESCOM	**SPS**	1995	17	VALCAR	**VCR**	1988	9
SPICER	**SPI**	1988	14	VENFIN	**VNF**	2002	15
SPICER	**SPI**	1994	19	VENTEL	**VTL**	1992	15
SPICER	**SPI**	1996	15	VESTCOR	**VTR**	1993	15
SPICER	**SPI**	1999	18	VESTCOR	**VTR**	1996	17
STANTRN	**STT**	1993	8	VIKING	**VKG**	1998	7
STEINHOFF	**SHF**	1999	10	VOGELS	**VOG**	1996	6
STELLA	**SLL**	1999	8	VOLTEX	**VLX**	1990	16
STILFTN	**STI**	1994	18	WACO	**WAC**	1995	6
STRAND	**STR**	1992	16	WANKIE	**WAN**	1998	22
STRAND	**STR**	1994	14	WBHO	**WBO**	1996	15
SUPRGRP	**SPG**	1996	9	WBHOLD	**WBH**	2002	6
SYCOM	**SYC**	1998	15	WESCAP	**WSC**	1992	18
TAUFIN	**TUF**	2000	13	WESCAP	**WSC**	1998	14
THEBEFIN	**TBE**	1994	6	WESCAP	**WSC**	1999	16
TIGON	**TGN**	1996	9	WHETSTN	**WTS**	1999	16
TONGAAT	**TNT**	1998	21	YTHRK	**YHK**	1998	7
TOP-TECH	**TOT**	2000	16	YTHRK	**YHK**	2001	14
TRADEK	**TDK**	1999	9	ZARARA	**ZRR**	1996	6
TRENCOR	**TRE**	2001	18	ZARARA	**ZRR**	1999	15
TRNPACO	**TPC**	1990	15	Z-C-I	**ZCI**	1999	18
TRNPACO	**TPC**	1999	15	ZELTIS	**ZLT**	1988	16
UAM	**UAM**	2001	18	ZELTIS	**ZLT**	1991	18
UNIGRO	**UNG**	1993	18	ZELTIS	**ZLT**	1996	18
UNION	**UNN**	1994	14	ZENITH	**ZNT**	1998	16

APPENDIX VII

Industry Classifications

Historically, the South African economy has been built on the resources sector and has been characterised by a number of large diversified industrial companies. This results in an economic landscape that is considerable different to that studied by Barth et al. (2000). For this reason, a number of considerations needed to be taken into account in classifying firms in order that a comparison of the inter-industry information content of cash flows and accrual-based earnings could be made. These include:

- Comparability with Barth et al (2000).
- Sufficient number of firms per industry classification to draw statistical inferences.
- Potential rationale for varied value-relevance of cash flow and earnings data across industry classifications.

Using the JSE Securities Exchange sectors at 30 June 2003 as a basis, the universe of firms was arranged into industry classification. Where firms could not be allocated to particular industries based on the JSE sector classification, all the shares within a sector were scrutinised and allocated based on the true nature of their business. These specific cases are described as 'mixed' in the table below and all listed in the notes that follow.

JSE Index Industry Classification	Industry Classification
DELISTED	Mixed: Note 1.
UNKNOWN	Mixed: Note 1.
FJA - AUTOMOBILES AND PARTS (AUTO)	Transportation
FJA - BANKS (BNKS)	Financial Services
FJA - BEVERAGES (BEVE)	Food, Beverages and Drugs
FJA - DIVERSIFIED INDUSTRIALS (DIND)	Mixed: Note 2.
FJA - ELECTRONIC AND ELECTRICAL EQUIPMENT (EEEQ)	Electronics and Electrical
FJA - ENGINEERING AND MACHINERY (EGMC)	Industrial
FJA – FINANCIAL AND INDUSTRIAL 30 (FNDI)	Industrial
FJA - FOOD AND DRUG RETAILERS (FDRT)	Food, Beverages and Drugs
FJA - FOOD PRODUCERS AND PROCESSORS (FPPS)	Food, Beverages and Drugs
FJA - FORESTRY AND PAPER (FRPP)	Mining and Resources

FJA - GENERAL RETAILERS (GENR)	Retail
FJA - HEALTH (HLTH)	Services: Note 3.
FJA - HOUSEHOLD GOODS AND TEXTILES (HGTX)	Textiles
FJA - INDUSTRIAL 25 (INDI)	Mixed: Note 4.
FJA - INFORMATION TECH HARDWARE (ITHD)	Computers
FJA – INSURANCE (INSR)	Insurance and Real Estate
FJA - LEISURE, ENTERTAINMENT AND HOTELS (LEHT)	Services
FJA – LIFE ASSURANCE (LFEA)	Insurance and Real Estate
FJA - MEDIA AND PHOTOGRAPHY (MDPT)	Services
FJA - MINING (MNNG)	Mining and Resources
FJA - OIL AND GAS (OLGS)	Mining and Resources
FJA - PHARMACEUTICALS AND BIOTECH (PBIO)	Food, Beverages and Drugs
FJA – REAL ESTATE (RLST)	Insurance and Real Estate
FJA - SOFWARE AND COMPUTER SERVICES (SCSV)	Computers
FJA - SPECIALITY AND OTHER FINANCE (SPOF)	Financial Services
FJA - STEEL AND OTHER METALS (STMT)	Mining and Resources
FJA - SUPPORT SERVICES (SSEV)	Services
FJA - TELECOMMUNICATION SERVICES (TLSV)	Services
FJA – TRANSPORT (TRNS)	Transport

Note 1.

All delisted and unknown(predominantly venture and development capital as previously classified) shares were allocated to industry classifications based on the nature of business, as described in the most recent JSE Handbook in which they appeared.

Note 2.

The diversified industrial sector was made up of the companies listed in the table below. These were allocated or excluded as tabulated below:

Company Name	Classification
ARGENT	Industrial
BARWORLD	Industrial
DORBYL	Industrial
IMPERIAL	Transport
MT-EAGLE	Excluded: Infrequently traded
SEKUNJALO	Excluded: BEE investment company without a definite industry classification

Note 3.

The health sector was made up of the companies listed in the table below. These were allocated or excluded as tabulated below:

Company Name	Classification
AHEALTH	Hospital included in Services
ALIANCE	Hospital included in Services

FORIM	Excluded: Holding company of Alliance (Pharmaceutical)
MEDCLIN	Pharmaceutical included in Food, Beverages and Drugs
NETCARE	Hospital included in Services

Note 4.

The Industrial sector was made up primarily of packaging and chemical companies as listed below. Packaging companies primarily supply packaging for the retail sector. As a result of this strong link with the retail sector, these have been included in the retail industry classification.

Similar types of accruals are likely to arise in industries where there is similar large-scale gross domestic fixed investment. The Chemical, Engineering, industrial and Construction industry all evidence this type of investment to a similar degree and have accordingly been included in the Industrial sector.

