# *UK CORPORATE DATA*

# *AND FUTURE CASH FLOWS*

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*To MY PARENTS*

# Abstract

This study examines the ability of current accounting data to explain future cash flows for UK firms, as disclosed under FRS1 (1991, revised 1996). Rather than examining price data — from which cash flow implications have to be inferred — a more direct approach used in several recent US studies is adopted, in which *actual* future cash flow data are examined. Specifically, the methodology is a development of the OLS regression framework employed by Barth, et al. (2001). In the first stage of this study, a replication of their main OLS analysis is provided, and then extended to deal with fixed effects and time trends in the levels of cash flow data. The results show that (i) aggregate accruals have incremental information content beyond that already existing in aggregate earnings; (ii) the main components of aggregate accruals (depreciation and changes in accounts payable, accounts receivable, inventory) have incremental information content beyond that already existing in either earnings or aggregate accruals; and (iii) cash flows alone outperform earnings alone in explaining the variation in future cash flows. Furthermore, accruals (either aggregate or the individual components of accruals) have incremental information content beyond that already existing in cash flows. This evidence supports FRS1's assertion that accruals data should be used in conjunction with cash flow data in predicting future cash flows. The research design is then developed to examine the effect of firm characteristics on the association of earnings, cash flows and accruals with future cash flows. The results show that the decomposition of earnings into cash flows and accruals is more relevant and more value useful when: (i) the length of the operating cycle is short; (ii) the performance level is not extreme; (iii) the magnitude of total accruals is high; and (iii) the probability of default risk is high. The results also reveal that earnings outperform cash flows in explaining the variation in future cash flows when: (i) the magnitude of total accruals is low, and (ii) the probability of default risk is low.

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# Chapter 1

# Introduction

## 1.1 Preamble

The relative information content of alternative performance measures (e.g. earnings and cash flows) is a fundamental question in accounting. In evaluating alternative performance measures, the criterion used must take into consideration the objective of a particular performance measure (Kothari, 2001). An important objective of cash flow statements is that cash flow data is helpful in assessing the amount, timing, and uncertainty of future cash flows (see FRS1, (1991, revised 1996)). A straight implication for this is to compare between alternative performance measurement on the basis of their association with future cash flows. Nevertheless, the majority of prior empirical studies have used the association with share price or stock return as the criterion to evaluate the alternative performance measures. An implicit assumption in these kinds of studies, *share-price studies*, is that share prices reflect information about expected future cash flows in an efficient market.

However, recent evidence of market "anomalies" has challenged this assumption. For instance, the results of Sloan (1996) indicate that investors appear to fixate on earnings, and investors were unable to consider the differential persistence of their accruals and cash flows components. Thus, there is the possibility that the results of share-price studies may be affected by the possibility that the market fixates on bottom line earnings (market is not efficient). In this context, Bernard (1995)

described the limitation of share-price studies: "Preclude from the outset the possibility that researchers could ever discover something that was not already known by the market".

For the above reasons, realised future cash flow data have emerged as alternative method of evaluation for the relative information content of past cash flow and earnings data. These kinds of studies, *predictive-studies*, are motivated from a direct objective of financial accounting, which is the prediction of the magnitude and timing of prospective future cash flows.

In the accounting literature, both methods are used and they complement each other. According to Brown (1993), share-price and predictive studies are two sides of the same coin. This implies that the main inferences drawn from the two approaches should be the same, at least at the theoretical level. In practise, Barth et al. (2001) found that when stock return is the dependent variable earnings are better than cash flows but when actual future cash flows is the dependent variable, cash flows turn out to be better than earnings in explaining the variation in future cash flows. Thus, providing evidence on the value relevance of cash flows versus earnings using only share-price studies is not enough to judge the usefulness of cash flow data. While there are many UK share-price studies, there is no attempt made to compare between cash flows and earnings on the basis of their association with actual future cash flows. Therefore, this study will try to bridge this gap.

Based on UK data, this study aims to investigate the usefulness of accounting data in explaining future corporate cash flows. This is achieved through the development of an empirical framework utilised in a recent paper by Barth, et al. (2001). Future cash flows are, of course, a potentially important input for share valuation models and a matter of concern for corporate creditors. In the late 1980s and

early 1990s many accounting bodies across the world adopted cash flow statements as replacements for traditional statements of changes in financial position (Garrod and Hadi, 1998), and in 1991 the UK's Accounting Standards Board (ASB) published *Financial Reporting Standard 1* (FRS1, 1991, revised 1996). A major advantage of this study over prior UK studies is that it looks at how accounting data explains *actual* future cash flows, rather than looking at *price data* and having to infer what may be the implications for future cash flows. In addition, the cash flow data used here are those disclosed by companies, in line with FRS1. Prior to FRS1, researchers had to calculate their own estimates of operating cash flows from existing accounting disclosures. This procedure is likely to have been a source of measurement error.

Although cash flow statements were adopted by accounting standards boards to help users better assess future corporate cash flows, these bodies assert that cash flow statements alone are not enough (FRS1, appendix III, para.4, p.291). The reason is that cash flow statements may contain flows from prior periods and flows belonging to future periods so that the cash flow statement, profit and loss account and balance sheet should be used together when making an assessment of future cash flows. Similarly, the US Financial Accounting Standard Board (FASB) have stated that the main objective for accounting statements is to help users assess the amount, timing and uncertainty of prospective net cash flows to an organization (FASB, 1978, para.37). It asserts that current earnings is generally a better predictor for future cash flows than current cash flow (FASB, 1978, para.44).

However, the relative usefulness of earnings and cash flows as measures of corporate performance has long been a source of controversy within the financial community. Foster (1986) quotes Harold Williams, a former chairman of the SEC:

*Corporate earnings reports communicate, at best, only part of the story. And their most critical omission ..... is their failure to speak to a corporation's cash position. Indeed, in my view, cash flow from operations is a better measure of performance than earnings-per-share. (Arthur Young Views, 1981: in Foster, 1986, p.604).*

This study will examine the relative explanatory power of both operating cash flows and earnings-per-share with respect to future cash flows. Surveys of UK analysts show that both variables are considered important inputs to valuation models. Pike, et al. (1993, Table 5) and Barker (1999, Table 1) find that the use of price-earnings ratios and price-cash flow ratios is widespread within the investment community. Cash flow data are also employed in discounted cash flow valuation models, but these are less popular among UK analysts.