Company Name	**Classification**
AECI	Chemical: included in Industrial
AFROX	Chemical: included in Industrial
ALEXWYT	Packaging: included in Retail
ASTRAPAK	Packaging: included in Retail
BOWCALF	Packaging: included in Retail
CHEMSERVE	Chemical: included in Industrial
OMNIA	Chemical: included in Industrial
SPANJAARD	Chemical: included in Industrial
TRNPACO	Packaging: included in Retail

These allocations resulted in the following broad industry classifications, which are comparable to a certain degree with Barth et al. (2000) as tabulated below.

Industry classifications	***Barth et al. (2000)***
Insurance and Real Estate	*Insurance and Real Estate*
Financial Services	*Financial Institutions*
Retail	*Retail*
Textiles	*Textiles*
Transportation	*Transportation*
Services	*Services*
Industrial	*Utilities*
	Durable manufacturers
	Chemical
Mining and Resources	*Mining and Construction*
	Extractive industries
Food, Beverages and Drugs	*Food and Beverages*
	Pharmaceuticals
Computers (IT)	*Computers*
Electronics and Electrical	

APPENDIX VIII

Specific exclusions and reasons

Name	Code	Reason for exclusion
AF-&-OVER	**AOO**	Multiple holding companies (pyramid structure)- removed to avoid duplication
ALIANCE	**ALN**	Same group as FORIM (Pharmaceuticals)- excluded to avoid duplication
BATSA	**BTS**	Nature of business not listed in relevant JSE handbook
BOECORP	**BOC**	Multiple holding companies (pyramid structure)- removed to avoid duplication
BRANSBY	**BNS**	Nature of business not listed in relevant JSE handbook
CAPSTAR	**CST**	Mixed nature of business - does not fit into an industry classification as defined
CCG	**CCG**	Nature of business not listed in relevant JSE handbook
CFC	**CFC**	Property unit trusts- little difference between cash and accrual-based accounting
CGU	**CGU**	Nature of business not listed in relevant JSE handbook
COPI	**CAN**	Very thinly traded
C-TECH	**CTH**	Nature of business not listed in relevant JSE handbook
CYCAD	**CYD**	Mixed nature of business - does not fit into an industry classification as defined
DALYS	**DLS**	Mixed nature of business - does not fit into an industry classification as defined
EDUTECH	**ETH**	Nature of business not listed in relevant JSE handbook
ETINGTN	**ETN**	Property unit trusts- little difference between cash and accrual-based accounting
EUREKA	**EUR**	Mixed nature of business - does not fit into an industry classification as defined
FELTEX	**FLX**	Nature of business not listed in relevant JSE handbook
FRALEX	**FRX**	Multiple holding companies (pyramid structure)- removed to avoid duplication- Alexander Group
GENBEL	**GBL**	Nature of business not listed in relevant JSE handbook
HEDGE	**HDG**	Nature of business not listed in relevant JSE handbook
INDFIN	**IND**	Property unit trusts- little difference between cash and accrual-based accounting
INTEGREAR	**ITG**	Nature of business not listed in relevant JSE handbook
INTRUST	**ITT**	Property unit trusts- little difference between cash and accrual-based accounting
ITECH	**IEH**	Nature of business not listed in relevant JSE handbook
LIB-HOLD	**LBH**	Multiple holding companies (pyramid structure)- removed to avoid duplication
LIBSIL	**LBS**	Multiple holding companies (pyramid structure)- removed to avoid duplication
LIBVEST	**LBV**	Multiple holding companies (pyramid structure)- removed to avoid duplication
LOGOPT	**LOT**	Nature of business not listed in relevant JSE handbook
MDMGROW	**MDG**	Mixed nature of business - does not fit into an industry classification as defined
MT-EAGLE	**MTE**	Not an industrial company as specified- no clear industry classification
PACHOLD	**PAC**	Nature of business not listed in relevant JSE handbook
PACIFIC	**PCF**	Nature of business not listed in relevant JSE handbook
PIKWIK	**PWK**	Multiple holding companies (pyramid structure)- removed to avoid duplication
PSL	**PSL**	Nature of business not listed in relevant JSE handbook
PUTRA	**PTA**	Nature of business not listed in relevant JSE handbook
REFCORP	**REF**	Mixed nature of business - does not fit into an industry classification as defined
REMBR-BEH	**RMB**	Multiple holding companies (pyramid structure)- removed to avoid duplication
RPFIN	**RPF**	Nature of business not listed in relevant JSE handbook
RRM	**RRM**	Nature of business not listed in relevant JSE handbook
SEKUNJALO	**SKJ**	BEE diversified investment holding company - doesn't fit well into a single industry
SFG	**SFG**	Nature of business not listed in relevant JSE handbook
SPURHLD	**SPH**	Multiple holding companies (pyramid structure)- removed to avoid duplication - Spur group
TEGKOR	**TEG**	Multiple holding companies (pyramid structure)- removed to avoid duplication

TEMPORA	**TEM**	Property unit trusts- little difference between cash and accrual-based accounting
THW	**THW**	Nature of business not listed in relevant JSE handbook
TIB	**TIB**	Multiple holding companies (pyramid structure)- removed to avoid duplication
TREMATON	**TMT**	Mixed nature of business - does not fit into an industry classification as defined
YABENG	**YBG**	Mixed nature of business - does not fit into an industry classification as defined

APPENDIX IX

Winsorised observations

All winsorised Data in bolded red type

Case Number	Code	Share Name	Year	Industry	Raw Data			Winsorised Data		
					CAR	Scaled EPS	Scaled CFPS	CAR	Scaled EPS	Scaled CFPS
19	**ADL**	ADMIRAL	2002	Services	519%	-0.1850	0.0890	**350%**	-0.1850	0.0890
50	**ADT**	ADVANCED	1996	Services	677%	0.6357	0.9686	**350%**	0.6357	0.9686
279	**ART**	ARGENT	2000	Industrial	474%	1.7182	2.4873	**350%**	1.7182	2.4873
311	**ASR**	ASSORE	1998	Mining and Resources	-44%	3.9355	3.9990	-44%	**2.3510**	3.9990
313	**ASR**	ASSORE	1996	Mining and Resources	-19%	2.4882	2.6348	-19%	**2.3510**	2.6348
319	**ASR**	ASSORE	1990	Mining and Resources	-4%	3.1394	3.6260		**2.3510**	3.6260
405	**BDM**	BUILDMAX	2000	Industrial	53%	2.8400	-2.2070	-53%	**-1.9543**	-2.2070
438	**BNX**	BARNEX	1994	Mining and Resources	1107%	-0.0347	-0.0350	**350%**	-0.0347	-0.0380
479	**BRM**	BEARMAN	1994	Retail	142%	3.6833	4.0127	142%	**2.3510**	4.0127
480	**BRM**	BEARMAN	1993	Retail	68%	2.4667	2.9802	68%	**2.3510**	2.9802
495	**BSR**	BASREAD	1993	Industrial	59%	-2.3300	-2.8812	59%	**-1.9543**	-2.8812
552	**CCT**	CONNECT	2002	Retail	3641%	0.2964	0.2025	**350%**	0.2964	0.2025
631	**CMT**	CEMENCO	2001	Industrial	92%	1.5314	5.0816	92%	1.5314	**4.0549**
697	**CNX**	CONAFEX	1994	Food, Beverages and Drugs	138%	1.1407	4.8357	138%	1.1407	**4.0549**
705	**COI**	CHOICE	1995	Food, Beverages and Drugs	478%	0.1106	0.2814	**350%**	0.1106	0.2814
728	**CPA**	CORPCAP	1996	Financial Services	893%	0.0933	0.7500	**350%**	0.0933	0.7500
826	**CSY**	CASEY	2002	Computers	73%	-3.1667	-2.8400	73%	**-1.9543**	-2.8400
827	**CUL**	CULLINAN	2002	Services	765%	0.6750	0.7675	**350%**	0.6750	0.7675
879	**DDT**	DIDATA	2002	Computers	-80%	0.0781	-6.3535	80%	0.0781	**-3.3519**
890	**DDT**	DIDATA	1990	Computers	53%	2.7417	2.9208	53%	**2.3510**	2.9208

1001	**ELH**	ELLERINE	1991	Retail	8%	2.9884	3.5432	8%	2.3510	3.5432
1015	**ELR**	ELBGROUP	1991	Industrial	79%	2.3757	3.0655	79%	2.3510	3.0655
1016	**ELR**	ELBGROUP	1990	Industrial	29%	2.9217	3.9383	29%	2.3510	3.9383
1041	**FBF**	FBCFID	1991	Financial Services	43%	2.6586	2.8483	43%	2.3510	2.8483
1042	**FBF**	FBCFID	1990	Financial Services	18%	3.3588	3.3612	18%	2.3510	3.3612
1073	**FOS**	FOSCHINI	1990	Retail	71%	2.8981	3.4494	71%	2.3510	3.4494
1074	**FOS**	FOSCHINI	1989	Retail	11%	3.8657	3.8896	11%	2.3510	3.8196
1075	**FOS**	FOSCHINI	1988	Retail	32%	3.1269	3.9693	32%	2.3510	3.9693
1130	**FSR**	FIRSTRAND	1991	Financial Services	69%	1.2850	50.0875	69%	1.2850	4.0549
1169	**GLB**	GILBOA	2001	Insurance and Real Estate	27%	-0.9000	5.5100	27%	-0.9000	4.0549
1230	**GRF**	GROUP-5	1994	Industrial	452%	0.5145	1.6680	350%	0.5145	1.668
1474	**JCM**	JOHNCOM	2002	Services	-107%	0.1635	4.2914	107%	0.1635	4.0549
1525	**JSC**	JASCO	2001	Computers	-85%	-1.0800	-4.9898	-85%	-1.5800	-3.3519
1528	**JSC**	JASCO	1998	Computers	354%	0.1417	0.2020	350%	0.1417	0.202
1602	**LAB**	LABAT	1994	Services	-26%	1.3750	-12.9807	26%	1.3750	-3.3519
1615	**LAR**	LA-GROUP	1993	Retail	-34%	-2.2833	0.0328	-34%	-1.9543	0.0328
1616	**LAR**	LA-GROUP	1992	Retail	14%	2.5800	3.3090	14%	2.3510	3.309
1618	**LAR**	LA-GROUP	1990	Retail	-25%	2.4500	3.1087	25%	2.3510	3.1087
1636	**LGL**	LIBERTY	1989	Insurance and Real Estate	21%	0.9260	7.0344	21%	0.9260	4.0549
1819	**MOB**	MOBILE	1992	Transportation	48%	3.0708	2.9974	48%	2.3510	2.9974
1828	**MPC**	MRPRICE	1995	Retail	927%	0.7171	0.9598	350%	0.7171	0.9598
1878	**MTL**	MRCANTIL	2002	Financial Services	-90%	-3.8750	-2.1241	-90%	-1.9543	2.1241
1893	**MTX**	METOREX	1994	Mining and Resources	413%	0.3674	0.4884	350%	0.3674	0.4884
1910	**MVL**	MVELA RES	2000	Mining and Resources	401%	0.0388	-0.0377	350%	-0.0388	-0.0377
1997	**NFH**	NAMPAK	1993	Food, Beverages and Drugs	27%	1.1395	4.7228	27%	1.1395	4.0549
2099	**OML**	OLDMUTUAL	2002	Insurance and Real Estate	-36%	1.3608	8.2663	-36%	1.3608	4.0549
2123	**OZZ**	OZZ	1991	Industrial	503%	1.2806	2.3694	350%	1.2806	2.3694
2173	**PET**	PETMIN	2002	Mining and Resources	380%	0.3114	0.3190	350%	0.3114	0.319
2180	**PET**	PETMIN	1994	Mining and Resources	4386%	1.4767	-0.0370	350%	1.4767	-0.037
2223	**PML**	PRFM-GRP	1989	Food, Beverages and Drugs	40%	2.6188	3.0711	40%	2.3510	3.0711
2241	**POW**	POWTECH	2001	Electronic and Electrical equipment	702%	0.1461	0.2669	350%	0.1461	0.2669
2293	**PRB**	PERSBEL	1990	Services	-26%	2.9542	3.1492	-26%	2.3510	3.1492

2294	**PRB**	PERSBEL	1989	Services	15%	4.2000	0.6573	15%	2.3510	0.6573
2394	**RLY**	RELYANT	2002	Retail	-73%	-3.1625	-0.7113	73%	-1.9543	-0.7113
2420	**RNT**	RENTSUR	1996	Insurance and Real Estate	961%	6.3919	12.6981	350%	2.3510	4.0549
2422	**RNT**	RENTSUR	1994	Insurance and Real Estate	37%	-0.4000	9.5304	37%	-0.4000	4.0549
2424	**RNT**	RENTSUR	1992	Insurance and Real Estate	-56%	-2.4040	0.2594	-56%	-1.9543	0.2594
2425	**RNT**	RENTSUR	1991	Insurance and Real Estate	43%	1.4959	4.6249	43%	-1.4959	4.0549
2426	**RNT**	RENTSUR	1990	Insurance and Real Estate	0%	1.4867	5.9138	0%	1.4867	4.0549
2589	**SFR**	SAFRON	1969	Transportation	1413%	0.0736	0.2640	350%	0.0736	0.264
2769	**SSH**	S&SHOLD	1999	Industrial	11%	-8.7400	3.6502	11%	-1.9543	3.6502
2800	**STS**	STOCKS	1999	Industrial	18%	9.3913	-1.7274	-18%	-1.9543	-1.7274
2822	**TBE**	THEBEFIN	1997	Financial Services	397%	0.6789	0.7516	350%	0.6789	0.7516
2868	**TPC**	TRNPACO	1996	Retail	453%	0.3571	0.6233	350%	0.3571	0.6233
3012	**VTL**	VENTEL	1999	Textiles	-41%	-2.6850	-2.3870	-40%	-1.9543	-2.387
3101	**WNH**	WINHOLD	1995	Retail	880%	1.0000	3.3350	350%	1.0000	3.335