While much of the debate regarding the relative usefulness of cash flows versus earnings revolves around share valuation, it must not be forgotten that future corporate cash flows are of concern to company creditors too. While shareholders may be concerned with the stream of cash flows to perpetuity, many creditors are concerned solely with the short term cash-generating ability of a company. The importance of cash flow data is stated by Robert Morris Associates again cited in Foster (1986). The quote refers to bank lending but could equally well apply to other creditors:

*Banks lend cash to their clients, collect interest in cash, and require debt repayment in cash. Nothing less, just cash. Financial statements, however, usually are prepared on an accrual, not a cash basis. And projections? Same*

> *thing. Projected net income not projected cash income. (Robert Morris Associates, 1982: in Foster, 1986, p.604).*

Indeed, the importance of cash flow data for assessing a corporation's liquidity and solvency is reiterated in the UK standard FRS1 (para.1b). Therefore, it can be seen that the ability to assess future corporate cash flows is an important factor for the investment community, both corporate owners and creditors. This study will provide some of the first direct UK evidence on the usefulness of earnings, cash flow and accruals data for explaining future FRS1 corporate cash flow numbers.[1]

From the outset, it should be noted that the primary focus of this research is the empirical explanation of short-term future cash flow data. Specifically, the models employed here focus on the forecast horizons of one, two, and three-years-ahead. This focus reflects the limited time series of observations currently available for UK data sets, and an important implication of this is that my work is likely to be most beneficial for those concerned with short-term cash flow generation, i.e. corporate creditors. While future cash flow data are also of major interest to shareholders, their concern will be with the stream of cash flows to perpetuity, not only for the next few years. Therefore, this work— its findings and implications— will primarily be of benefit to short term corporate creditors.

Theoretically, the wide aim of this study will be achieved in three stages. In the first stage the theoretical frame work of Barth et al. (2001) will be followed in examining the usefulness of earnings, cash flows and accruals in explaining the variation in future cash flows. More extension for Barth et al. is also included in this

[1] It should be noted that it is not my concern to test how well FRS1 has been implemented: this study does not survey reporting practices across UK companies.

stage. This includes employing new techniques such as using panel data and first difference analysis.

In the second stage, the effect of firms' characteristics on the value relevance of earnings, cash flows and accruals will be examined. The approaches adopted in this stage will be in the line with prior share-price studies such as Dechow (1994) and Garrod et al. (2000).

Finally, the last stage will aim to examine the effect of the financial position of the companies on the value relevance of earnings components, particularly the relative information content of earnings versus cash flows. This examination will be the first based on any data.

The remainder of this chapter is organised as follows. Section 1.2 provides the motivations for the study. Section 1.3 provides the objectives of the study. Section 1.4 explains its scope. Section 1.5 outlines the structure of the thesis with a brief summary of each chapter.

## 1.2 Motivations for the Study

A primary motivation for this study is to bridge an important gap in the UK literature relating to the information content of corporate data. While prior UK evidence is drawn from *share-price studies* (i.e. studies that use share price as the criterion in evaluating the value relevance of accounting data), there are at present *no UK predictive studies* (i.e. studies that measure the information content of earnings components by examining their ability to explain the variation in future cash flows).

The differences between these two approaches are significant For example, an assumption in share-price studies is that share prices accurately reflect the future cash

flow information contained in current earnings and current operating cash flows. However, recent studies (e.g. Sloan, 1996) indicate that markets are often earnings fixated. This raises questions about the validity of the assumption inherent in using stock returns to measure value relevance. Predictive studies require no such assumption so the results of these studies do not depend on whether the market is efficient or not. A second distinction is that the results of share-price studies are mainly of concern to corporate owners. On the other hand, the results of the predictive studies are useful for corporate owners and creditors alike.

Another powerful motivation for the research is to provide evidence on the validity of normative accounting theory by using positive accounting theory. Normative accounting theory provides decision makers with a theoretical model that should be used if they want to make rational decisions. On the other hand, positive accounting theory provides researchers with empirically testable models that can be used to test share price reactions to accounting disclosures or explain accounting policy choice. Although FRS 1 states that data from both the income statement and balance sheets should be used in conjunction with cash flows in predicting future cash flows, there is no empirical examination for this statement. This will be a major issue for my empirical work. Thus, this study will integrate normative theory (FRS1 statement) and positive accounting theory (testing FRS1 statement) to shed light on these virtual issues.

## 1.3 The Objectives of the Empirical Analysis

The main objectives of my study according to each stage of the study can be summarised as follows:

*First Stage;*

This stage will be discussed in chapter 5. The analysis will be conducted using both OLS and Panel data models. The main objectives of this part can be summarised as follows;

1. To examine whether there are gains from decomposing aggregate earnings into operating cash flows and aggregate accruals.
2. To determine whether the individual components of aggregate accruals have incremental information content beyond that already existing in aggregate accruals.
3. To examine whether operating cash flows have more ability than aggregate earnings in explaining the variation in future cash flows.
4. To examine FRS1's assertion that current cash flows alone are not enough to predict future cash flows.
5. To examine if controlling for time trend and fixed effects will affect the value relevance of decomposing aggregate earnings into cash flows and accruals.

*Second Stage;*

This stage will be discussed in chapter 6. The main objectives of this stage are as follows;

1. To examine if the value relevance of cash flows and accruals (relative to earnings) varies across industries.
2. To examine the effect of the length of the operating cash cycle on the ability of current earnings, cash flows and accruals in explaining the variation in future cash flows.
3. To determine if the performance of companies affects the incremental information content of cash flows and accruals.
4. To examine if the quality of earnings affects the relative ability of current earnings, cash flows and accruals in explaining the variation in future cash flows.

*Third Stage;*

This stage will be discussed in chapter 7. The main objective of this stage is:

1. To examine the effect of financial distress (calculated using a bankruptcy model to calculate the probability of default risk) on the ability of current earnings, cash flows and accruals in explaining the variation in future cash flows.

## 1.4 Scope of the Study

This study adopts an empirical approach to achieve its objectives. The source of the data is Datastream. The data employed to run the empirical tests will only be drawn from UK industrial companies. This study will cover the period from 1991 to 2000.

## 1.5 Structure of the Thesis

The remaining seven chapters of this thesis are as arranged thus. The following two chapters (2 and 3) review the theoretical and the empirical evidence on the usefulness of earnings, accruals and cash flows in evaluating future cash flows. Chapter 4 describes the theoretical framework for my analysis. In Chapters 5, 6, and 7, I present and discuss my empirical results. Chapter 8 provides a conclusion and possible implications of the results of this study. A more detailed overview of the chapters is given below.

**Chapter 2: Cash Flow: Disclosure and Uses**

This chapter provide an historical look at the development of cash flow statements in the UK. This includes a discussion of the rational for issuing FRS1. The chapter also compares the format of cash flow statements across different countries. Then, the academic debate about the usefulness of cash flow data is reviewed. Finally, the studies that explored the usefulness of cash flow data from the users' point of view are reviewed.

**Chapter 3: Empirical Studies on the Usefulness of Cash Flows**

This chapter is devoted to reviewing and discussing the empirical evidence on the value relevance of earnings, cash flows, and accruals. These prior studies are organised into two main categories: share-price and predictive studies. The first category includes the studies that evaluate the usefulness of cash flows, earnings and

accruals by using share price or stock return as the dependent variable. The second includes the studies that used actual future cash flow as the benchmark to evaluate the usefulness of cash flows, earnings and accruals.

**Chapter 4: Research Methodology**

This chapter provides a discussion of different issues that are particularly relevant to the first part of my study, evaluating the value relevance of decomposing earnings into its components. It discusses the development of the hypotheses, the models used in the empirical analysis, the definitions of the variables, and sample selection procedure. It also provides a discussion for the statistical method used in testing the hypotheses of this study.

**Chapter 5: The Value relevance of Earnings' Components**

This chapter develops tests for the hypotheses developed in chapter 4. The results in this chapter are reported for both OLS and fixed effects models. These results provide evidence on: (i) the relative ability of accruals versus aggregate earnings; (ii) the relative information content of earnings versus cash flows; and (iii) the relative ability of accruals versus cash flows.

**Chapter 6: The Effect of Contextual Factors on the Explanatory Power of Earnings' Components**

This chapter extends the results reported in chapter 5, by examining the effect of firm characteristics on the predictive ability of earnings, cash flows and accruals. These characteristics are: industrial membership, the length of the operating cash cycle, the level of earnings and cash flow, and the magnitude of aggregate accruals.

**Chapter 7: The Effect of Financial Distress on the Explanatory Power of Earnings' Components**

This chapter begins with a theoretical background to this subject. This includes a review of bankruptcy models as well as the evidence on the usefulness of cash flow ratios in bankruptcy models. This chapter provides a review of studies that examine the effect of financial position on the association between stock return and cash flows. This chapter also includes: the measurement and the definition of the variables, descriptive statistics, and empirical results on the effect of financial distress on the value relevance of earnings, cash flows and accruals.

**Chapter 8: Summary and Conclusions**

This last chapter provides an overview of this study. This includes a summary of the main analysis, the main findings of this study, the potential implications of the results of this study, and suggestions for future research.

# Chapter 2

# Cash Flow: Disclosures and Uses

## 2.1 Introduction

In the mid seventies the Accounting Standard Committee (ASC) issued Statements of Source and Application of Funds (SSAP 10) to provide information about changes in funds. The definition of funds was unclear which led to the creation of a multitude of definitions; for instance some companies defined funds as working capital, while other companies defined it as cash. This confusion made comparisons between different companies' fund flow statements difficult. The flexibility in defining funds motivated the ASC to issue cash flows statements (CFS, hereafter) to replace SSAP 10 in June 1990. In September (1991) the Accounting Standards Board (ASB), which replaced the ASC, issued FRS1 *Cash Flow Statements* (Alexander and Britton, p.615). Before that, in 1989 the Financial Accounting Standards Board in the US issued Statement of Financial Standards No. 95 to replace funds flow statements.

As accounting standard setters across the world required companies to publish CFS, academic debate about the usefulness of CFS to accounting users increased. The main issue in these debates is whether cash flow provides information that does not exist in earnings.

This chapter will be devoted to the theoretical debate about the importance of cash flows while the empirical evidence will be discussed in chapter 4. The remainder of this chapter is divided as follows: Section 2.2 reviews the reasons that motivated

replacing statements of source and funds with cash flow statement; Section 2.3 reviews the format of CFS as mentioned in FRS1 and compares it with other countries' formats; Section 2.4 reviews the usefulness of CFS from academics point of view; Section 2.5 reviews the evidence on the usefulness of CFS from users' point of view. Finally Section 2.6 summarize the chapter.

## 2.2 Why Cash Flow Rather than Fund Flow Statements?

As there was no clear definition of funds in SSAP 10, companies consider change in working capital as a Statement of Source and Application of Funds. In FRS1-Appendix III paragraph 5, the ASB mentions the advantages of cash flows over funds flow (change in working capital). These advantages can be summarized as follows.

1. Change in working capital does not provide reliable information to accounting users for assessing the liquidity of a firm. Moreover it could provide misleading information about the financial condition of a firm. Increase in working capital does not necessary mean increase in cash and vice versa. For instance a company may have a decrease in cash and an increase in debtors at the same time which masks the decrease in cash.
2. Cash flow as a concept is clearer than change in working capital. In addition cash flows can be used as direct inputs into valuation models so historical cash flow is more useful than change in working capital.
3. Change in working capital represents the difference between two balance sheets, therefore it does not provide new information. The cash flow statement and its notes may convey new information to the market.

In paragraph 48 from the statements ASB states the new information that may be provided by cash flows as follows:

> *Historical cash flow information may assist users of financial statements in making judgments on the amount, timing and degree of certainty of future cash flows; it gives an indication of the relationship between profitability and cash generating ability, and thus of the quality of the profit earned. In addition, analysts and other users of financial information often, formally and informally, develop models to assess and compare the present value of future cash flows entities. Historical cash flow information could be useful to check accuracy of past assessments and indicate the relationship between the entity's activities and its receipts and payments (*Alexander and Britton 1999, p.622)

ASB recommends that cash flow statements should be used in conjunction with profit and loss accounts and balance sheets. ASB states in FRS1appendix III, paragraphs 3 and 4 respectively:

> *A cash flow statement in conjunction with a profit and loss account and balance sheet provides information on financial position and performance as well as liquidity, solvency and financial adaptability.*

> *Although cash flow statement shows information about the reporting entity's cash flows in the reporting period, it provides incomplete information for assessing future cash flows. Some cash flows result from transactions that took place in an earlier period and some cash flows are expected to result in further cash flows in a future period. Accordingly, cash flow statements should*

> *normally be used in conjunction with profit and loss accounts and balance sheets when making and assessment of future cash flows.*

The UK was not the only country that replaced the fund flow statement with the cash flow statement. The US, Australia, Canada and other countries over the world adopted CFS as well.