APPENDIX X

Regression results

Raw data

	Earnings						Cash Flow from operations						Whole Regression model		
	Beta	p level	Mean	Std Dev	Adj R2	p level	Beta	P level	Mean	Std Dev	Adj R2	p level	Adj R2	p level	N
Electronics and Electrical	-10.26	0.72	0.2816	1.1694	0.09%	0.715	20.24	0.47	0.4253	1.3263	1.08%	0.193	1.17%	0.40	158
Computers	12.09	0.29	0.0996	0.533	0.87%	0.286	15.07	0.18	0.0453	0.9261	**5.18%**	**0.010**	**6.05%**	**0.02**	127
Textiles	-6.35	0.84	0.1791	0.739	0.02%	0.843	37.73	0.24	[illegible]	0.8888	**9.97%**	**0.000**	**10.00%**	**0.00**	148
Services	**47.93**	**0.00**	**0.2436**	**0.7098**	**6.85%**	**0.000**	**-52.46**	**0.00**	[illegible]	1.4502	[illegible]	**0.000**	**22.92%**	**0.00**	409
Retail	-7.37	0.72	0.3301	1.3692	0.04%	0.719	12.59	0.54	[illegible]	1.6565	0.30%	0.333	0.35%	0.59	310
Mining and Resources	**44.71**	**0.00**	**0.1627**	**0.3954**	**2.25%**	**0.001**	**-37.08**	**0.00**	[illegible]	**0.5984**	**4.92%**	**0.000**	**7.16%**	**0.00**	469
Insurance and Real Estate	**13.71**	**0.04**	**0.1159**	**0.784**	**0.90%**	**0.036**	**28.23**	**0.00**	**0.2665**	1.3967	**14.52%**	**0.000**	**15.43%**	**0.00**	415
Industrial	6.32	0.23	0.1591	0.7907	0.32%	0.229	**30.05**	**0.00**	[illegible]	**0.7615**	[illegible]	**0.000**	**11.12%**	**0.00**	406
Food, Beverages and Drugs	-10.02	0.30	0.1297	0.9821	0.34%	0.301	**36.72**	**0.00**	[illegible]	**0.9149**	**8.17%**	**0.000**	**8.51%**	**0.00**	286
Financial Services	**15.1**	**0.03**	**0.242**	**0.5992**	**2.74%**	**0.014**	5.1	0.46	[illegible]	3.4227	0.24%	0.463	**2.98%**	**0.04**	221
Transportation	2.75	0.87	0.2905	0.6884	0.01%	0.868	13.89	0.10	0.517	0.7879	1.30%	0.097	1.31%	0.25	214
Average	**9.37**	**0.37**	**0.2031**	**0.7964**	**1.31%**	**0.37**	**10.01**	**0.21**	**0.3566**	**1.2845**	**6.60%**	**0.10**	**7.91%**	**0.12**	
All Shares	-10.26	**0.00**	**0.1983**	**0.8279**	**1.37%**	**0.000**	-2.93	0.19	0.3515	1.4244	0.05%	0.186	**1.42%**	**0.00**	3 163

Winsorised	EPS	p level	Mean	Std Dev	Adj R-2	p level	CF	p level	Mean	Std Dev	Adj R-2	p level	Multiple R2	p level	Db Stat	Serial corr	N
Electronics and Electrical	13.13	0.31	0.2086	0.459	4.92%	0.005	11.35	0.0038	0.3539	64.95	0.47%	0.382	5.39%	0.01	1.82	0.08	158
Computers	17.62	0.22	0.1061	0.4666	6.86%	0.003	10.73	0.0048	0.0834	70.18	0.42%	0.456	7.27%	0.01	2.19	-0.10	127
Textiles	29.18	0.33	0.2022	0.4995	10.43%	0	3.23	0.0291	0.3562	72.19	0.01%	0.911	10.44%	0.00	2.13	-0.07	148
Services	31.19	0	0.2054	0.4977	6.87%	0	-6.93	0.0032	0.2804	78.31	0.23%	0.316	7.10%	0.00	2.03	-0.02	409
Retail	14.33	0.32	0.2784	0.648	4.38%	0	7.16	0.0062	0.4054	102.61	0.08%	0.617	4.46%	0.00	1.84	0.08	310
Mining and Resources	18.27	0.02	0.1574	0.3551	0.75%	0.061	-11.99	0.0012	0.2341	59.84	0.51%	0.121	1.26%	0.05	1.80	0.10	469
Insurance and Real Estate	12.25	0.03	0.1284	0.3117	1.15%	0.026	14.45	0.0001	0.2067	61.23	4.17%	0.000	5.31%	0.00	1.82	0.09	415
Industrial	19.6	0.01	0.1926	0.4349	10.35%	0	16.37	0.0003	0.3926	71.44	1.10%	0.000	11.45%	0.00	1.89	0.05	406
Food, Beverages and Drugs	14.04	0.18	0.1679	0.405	0.58%	0.178	19.85	0.0006	0.3315	69.47	10.03%	0.000	10.60%	0.00	1.89	0.05	286
Financial Services	-5.8	0.62	0.2447	0.5231	0.11%	0.617	34.04	0	0.3271	75.27	8.55%	0.000	8.65%	0.00	1.56	0.22	221
Transportation	18.72	0.19	0.2509	0.4059	6.92%	0	8.58	0.0055	0.1972	66.15	0.16%	0.548	7.08%	0.00	1.80	0.10	214
Average	**16.59**	**0.2**	**0.1948**	**0.4551**	**4.[illegible]%**	**0.0**	**10**	**0.0031**	**0.3235**	**71.97**	**2.34%**	**0.30**	**7.18%**	**0.01**	**1.89**	**0.05**	
All Shares	17.87	0	0.1922	0.4544	5.49%	0	6.93	0.0002	0.3212	73.34	0.17%	0.016	5.66%	0.00	1.86	0.07	3 163