Canada was the first country that adopted cash flow statements in 1985, the motivations being:

> *To present information about operating, financing and investing activities of an enterprise and the effects of those activities on cash resources...assists users of financial statements in evaluating the liquidity and solvency of an enterprise, and in assessing its ability to generate cash from internal resources....the information is not provided or is only indirectly provided in the balance sheet, income statement and statement of retained earnings. Thus the SCFP (sic) complements, and presents information different from that provided in, the other financial statements* (Donleavy, 1993, p.142)

In the US, cash flow statements were required by SFAS 95 in 1987. The main objective of this statement was to help investors, creditors and others to assess the ability of a firm to: (i) generate future cash flows; (ii) meet its obligations, (iii) to pay dividends, and to provide information about the quality of earnings. However, FASB asserted that CFS should be reported as a supplementary statement (Wolk et al., 2001, p.441). Moreover, FASB asserts that earnings and its components are more important than cash flow in predicting future cash flows (Donleavy, 1993, P.164).

In Australia, Australian Accounting Standard No. 28 (AAS 28) adopted CFS in 1991. AAS 28 points out that CFS in conjunction with other statements should be able to provide information about a firm's ability to: (i) generate future cash flows, and (ii) meet its obligations related to either creditors or investors.

To sum up, accounting setters asserted that CFS in conjunction with profit and loss accounts and balance sheet should be able to achieve the following objectives:

1. Providing new information about future cash flows.
2. Providing new information about the liquidity, solvency and financial adaptability of a firm.
3. Providing new information about the quality of earnings.

## 2.3 The Format and the Classification of Cash Flow Statements

Although there is general agreement between different accounting standard setters across the world on the objectives of CFS, there are differences between these regarding the format and the classification of CFSs. In this section the format of CFS in the UK will be reviewed in detail, including the main differences between it and other countries.

According to FRS1 (1991, revised in 1996) cash flow statements should contain the following headings:

1. Operating activities
2. Returns on investments and servicing of finance
3. Taxation
4. Capital expenditure and financial investment
5. Acquisition and disposal

6. Equity dividends paid
7. Management of liquid resources
8. Financing

The ASB indicates that the last two headings could be merged together under a single heading but subheadings should be given for each one. It also required the first six headings be reported in the above same sequence. The explanation of the above headings is mentioned below:

Operating Activities

Cash flows from operations is the cash produced from the normal activities, in either operating or trading activities. Normally, this cash is represented in operating profits. This also includes (1) provision whether it is considered as part of operating profits or not, and (2) dividends received from equity accounted companies where the results are included as part of operating profit.

There are two methods in preparing operating cash flows: direct and indirect. Operating cash flows under the direct method represents the difference between mainly cash receipts from customers and cash payments to suppliers and to and on behalf of employees. Under the indirect method operating cash flow equals operating profit after excluding the effect of any non-cash transactions. These non-cash transactions represent change in working capital items such as change in inventory accounts and change in provisions like depreciation and amortization. The ASB does not consider the reconciliation between operating profits and net operating cash flows as part of the cash flow statement and should be given a separate heading if it is reported in it. The ASB also requires all companies to disclose this reconciliation as a note whether they follow the direct or indirect method in preparing operating cash

flows. It can be noticed that FRS1 adopts and recommends the indirect rather than direct method, which contradicts the FASB recommendation, as it will be seen later in this chapter.

Returns on investments and servicing of finance

Any cash representing the financing activities of a firm should be reported under this heading. Interest received and dividends received should be reported, except that reporting under operating cash flows make up the main sources of cash inflow from returns on investments and servicing of finance. Cash outflow mainly results from interest and dividends paid for non-equity shareholders such as preferred shareholders.

Taxation

This item is for any tax paid to and received from the relevant tax authority.

Capital expenditure and financial investment

This item includes cash flows related to buying or selling any fixed assets other than that included in 'acquisition and disposal'. It also includes cash flows from the repayments of reporting entity's loans to other entities or sales of debt instruments of other entities other than reported under 'acquisition and disposals' or 'management of liquid resources'. Loans made by the reporting entities and payments to acquire debt of other entities, other than cash equivalent is included as well.

Acquisition and disposals

Cash flows are those related to the acquisition or disposal of any trade or

business, or of an investment in any associate, joint venture or subsidiary undertaking.

Equity dividends paid

All dividends paid to equity shareholders excluding any advance corporation tax.

Management of liquid resources

Includes cash flows related to changes in cash equivalent accounts.

Financing

Issuing shares or any other equity instrument and bonds or any other debt instruments are the main source of cash inflows. Payments to reacquire an entity's shares to redeem loans are the main source of cash outflows.

Comparing FRS1 (1991, revised in 1996) with other countries reveals many differences, the main differences are: (i) differences in defining cash; and (ii) differences in classification some components of CFS. These differences might explain why the number of main headings in CFS varies between countries. For instance in the US, CFS contains three main headings: operating, investing and financing cash flows. However, in this section the following points will be highlighted:

1. The definition of cash;
2. The components of operating cash flows;
3. Preparing operating cash flows;

The above points are chosen because of the following reasons: (i) the main aim of CFS is to clarify the source of change in a firm's cash; and (ii) operating cash flows

(OCF) is the main concern for most of analytical research and represents the main component of CFS.

Definition of Cash

Comparing the definition of cash among different countries reveals significant differences. For instance FRS1 defines cash as cash in hand and deposits repayable on demand less overdrafts. The FASB defines cash as cash in hand and deposits plus cash equivalents, which are highly liquid investments that are convertible to known amounts of cash and that have short term maturities (usually less than three month). The Canadian Institute Chartered of Accounts (CICA) defines cash as cash and cash equivalents which includes highly liquid investments and net of short term borrowings. The Australian Accounting Standards Review Board (AASRB) defines cash as cash and cash equivalents which are defined as 'highly liquid investments which are readily convertible to cash on hand at the investor's option and which an entity uses in its cash management function on a day-to-day basis; and borrowings which are integral to the cash management function and which are not subject to a term facility'. Finally, the International Accounting Standard Committee (IASC) in International Accounting Standard No. 7 (IAS 7) adopted the FASB definition for cash (Donleavy, 1993, pp. 144-158).

It should be noted that the narrowest definition of cash can be found in FRS1. Actually in the original version of FRS1 (1991) the definition of cash was cash and cash equivalents but because of confusion about the definition of cash equivalents the ASB changed the definition in its revision in 1996 and reported a change in cash equivalents as part of CFS under 'management of liquid resources'. This confusion in defining cash equivalents can be seen in the above paragraph between countries such

as between FASB and CICA. The ASB justified changing the definition of cash as follows (FRS1-Appenix III, para, 9):

1. Avoiding an arbitrary cut-off point in the defining of cash equivalents;
2. Distinguishes cash flows arising from accumulating or using liquid resources from those for other investing activities;
3. Provides information about an entity's treasury activities that was not previously available to the extent that the instruments dealt in fell within the definition of cash equivalents;

The FRS1 definition may provide more accurate information to investors and creditors about firm's ability to meet its obligations. Donleavy (1993, p.161) in his comments on differences between countries in defining cash states that:

*'The narrower the definition of cash, the sharper the focus on liquidity"*

<u>The components of OCF</u>

The differences in the components of operating cash flows are mainly caused by the differences in classifying interest, dividends and income tax.

Contrary to the FRS1 classification, the FASB considered net interest and dividends received as a part of OCF, while the AASRB also considers interest and dividends received as a part of operating cash flows (OCF, hereafter), it considers interest paid under financing cash flows. The CICA leaves classification of interest and dividends received and interest paid to a firm itself. Classification of interest and dividends receipts under OCF has been criticized because it contradicts the finance literature which considers interest and dividends receipts as investing activities and interest paid as financing activities, therefore the FRS1 format is better than the SFAS 95 format (White et al. , 1997, pp.116-119).

Another difference is related to income tax classification. While the ASB create a separate heading for income tax, the FASB, AASRB and IASC group it under OCF.

Preparing OCF: Direct versus indirect method

As mentioned earlier under FRS1 a firm has a choice either to prepare OCF by using the direct or the indirect method, and we indicated that ASB prefer the indirect method. This flexibility in preparing OCF is consistent with FASB, although the FASB recommend using the direct method. Accounting setters in Canada adopted the indirect method. The AISC in IAS 7 encouraged companies to use the direct method in reporting OCF but at the same time it pointed out that the cost of applying this method may outweigh the benefits it may provide to external users, therefore, it permits using the indirect method as well. Contrary to the above accounting setters, AARSB adopted the direct method but included that a firm should disclose the reconciliation of operating cash flow to profit after tax as a note (Donleavy 1994, p.150).

Although direct and indirect methods give the same result, companies prefer to use the indirect method in preparing OCF. Wallace et al. (1999) found that out of 200 UK companies only 2 companies used the direct method. The same thing applies to US companies where more than 98 % prefer to use the indirect method (Wolk et al., 2001, p.446). Wallace et al. (1999, pp.315-316) reported the advantages of both the direct and the indirect methods. The main advantages of the indirect method are: ease of implementation; provides a clear picture about the differences between accounting income and CFS; minimizes management manipulation, and articulates CFS with other statements. On the other hand the direct method has the following advantages:

understandable for non-accounting readers; users can compare similar types of receipts and payments across companies, and makes the comparison between actual cash flows and cash budget easier. The direct method contained more information than the indirect method as it is reported and investigated empirically by Krishnan and Largay (2000). They compared the ability of past operating cash flows calculated using the indirect method and past operating cash flows calculated using the direct method in predicting future operating cash flows. They found that using the direct method in preparing operating cash flows enhanced the ability of cash flows in predicting future cash flows. This conclusion is consistent with Australian accounting setters who state that:

> *The reasons for requiring the direct method are to ensure SCF (Statement of Cash Flow) provides information not otherwise available and provides a method of estimating future cash flow more useful than the net presentation characteristic of the indirect method* (Donleavy, 1993, p.150).

## 2.4 The Usefulness of CFSs: Academics' Perceptions

The difference between earnings and cash flows is the difference in timing of recognizing revenues and expenses. Earnings recognize revenue as a firm provides services or sell products and recognize expenses as receiving services or buying materials. On the other hand cash flows recognize revenues (expenses) as cash receipts (cash paid). Earnings' recognition of revenues and expenses is based on the matching principle which implies that in order to measure the performance of a firm

during a specific period all expenses that generate revenue should be reported together in the same period even though a cash transaction may not happen.

This difference is referred to as accruals. Accruals are the noisy part in earnings. It is vulnerable to management manipulation and arbitrary allocation. Thomas (1969) argued that the accrual accounting system suffers from arbitrary allocation, and that cash flow reporting avoids this problem. Lawson (1971) and Ijiri (1980) argued that firms used discounted cash flow approach in evaluating projects (taking capital decisions) while the results of these projects are reported using accrual accounting.

Lee (1987, pp31-49) criticized the accrual system and called for adopting a cash flow system. His criticisms can be summarized in the following points:

1. There is no specific meaning for earnings. Earning's figures summarize all the activities of a company that can be measured in monetary terms. The meaning of this figure depends on the methods of capital maintenance and valuation used. Lee described profit and loss accounts as man- made financial indicators which should be used with a great deal of care and understanding.
2. The above problem affects the ability of earnings (or its related ratios) as a financial indicator of a company's financial position and performance. Different accounting procedures lead to different profit numbers for the same event and period.
3. Financial reporting is based on aggregating cash and non-cash items. The latter is determined subjectively. The proper accounting and reporting system is the system that can reduce non-cash items, which is unlikely to be the current system based on cost allocation.

4. Although different users have different interests, they have one interest in common, which is a firm's liquidity. This can be satisfied by providing information about the change in cash and cash equivalents. A cost-allocation based system does not provide this information.

Although Lee criticized income accounting, he asserted that it should be reported as well as the balance sheet. He stated that:

> *Despite its inherent problems, the financial report should continue to contain statements of income and financial position since these reveal data of apparently great significance to report users.* (Lee, 1982, p.293)

According to Lee, cash flow statements can overcome or at least minimize the deficiencies of the accrual system. The advantages of the cash flow statement from Lee's point of view are the following (Lee, 1987, pp.73-93; Lee, 1982, pp.292-294):

1. It is relevant for all accounting users as it provides information about the change in cash and cash equivalents which is, eventually, the main concern for accounting users.
2. It is easily understandable by non-accountants because it is based on cash flows and sales price. This is supported by Tweedie's (1977) results. Tweedie asked first-year accounting students about their own thinking of accounting concepts. Most students' answers referred to cash flow rather than the matching and the recognition principle. Moreover, they thought of sales price rather than replacement price.