Top half	Earnings						Cash Flow from operations						Whole Regression model		
	EPS	p level	Mean	Std Dev	Adj R2	p level	CF	p level	Mean	Std Dev	Adj R2	p level	Mult - R2	p level	N
Electronics and Electrical	2.11	0.870	0.2106	0.4089	0.04%	0.8740	11.98	0.440	0.3481	0.5722	1.82%	0.262	1.86%	0.529	71
Computers	-0.1	-0.450	0.1529	0.4494	0.00%	0.9970	26.91	0.240	0.1511	0.6469	7.19%	0.011	7.19%	0.040	89
Textiles	8.84	0.890	0.1567	0.5142	4.28%	0.1350	12.29	0.850	0.294	0.7264	0.04%	0.893	4.42%	0.323	53
Services	29.17	0.000	0.3899	0.4503	6.92%	0.0000	8.08	0.310	0.[illegible]	0.6998	0.44%	0.308	6.46%	0.001	227
Retail	4.78	0.830	0.2525	0.5606	0.03%	0.8530	9.55	0.670	0.3796	0.9553	1.97%	0.080	2.00%	0.212	157
Mining and Resources	12.06	0.180	0.1161	0.2481	1.86%	0.0560	0.64	0.940	0.1868	0.4773	0.00%	0.942	1.56%	0.162	234
Insurance and Real Estate	3.9	0.590	0.1252	0.2627	0.14%	0.5910	14.95	0.040	0.2327	0.6418	2.56%	0.023	2.70%	0.065	203
Industrial	16.71	0.070	0.2188	0.4299	1.49%	0.0660	17.17	0.060	0.4045	0.7452	8.16%	0.000	9.66%	0.000	210
Food, Beverages and Drugs	5.77	0.780	0.1563	0.4993	0.07%	0.7830	28.73	0.170	0.3109	0.721	3.45%	0.001	11.53%	0.003	97
Financial Services	-6.53	0.680	0.1954	0.3715	0.12%	0.6830	30.96	0.050	0.2693	0.6144	6.45%	0.003	6.56%	0.010	138
Transportation	21.69	0.480	0.3218	0.5973	10.19%	0.0030	10.89	0.720	0.[illegible]26	0.9219	0.14%	0.721	10.33%	0.041	85
Average	9.98	**0.450**	0.187[illegible]	**0.4357**	**4.19%**	**0.4560**	**14**	**0.410**	**0.3062**	**0.702**	**3.66%**	**0.295**	**0.06**	**0.123**	
All Shares	14.9	0.000	0.1796	0.4249	4.23%	0.0000	7.54	0.040	0.291	0.7077	0.25%	0.041	4.47%	0.000	1 564
Bottom Half	**EPS**	**p level**	**Mean**	**Std Dev**	**Adj R2**	**p level**	**CF**	**p level**	**Mean**	**Std Dev**	**Adj R2**	**p level**	**Mult - R2**	**p level**	**N**
Electronics and Electrical	34.18	0.140	0.2069	0.4985	11.63%	0.001	0.00	1.000	0.3627	0.7096	0.00%	0.997	11.63%	0.006	87
Computers	28.04	0.190	0.0936	0.4933	7.38%	0.099	-1.00	0.950	-0.0751	0.8033	0.01%	0.948	7.40%	0.261	38
Textiles	48.71	0.200	0.1836	0.487	15.34%	0.000	-10.00	0.790	0.3372	0.7268	0.07%	0.794	15.41%	0.001	87
Services	31.85	0.020	0.2589	0.5518	8.05%	0.000	-4.00	0.750	0.3554	0.8722	0.05%	0.752	8.10%	0.001	182
Retail	19.26	0.330	0.305	0.7277	7.03%	0.001	8.00	0.690	0.6142	1.0842	0.10%	0.691	7.13%	0.004	153
Mining and Resources	45.39	0.000	0.206	0.4513	0.71%	0.227	-43.00	0.000	0.3139	0.73	4.64%	0.002	5.35%	0.003	209
Insurance and Real Estate	17.1	0.060	0.1188	0.3529	6.79%	0.000	13.00	0.140	0.1818	0.5832	0.96%	0.142	7.74%	0.000	212
Industrial	25.29	0.060	0.199	0.4412	13.80%	0.000	13.00	0.330	0.3798	0.6816	0.42%	0.333	13.92%	0.000	196
Food, Beverages and Drugs	17.82	0.150	0.1788	0.3481	9.80%	0.000	16.00	0.200	0.3421	0.6826	0.78%	0.204	10.18%	0.000	189
Financial Services	-5.38	0.770	0.3267	0.7019	0.10%	0.768	41.00	0.030	0.4233	0.935	13.07%	0.001	13.17%	0.004	83
Transportation	20.19	0.080	0.2041	0.1858	5.65%	0.007	5.00	0.643	0.4456	0.4044	5.81%	0.644	11.46%	0.023	129
Average	**25.68**	**0.15[illegible]**	**0.1962**	**0.4763**	**7.78%**	**0.1**	**3.00**	**0.500**	**0.3346**	**0.746[illegible]**	**2.36%**	**0.50[illegible]**	**10.13%**	**0.027**	
All Shares	23.11	0.000	0.203	0.4841	7.15%	0	4.27	0.350	0.3531	0.762	0.05%	0.347	7.20%	0.000	1 565

Winsorised	Earnings						Cash Flow from operations						Whole Regression model		
	EPS	p level	Mean	Std Dev	Adj R2	p level	CF	p level	Mean	Std Dev	Adj R2	p level	Adj R2	p level	N
1988	0.750	0.3601	0.3316	0.471	1.35%	0.494	-0.380	0.4444	0.4898	0.7698	1.71%	0.444	3.06%	0.590	37
1989	1.010	0.9632	0.6282	0.741	0.00%	0.963	22.020	0.314	0.9392	1.2124	5.24%	0.033	5.24%	0.104	87
1990	13.200	0.676	0.511	0.7648	0.11%	0.676	25.710	0.4161	0.7591	1.1974	14.83%	0.000	14.93%	0.000	144
1991	27.060	0.0316	0.3964	0.6661	15.32%	0.000	14.490	0.2475	0.6635	1.056	0.64%	0.247	15.96%	0.000	180
1992	4.850	0.6734	0.2639	0.5381	0.09%	0.673	15.110	0.19	0.4354	0.7853	3.57%	0.009	3.66%	0.031	189
1993	7.240	0.6242	0.2414	0.5481	0.11%	0.624	26.610	0.073	0.4158	0.857	10.93%	0.000	11.04%	0.000	201
1994	21.020	0.0256	0.2732	0.4997	7.64%	0.000	9.310	0.3205	0.4498	0.8671	0.43%	0.320	8.07%	0.000	216
1995	17.960	0.2509	0.1892	0.3695	3.26%	0.007	0.110	0.9942	0.2807	0.548	0.00%	0.994	3.26%	0.026	223
1996	-22.410	0.108	0.1432	0.3268	1.01%	0.108	52.820	0.0002	0.2297	0.4627	10.76%	0.000	11.77%	0.000	230
1997	15.400	0.0618	0.0954	0.2379	3.59%	0.002	5.400	0.5115	0.1808	0.384	0.17%	0.511	3.75%	0.008	253
1998	2.870	0.7759	0.072	0.2536	0.03%	0.776	8.920	0.3768	0.117	0.4536	1.25%	0.075	1.28%	0.197	255
1999	7.890	0.2177	0.0692	0.307	0.54%	0.218	17.510	0.0065	0.1259	0.4593	4.17%	0.001	4.71%	0.002	274
2000	45.730	0	0.1063	0.2754	14.44%	0.000	-16.200	0.0099	0.1538	0.5636	2.03%	0.010	16.47%	0.000	281
2001	15.410	0.0211	0.1034	0.2963	1.62%	0.021	21.060	0.0017	0.231	0.5372	8.84%	0.000	10.46%	0.000	300
2002	31.560	0.0001	0.1401	0.4123	5.72%	0.000	-10.260	0.1994	0.2946	0.7314	0.65%	0.157	6.37%	0.000	293
Average	**12.640**	**0.3193**	**0.2376**	**0.4472**	**3.66%**	**0.300**	**13.000**	**0.27**	**0.3844**	**0.7257**	**4.35%**	**0.190**	**8.00%**	**0.064**	
All Shares	17.870	0	0.1922	0.4544	5.49%	0.000	6.930	0.02	0.3212	0.7334	0.17%	0.016	5.60%	0.000	3 163

APPENDIX XI

Descriptive Statistics

Descriptive Stats: All winsorised

	Mean	Std Dev	Cases
EPS	0.192	0.454	3163
CFO	0.321	0.733	3163
CAR	2.67%	65.32%	3163

Descriptive Stats: Break down by Trading volume

	Low turnover			*High turnover*			*Total*		
	Mean	*Std Dev*	*Cases*	*Mean*	*Std Dev*	*Cases*	*Mean*	*Std Dev*	*Cases*
EPS	0.204	0.484	1581	0.181	0.423	1582	0.19	0.45	3163
CFO	0.354	0.761	1581	0.289	0.703	1582	0.32	0.73	3163
CAR	3.50%	62.00%	1581	1.84%	68.41%	1582	2.67%	65.32%	3163
	Mean turnover		*3.47%*	*Mean turnover*		*95.58%*	*Mean turnover*		*49.39%*

Descriptive Stats: Break down by Industry

	Mean			*Std Dev*			*Cases*		
Industry	*EPS*	*CFO*	*CAR*	*EPS*	*CFO*	*CAR*	*EPS*	*CFO*	*CAR*
Computers	0.106	0.083	-0.97%	0.465	0.699	83.55%	127	127	127
Electronic and Elec. eqtmnt	0.209	0.354	2.37%	0.458	0.647	66.53%	158	158	158
Financial Services	0.245	0.327	7.53%	0.522	0.751	70.69%	221	221	221
Food, Beverages and Drugs	0.168	0.331	1.34%	0.404	0.694	51.64%	286	286	286
Industrial	0.193	0.393	6.37%	0.434	0.714	63.92%	406	406	406
Insurance and Real Estate	0.128	0.207	-4.13%	0.311	0.612	46.75%	415	415	415
Mining and Resources	0.157	0.234	3.08%	0.355	0.598	70.40%	469	469	469
Retail	0.278	0.495	7.53%	0.647	1.024	72.64%	310	310	310
Services	0.295	0.280	0.72%	0.497	0.782	72.33%	409	409	409
Textiles	0.202	0.356	-2.07%	0.498	0.719	59.46%	148	148	148
Transportation	0.251	0.497	6.97%	0.405	0.660	61.27%	214	214	214
Total	**0.192**	**0.321**	**2.67%**	**0.454**	**0.733**	**65.32%**	**3163**	**3163**	**3163**

Descriptive Stats: Break down by Industry

	Mean			*Std Dev*			*Cases*		
Year	*EPS*	*CFO*	*CAR*	*EPS*	*CFO*	*CAR*	*EPS*	*CFO*	*CAR*
1988	0.332	0.490	1.57%	0.465	0.759	58.82%	37	37	37
1989	0.628	0.939	-6.81%	0.737	1.205	46.10%	87	87	87
1990	0.511	0.759	-5.60%	0.762	1.193	42.12%	144	144	144
1991	0.396	0.663	9.00%	0.664	1.053	62.87%	180	180	180
1992	0.264	0.435	-3.60%	0.537	0.783	55.01%	189	189	189
1993	0.241	0.416	12.51%	0.547	0.855	69.48%	201	201	201
1994	0.273	0.450	44.19%	0.499	0.865	86.25%	216	216	216
1995	0.189	0.281	13.82%	0.369	0.547	59.67%	223	223	223
1996	0.143	0.230	12.79%	0.326	0.462	75.01%	230	230	230
1997	0.095	0.181	8.20%	0.237	0.383	63.49%	253	253	253
1998	0.072	0.117	-7.28%	0.253	0.453	60.66%	255	255	255
1999	0.069	0.126	-10.53%	0.306	0.458	58.90%	274	274	274
2000	0.106	0.154	-13.92%	0.275	0.563	61.49%	281	281	281
2001	0.103	0.231	-7.84%	0.296	0.536	57.12%	300	300	300
2002	0.140	0.295	-1.08%	0.412	0.730	68.03%	293	293	293
Total	**0.192**	**0.321**	**2.67%**	**0.454**	**0.733**	**65.32%**	**3163**	**3163**	**3163**

APPENDIX XII

Annual Industry results where significant

Winsorised	Earnings						Cash Flow from operations						Whole Regression model		
	EPS	p level	Mean	Std Dev	Adj R2	p level	CF	P level	Mean	Std Dev	Adj R2	p level	Mult - R2	p level	N
Electronics and Electrical	13.135	0.312	0.21	0.46	4.92%	0.005	0.113	0.38	0.35	0.65	0.47%	0.382	5.39%	0.014	158
Computers	17.625	0.221	0.11	0.47	6.86%	0.003	0.107	0.46	0.08	0.70	0.42%	0.456	7.27%	0.009	127
Textiles	29.182	0.327	0.20	0.50	10.43%	0.000	0.032	0.91	0.36	0.72	0.01%	0.914	10.44%	0.000	148
Services	31.190	0.000	0.21	0.50	6.87%	0.000	-0.069	0.32	0.28	0.78	0.23%	0.316	7.10%	0.000	409
Retail	14.331	0.318	0.28	0.65	4.38%	0.000	0.072	0.62	0.50	1.03	0.08%	0.617	4.46%	0.001	310
Mining and Resources	18.267	0.018	0.16	0.36	0.75%	0.061	-0.120	0.12	0.23	0.60	0.51%	0.121	1.26%	0.052	469
Insurance and Real Estate	12.250	0.026	0.13	0.31	1.15%	0.026	0.145	0.01	0.21	0.61	4.17%	0.000	5.31%	0.000	415
Industrial	19.596	0.008	0.19	0.43	10.35%	0.000	0.164	0.03	0.39	0.71	1.10%	0.000	11.45%	0.000	406
Food, Beverages and Drugs	14.044	0.178	0.17	0.40	0.58%	0.178	0.199	0.06	0.33	0.69	10.03%	0.000	10.60%	0.000	286
Financial Services	-5.803	0.617	0.24	0.52	0.11%	0.617	0.340	0.00	0.33	0.75	8.55%	0.000	8.65%	0.000	221
Transportation	18.718	0.191	0.25	0.41	6.92%	0.000	0.086	0.35	0.50	0.66	0.16%	0.548	7.08%	0.000	214
Average	**16.594**	**0.201**	**0.19**	**0.46**	**4.85%**	**0.081**	**0.097**	**0.31**	**0.32**	**0.72**	**2.34%**	**0.305**	**7.19%**	**0.007**	
All Shares	17.874	0.000	0.19	0.45	5.49%	0.000	0.069	0.02	0.32	0.73	0.17%	0.016	5.66%	0.000	3 163