3. Although the cash flow statement may not be free from arbitrary judgments, it minimizes any possible manipulation as it depends on actual cash and sales price.
4. It reflects the actual economic facts without any distortion.
5. Providing information about the ability of a firm to survive and to pay its obligations are the main objectives of financial reporting. The cash flow statement provides information about the entity as a going concern.

Finally, the FASB assertion which is that to predict future cash flows future earnings should be predicted first, had been criticized. It had been argued that recording cash receipts and payments are the foundations of book entries, which are then arbitrary adjusted by the accrual system to produce financial reporting (Donleavy, 1994, p.221).

However, the cash flow statement has also been criticized. Eggington and Rutherford claim that cash flows suffer from arbitrary allocation and eventually manipulation. For instance debtors can be encouraged to pay by giving them large cash discounts. Donleavy (1994, p. 220) quoted from Eggington that:

> *Timeliness is crucial to accounting information; the interpretation of this year's figures can not await next year's results. More seriously, cash flow is simply not a measure of corporate performance in the way that earnings or profit are*

It is interesting to note that Lee shared Eggington and Rutherford's point of view. Moreover, Lee (1987, pp.117-122) admitted that cash flow has problems similar

to those of other forms of reporting. He classified these problems into three points as follows:

1. Measurement problems: although the cash flow statement summarizes the actual cash transaction in specific time, personal judgment plays a role in reporting these transactions. For instance, a personal judgment needs to be made when segmental reporting is prepared. Allocating items into ordinary and extraordinary items is also an arbitrary decision. Finally, classifying some items as operating cash flows or other forms of cash flows is also a personal judgment.
2. Disclosure problems: the problem relates to disclosing cash flow figures. The cash flow statement contained different terms which might be misunderstood by users. For instance, short and long –term liabilities, capital expenditure, and cash equivalents. Also the amount of information that should be disclosed in this statement is an unsolved problem.
3. Usage problems: the cash flow statement, as with other reporting forms, is not directly usable. Adjustments should be made before analyzing it. This problem mainly related to classification and allocation problems.

## 2.5 The Usefulness of CFSs: Users' Perceptions

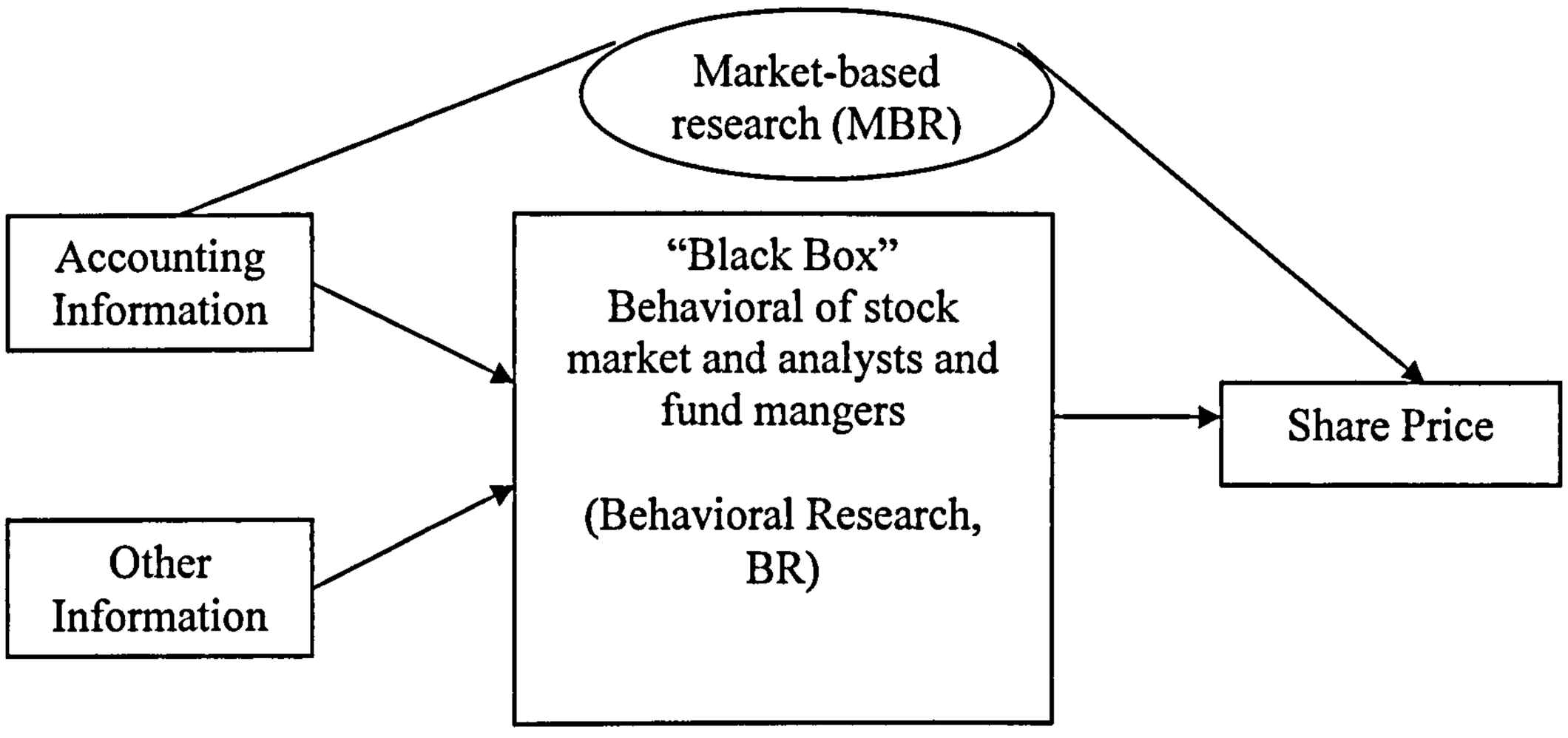
The above arguments reveal that the CFS is important but it should be reported as a complementary statement as accounting setters recommended. A question which needs to be answered is whether accounting users - especially analysts and investors - use CFS alongside other information sources? In other words, do the CFSs provide new information that does not exist in other accounting reports (e.g.

accounting earnings)? Accounting and finance scholars assess the usefulness of CFSs through two main methods: behavioural and market-based research (MBR).

The diagram on the following page shows the difference between behavioural and market-based research. As can be seen in Figure 1, MBR assesses the usefulness of information by relating it directly to share price. In MBR, in general, accounting information is considered useful if it affects the securities market. More about MBR can be found in next chapter.

**Figure 2.1**

**Approaches to Assessing the Usefulness of Accounting Information**




Source: Barker (2001, p.14)

Behavioural research considers accounting information useful if they are used by accounting users. Below are the main studies that used this method to examine the usefulness of CFS:

**Behavioural Research's Evidences**

**Lee (1981)**

He sent questionnaires to chartered accountants asking their opinions on cash flow accounting (CFA, hereafter) as a reporting system. More specifically the accountants were asked to give their opinions on the following main issues:

1. Should CFA be reported for external purpose and if yes who will be benefit from this statement?
2. Should forecasted cash flow data be reported to external users?
3. Do their companies use cash flow statement for internal purpose?

Out of 182 who responded, 90 members considered CFA not a useful system while 89 supported reporting CFS for external users. The reasons mentioned by respondents who favour CFA were: (i) provides information about liquidity; (ii) provides information about the quality of management, and (iii) helps users to understand financial results in a better way. The respondents also indicated that in general cash flow data would be useful for accounting users such as bankers, lenders and institutional shareholders and private shareholders. The results revealed that 55% of the respondents opposed reporting forecasted cash flow data for external users. Finally, respondents indicated that cash flow data was used in their companies for different purposes, mainly for managing working capital.

**Arnold and Moizer (1984)**

The methods used by UK investment analysts were investigated to make recommendations concerning buying and selling ordinary shares. They used unstructured interviews in addition to postal questionnaires to provide answers to the following main questions: What are the methods used to appraise investments in ordinary share? What are the main sources of information?

Their analysis revealed that analysts used fundamental analysis in making their recommendations. Analysts mainly used the Price-Earning ratio (PE ratio), which depends on accrual basis rather than discounted cash flows (DCF) in evaluating a company's market value. The result also revealed that analysts forecast earnings per share, price/earnings ratio, and dividends more than cash flows numbers. The above results indicate that analysts prefer using accrual numbers rather than cash flow numbers. More specifically Arnold and Moizer (p.202) state that:

> *The popularity of forecasts of conventional accounting earnings numbers relative to cash flow forecasts does suggest that analysts' appraisal procedures and valuation models are more dependent on accruals-based earnings than on cash flows*

**Day (1986)**

She aimed to explore the following two issues: (i) the usefulness of all information in annual reports and accounts to investment analysts, and (ii) the forecasting process used by investments analyst. Her sample contained 15 firms of stockbrokers. Her methodology was based on interviewing analysts and asking them

to start analyzing a company's accounts. This was done aloud and later transformed into a literal transcript.

Analysis of the results revealed that cash flow data is an important item for 11 analysts out of 15. The results also revealed that the majority of analysts aimed to forecast fully-taxed earnings per share, however, 9 of the analysts aimed to forecast cash flow to enable them to examine the expected changes in debt level which eventually help them to assess the interest charge.

**McEnroe (1989)**

He used the same method used by Lee (1981) to explore the opinion of audit partners in US public accounting firms about CFA. Out of 800 questionnaires sent 201 questionnaires were usable. The questions in the questionnaire focused on whether CFA should complement the historical accounting system or replace it?

McEnroe concluded that operating cash flow was considered neither a profitability measure nor a performance indicator. In general respondents believed that accounting income is an adequate measure and any additional external disclosure for cash flow information is not required. However, consistent with Lee's results, the results revealed that past cash flow data were important for all accounting users such as bankers, lenders, and institutional and private shareholders. The results also are consistent with Lee (1981) in that the majority of respondents opposed replacing historical accounting system with CFA.

**McEnroe (1996)**

McEnroe used questionnaires to survey the attitudes of financial analysts, investment advisors, accounting professors and accountants towards reporting cash

flow accounting. The main questions in the questionnaire were about: disclosing operating cash flow per share, disclosing cash flow forecast, replacement of historical accounting system with cash flow accounting, the meaningfulness of operating cash flow in terms of evaluating economic firm performance, the adequacy of net income, and disclosing free cash flow statements.

The results of analyzing the questionnaire indicated that in general financial analysts and investment advisors supported disclosing operating cash flow accounting while accounting professors and accountants were not supportive of the cash flow accounting system as an integral part of the external financial reporting. For instance, accounting professors and accountants opposed disclosing operating cash flow per share while financial analysts supported disclosing it and financial advisors were not certain about its importance. The same trend was reported regarding the importance of disclosing forecasted cash flow while financial advisors and analysts were either demanding or uncertain about it respectively; accounting professors and accountants opposed disclosing it. The results also revealed that operating cash flow should not replace accrual-accounting system according to the four group's opinions. It is also reported that respondents preferred the direct method rather than the indirect method in presenting operating cash flow. Around 56% supported using the direct method in preparing operating cash flow. The author pointed out that it seems the view point of users had changed, because in his previous study (McEnroe, 1989) 57% of respondents favoured the indirect method. The respondents also pointed out that cash flow accounting and forecasted cash flow is more important for bankers, lenders, and institutional and private shareholders that for suppliers and governments.

**Barker (2001)**

Barker aimed to answer the following question: how do institutional investors use accounting information? His sample was made up from analysts and fund mangers in big UK companies. He used three methods in this sequence: observations which aimed to collect primary data about the work and the methods used in the analyzing process. Questionnaires aimed to clarify and quantify the findings of observations. Finally he conducted one-hour interviews to analyze in-depth issues that were raised in the first and the second processes. 42 companies participated in the questionnaire process while 32 analysts were interviewed. The number of fund mangers who participated in the study was 16

The results of the study were presented under two main headings: use of financial statements, and valuation methods used by analysts and fund mangers. The results regarding the use of financial statements revealed that a profit and loss account is more important than other accounting statements. However, analysts and fund mangers considered the cash flow statement very important as a complementary statement especially since it provides information about the liquidity of a firm and it helps them to assess the quality of earnings. The results also revealed that operating cash flow is the most important sub-heading in the cash flow statement. Analysts and fund mangers considered it as an alternative measure of profit and loss earnings. They also preferred the indirect method rather than direct method in preparing operating cash flows. It can be noted that analysts and fund mangers in UK used cash flow statements in the way recommended by the ASB.

Regarding the valuation methods used by the sample of the study, as documented by Arnold and Moizer (1984) the price/earnings ratio is the most common valuation tool. Price/cash flow ratios were also used by analysts and fund

mangers in the valuation process. Consistent with Arnold and Moizer (1984) a discounted cash flow model was rarely used in the valuation process. The results also revealed that ratios based on profit and loss account and cash flow statements are more important than those based on balance sheet data.