		Earnings						Cash Flow from operations						Whole Regression model		
		EPS	p level	Mean	Std Dev	Adj R2	p level	CF	P level	Mean	Std Dev	Adj R2	p level	Mult - R2	p level	N
Mining and Resources	1990	59.416	0.714	0.20	0.44	0.47%	0.724	-57.286	0.72	0.28	0.66	0.07%	0.891	0.54%	0.936	30
	1991	95.306	0.021	0.13	0.25	13.98%	0.035	-63.905	0.11	0.25	0.68	7.30%	0.112	21.28%	0.031	32
	1992	31.258	0.462	0.30	0.20	0.48%	0.738	27.980	0.51	0.17	0.56	1.62%	0.510	2.02%	0.759	31
	1993	28.717	0.583	0.09	0.31	1.78%	0.485	-16.856	0.73	0.13	0.34	0.37%	0.747	2.07%	0.747	31
	1994	95.813	0.089	0.20	0.40	4.33%	0.214	-51.712	0.23	0.19	0.41	4.48%	0.233	9.41%	0.227	33
	1995	28.526	0.618	0.11	0.30	1.52%	0.466	-16.604	0.77	0.13	0.37	0.26%	0.771	1.89%	0.737	35
	1996	-18.406	0.615	0.14	0.45	0.82%	0.615	19.319	0.60	0.15	0.47	0.30%	0.861	0.92%	0.866	43
	1997	-4.297	0.909	0.13	0.38	0.72%	0.613	12.263	0.74	0.16	0.38	0.04%	0.909	0.75%	0.876	38
	1998	-27.729	0.341	0.12	0.42	0.97%	0.591	23.201	0.42	0.09	0.93	2.19%	0.424	3.17%	0.627	32
	1999	44.274	0.081	0.13	0.18	20.01%	0.038	2.091	0.90	0.22	0.13	0.04%	0.900	20.05%	0.051	34
	2000	-3.038	0.874	0.16	0.20	0.07%	0.874	-30.569	0.12	0.32	0.43	30.25%	0.063	10.32%	0.175	35
	2001	-35.187	0.263	0.10	0.30	3.46%	0.263	58.808	0.07	0.18	0.42	8.38%	0.087	11.84%	0.125	36
	2002	20.866	0.626	0.31	0.25	0.94%	0.626	35.104	0.41	0.68	0.17	2.76%	0.398	3.70%	0.624	28
	Average	15.618	0.51	0.15	0.33	3.85%	0.481	8.345	0.45	0.3	0.46	2.91%	0.531	7.7%	0.520	
	1988-2002	18.267	0.018	0.16	0.36	0.75%	0.061	-11.988	0.12	0.23	0.60	0.51%	0.121	1.26%	0.052	469

Insurance and Real Estate	1994	1.749	0.951	0.08	0.11	0.01%	0.951	-22.130	0.44	0.25	0.72	5.50%	0.204	5.51%	0.452	31
	1995	37.916	0.570	0.17	0.40	14.72%	0.028	0.462	0.99	0.26	0.69	0.80%	0.994	14.72%	0.092	33
	1996	-114.866	0.000	0.19	0.45	8.91%	0.000	175.337	0.00	0.28	0.75	41.49%	0.000	50.40%	0.000	32
	1997	6.530	0.867	0.14	0.19	0.35%	0.737	-0.734	0.98	0.14	0.26	0.00%	0.984	0.35%	0.946	35
	1998	4.848	0.802	0.11	0.14	0.23%	0.802	-10.665	0.58	0.08	0.16	0.94%	0.604	1.16%	0.849	31
	1999	30.284	0.111	0.13	0.10	9.24%	0.064	0.132	0.99	0.11	0.26	0.00%	0.994	9.24%	0.184	38
	2000	24.498	0.273	0.12	0.13	6.81%	0.109	2.328	0.92	0.13	0.18	0.03%	0.916	6.85%	0.280	39
	2001	2.536	0.876	0.11	0.29	0.06%	0.876	31.230	0.06	0.24	0.71	9.47%	0.057	9.53%	0.165	39
	2002	12.072	0.729	0.13	0.30	0.05%	0.901	11.526	0.74	0.22	0.71	0.36%	0.741	0.41%	0.939	34
	Average	0.618	0.578	0.13	0.24	4.48%	0.500	16.270	0.63	0.19	0.49	6.42%	0.611	10.90%	0.434	
	1988-2002	12.250	0.026	0.13	0.31	1.15%	0.026	14.453	0.01	0.21	0.61	4.17%	0.000	5.31%	0.000	415

Industrial	1996	31.863	0.207	0.11	0.08	18.23%	0.028	15.510	0.53	0.18	0.12	1.23%	0.534	19.46%	0.060	29
	1997	81.092	0.044	0.11	0.20	31.31%	0.001	-27.473	0.48	0.26	0.69	1.14%	0.483	32.25%	0.005	33
	1998	-40.426	0.053	0.08	0.14	8.57%	0.083	24.869	0.18	0.18	0.14	4.94%	0.179	13.51%	0.098	36
	1999	-3.236	0.849	0.01	0.49	0.09%	0.854	-1.168	0.95	0.28	0.69	0.01%	0.945	0.11%	0.981	39
	2000	98.487	0.000	0.13	0.49	39.14%	0.000	-42.416	0.09	0.33	0.80	5.09%	0.092	44.23%	0.000	36
	2001	-8.577	0.847	0.25	0.30	0.12%	0.847	44.124	0.33	0.47	0.76	13.15%	0.045	13.26%	0.136	31
	2002	61.313	0.000	0.22	0.28	33.86%	0.000	-14.621	0.34	0.49	0.42	2.04%	0.345	35.90%	0.002	32
	Average	31.502	0.283	0.13	0.28	18.73%	0.258	0.168	0.41	0.31	0.52	3.94%	0.375	22.68%	0.182	
	1988-2002	19.596	0.008	0.19	0.43	10.35%	0.000	16.370	0.03	0.39	0.71	1.10%	0.000	11.45%	0.000	406

Services	1996	14.103	0.798	0.15	0.45	0.24%	0.798	40.134	0.47	0.30	0.68	7.23%	0.158	7.47%	0.364	29
	1997	0.000	0.222	0.37	0.09	3.19%	0.345	-30.690	0.39	0.09	0.19	2.66%	0.390	5.85%	0.443	30
	1998	22.322	0.436	0.08	0.12	1.16%	0.436	41.624	0.15	0.11	0.21	37.43%	0.000	38.59%	0.000	36
	1999	20.070	0.269	0.06	0.09	6.56%	0.126	14.115	0.43	-0.02	0.25	1.68%	0.435	8.25%	0.232	37
	2000	74.898	0.000	0.10	0.23	48.29%	0.000	7.322	0.66	-0.05	0.59	0.24%	0.662	48.54%	0.000	44
	2001	15.312	0.361	0.07	0.27	2.93%	0.250	1.076	0.81	0.14	0.28	6.13%	0.807	3.07%	0.504	47
	2002	39.631	0.013	0.12	0.37	13.74%	0.01	5.000	0.36	0.25	0.75	1.75%	0.558	14.49%	0.044	43
	Average	22.587	0.300	0.14	0.23	10.87%	0.281	9.654	0.36	0.12	0.48	7.16%	0.430	18.04%	0.227	
	1988-2002	31.190	0.000	0.21	0.50	6.87%	0.000	-6.926	0.32	0.26	0.78	0.23%	0.316	7.10%	0.000	469
Retail	2001	5.925	0.841	0.13	0.24	0.36%	0.841	45.554	0.08	0.31	0.45	24.42%	0.603	24.52%	0.015	35
	2002	28.558	0.112	0.14	0.54	3.81%	0.293	-36.244	0.23	0.39	0.72	4.99%	0.220	8.80%	0.276	31
	Average	26.542	0.476	0.14	0.39	1.96%	0.567	4.656	0.15	0.35	0.58	14.70%	0.412	16.66%	0.145	
	1988-2002	11.551	-0.316	0.26	0.55	-0.58%	0.000	7.165	0.62	0.30	1.01	0.08%	0.317	4.46%	0.001	310
Financial Services	2001	45.803	0.032	0.08	0.34	15.21%	0.053	20.634	0.32	0.16	0.18	3.36%	0.315	16.58%	0.095	29
	2002	-62.091	0.150	-0.03	0.45	5.62%	0.150	110.277	0.01	0.05	0.35	37.97%	0.003	33.60%	0.085	29
	Average	-8.144	0.091	0.02	0.30	9.42%	0.101	44.822	0.16	0.10	0.26	15.67%	0.159	25.09%	0.050	
	1988-2002	-3.803	0.617	0.24	0.52	0.11%	0.617	34.044	0.00	0.33	0.75	8.55%	0.000	8.65%	0.000	221
Computers	2002	5.889	0.820	0.01	0.52	0.17%	0.820	22.133	0.39	0.09	0.88	3.25%	0.318	3.39%	0.596	33
	1988-2002	17.625	0.221	0.11	0.47	6.86%	0.003	10.730	0.46	0.08	0.70	0.42%	0.456	7.27%	0.009	127

APPENDIX XIII

Results of Supplementary testing

ANOVA: Summary

Groups	*Count*	*Sum*	*Mean*	*Variance*
Corroborative: EPS Pos AND CFO Pos	1640	340.230367	20.75%	0.79269
Ambiguous: EPS Pos AND CFO Neg	405	8.84285316	2.18%	0.82555
Ambiguous: EPS Neg AND CFO Pos	308	-28.159945	-9.14%	1.29071
Corroborative: EPS Neg AND CFO Neg	923	-154.42331	-16.73%	0.40298

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	90.73	3	30.2419	**41.2206002**	**0.00000**	**2.6076**
Within Groups	2 400.54	3272	0.7337			
Total	2 491.26	3275				

t-Test: Two-Sample Assuming Unequal Variances

	Pos/Pos	*Pos/Neg*
Mean	0.20745754	2.183%
Variance	0.79269022	0.82554556
Observations	1640	405
Hypothesized Mean Difference		0
Deg. of freedom		610
t Stat		-3.69643543
P(T<=t) one-tail		**0.0001192**
t Critical one-tail		1.64735411

t-Test: Two-Sample Assuming Unequal Variances

	Pos/Pos	*Neg/Pos*
Mean	0.20745754	-9.143%
Variance	0.79269022	1.29070838
Observations	1640	308
Hypothesized Mean Difference		0
Deg. of freedom		381
t Stat		-4.37182743
P(T<=t) one-tail		**0.0000080**
t Critical one-tail		1.64886387

t-Test: Two-Sample Assuming Unequal Variances

	Pos/Pos	*Neg/Neg*
Mean	0.207928493	-16.681%
Variance	0.7928102	0.4031908
Observations	1639	922
Hypothesized Mean Difference		0
Deg. of freedom		2420
t Stat		12.3478756
P(T<=t) one-tail		**0.0000000**
t Critical one-tail		1.64548283

t-Test: Two-Sample Assuming Unequal Variances

	Pos/Neg	*Neg/Pos*
Mean	0.02183421	-9.143%
Variance	0.82554556	1.29070838
Observations	405	308
Hypothesized Mean Difference		0
Deg. of freedom		575
t Stat		1.43508458
P(T<=t) one-tail		**0.0759033**
t Critical one-tail		1.64750873

t-Test: Two-Sample Assuming Unequal Variances

	Neg/Pos	*Neg/Neg*
Mean	-0.09142839	-16.731%
Variance	1.29070838	0.40298239
Observations	308	923
Hypothesized Mean Difference		0
df		373
t Stat		1.11543774
P(T<=t) one-tail		0.1326862
t Critical one-tail		1.64893027

t-Test: Two-Sample Assuming Unequal Variances

	Pos/Neg	*Neg/Neg*
Mean	0.02323001	-16.681%
Variance	0.82681434	0.4031908
Observations	404	922
Hypothesized Mean Difference		0
Deg. Of Freedom		582
t Stat		3.81287776
P(T<=t) one-tail		**0.0000760**
t Critical one-tail		1.64747689

t-Test: Two-Sample Assuming Unequal Variances

	EPS Pos	*CFO Pos*
Mean	0.170696	16.020%
Variance	0.8042714	0.8827072
Observations	2045	1948
Hypothesized Mean Difference		0
Deg. Of freedom		3955
t Stat		0.3607538
P(T<=t) one-tail		0.3591514
t Critical one-tail		1.6452395
P(T<=t) two-tail		0.7183028
t Critical two-tail		1.9605659

t-Test: Two-Sample Assuming Unequal Variances

	EPS Neg	*CFO Neg*
Mean	-0.1483211	-16.962%
Variance	0.6253064	0.5389149
Observations	1231	1328
Hypothesized Mean Difference		0
Deg. Of Freedom		2501
t Stat		-1.2801483
P(T<=t) one-tail		0.1003059
t Critical one-tail		1.6454624
P(T<=t) two-tail		0.2006117
t Critical two-tail		1.9609115