## 2.6 Summary

To summarize, the accrual-based accounting system is vulnerable to management manipulation, which makes accounting earnings insufficient to reflect fairly on an entity's performance. This fact motivated accounting setters to adopt fund flow statements which were eventually replaced by the cash flow statement. Cash flow data aims to provide users with new information about an entity's performance and activities. Cash flow data are considered to be useful if:

1. Accounting users (mainly investors) used it to assess the value of a firm or to judge its performance. This issue is addressed in behavioural research which provides general evidence to support reporting cash flow statements.
2. There is a relation between cash flow data and share price. This issue is addressed in market based research which will be the topic of the next chapter.

# Chapter 3

# Empirical Studies on the Usefulness of Cash Flow

It was mentioned in the last chapter that there are two main methods used in evaluating the usefulness of accounting information: behavioural and market based studies. The former was defined and discussed while the latter and its related issues will be the objectives of this chapter.

## 3.1 Introduction to Cash Flow Studies

The results of behavioural research had a very small effect on practitioners and public decision makers and limited advancement in the understanding of basic issues (Lev and Ohlson, 1982). Market-based accounting research (MBAR) has the following merits: (i) provides objective results; (ii) measures the strength and the magnitude of the relation between accounting data and market variables; and (iii) avoids the problems raised in behavioural research as a result of conducting the research into the individuals' decision making process which may be misleading, especially since aggregate outcomes may not equal the sum of the individuals' behaviour (Barker, 2001, p.15). These advantages to the MBAR may explain the massive amount of research conducted in over 1000 individual projects published in leading academic journals (Kothari, 2001).

Before reviewing the evidence from MBAR, the main methods used in these studies will be discussed.

### 3.1.1 A Note on MBAR and Market Efficiency

Before the mid 1960s all accounting research was normative, focusing on theoretical recommendations and without concern for empirical testing for these recommendations (Watts and Zimmerman, 1986, p.14). Thus, accounting theory in its early age was based on objectives assumed by the researchers and their prescriptions to achieve these objectives (Kothari, 2001). As researchers had different points of view regarding the objectives of accounting, there was no consensus on accounting policies. This led to the question of the usefulness of historical cost accounting numbers and especially accounting income. In the same period, significant advances occurred in financial economics which participated in developing empirical research methods in accounting (Watts and Zimmerman, 1986, p.14). Kothari (2001, p.114) identifies the following three major developments in finance and economics that led to the revolution in accounting research: (i) positive economic theory, (ii) the efficient market hypothesis (EMH) and the capital asset pricing model (CAPM), and (iii) the event study of Fama, et al. (1969), which is the first event study in financial economics.

The concept of efficiency refers to the speed that the price of stocks reacts to the announcement of any new information. Beaver (1989, p.135) mentions that:

> *The market is efficient with respects to some specified information system if and only if security prices act as if everyone observes the information system*

According to Beaver there are three forms of the EMH as follows (Beaver, 1989, p.137):

1. Weak form: in this form the market is considered efficient if prices of securities fully reflect the historical information about prices.
2. Semi-strong form: in this form, stock prices fully reflect all the past and current publicly available information.
3. Strong form: in this form all the information including inside information is embodied in stock prices.

Under these market efficiency concepts, especially the semi-strong form where share-prices are expected to reflect all the available accounting information including the present value of future cash flows, accounting numbers have information content if security prices respond to released data (Wolk et al., 2001, p. 247).

Based on the relation between accounting numbers and share prices, a huge body of research has been conducted. Lev and Ohlson, (1982) in their review of MBAR conducted during the late 1960s and 1970s, categorized MBAR in the following four groups according to their objectives:

1. Information content studies: These studies are interested in evaluating the usefulness of accounting data, mainly earnings. The pioneering study in this field is Ball and Brown (1968) study, which was followed by numerous studies. This type of study resulted in the question: Does cash flow have incremental information content over accounting income?
2. Differences in discretionary accounting techniques: These studies try to examine the effect of management discretion on investors, firms and managers. This kind of study aims to answer questions relating to whether different accounting methods lead to different effects on stock prices.

3. Market effects of accounting regulations: these studies addressed their concern with the effect of releasing new accounting regulations on market behaviour.
4. Impact of accounting on related disciplines: this part of MBAR examined some theories from other disciplines, like finance. Efficient market studies are an example of this kind of study.

Kothari (2001) in his review of MBARs conducted during the late of 1980s and 1990s categorized it according to the methodology used, identifying both event and association studies. The main aim of event studies is to examine whether an event such as an earnings announcement, conveys new information to a market. In other words these studies investigate if announced accounting numbers have information content. If the level of security prices or trading volume changes within a period around the announcement date (window), which is normally 2 or 3 days before and after an event, the conclusion will be that the event under investigation has information content. The results of this kind of study may be affected by whether there are confounding events, such as when the announcement of earnings is accompanied with dividends (Watts and Zimmerman, 1986, p.41). The association study focuses on measuring the relation between performance measures such as cash flows and earnings and stock returns over a long window such as one calendar year. Garrod et al. (2000, p.7) pointed out that event studies assume that the relationship between return and accounting data is causal. They state that:

> *The forecasting of event studies ...is misplaced and that returns relationships are only fully revealed when prices are allowed to lead earnings*

Contrary to event studies, association studies recognize that accounting information is not the only source that affect security's prices, thus, no causal relation between accounting information and changes in security prices is inferred. So association studies examine the nature of accounting numbers and their components. According to Collins and Kothari (1989, p.144):

> *Association studies recognize that market agents learn about earnings and valuation-relevant events from many non-accounting information sources throughout the period. Thus these studies investigate whether accounting earnings measurements are consistent with the underlying events and information set reflected in stock prices. Typically, causality is not inferred. Rather the focus is on whether the earnings determination process captures in a meaningful and timely fashion the valuation relevant events*

To sum up, event and association studies use stock prices or returns as the criteria for evaluating the usefulness of accounting numbers or methods. The assumption in these kinds of studies is that the market is efficient (Kothari, 2001). The question of the validity of this assumption leads to questions on the validity of the conclusions drawn from these studies. A number of studies pointed out that strong evidence exist suggesting that market is inefficient (Kothari, (2001); Beaver, (1989), chapter 6). Market efficiency implies that prices appropriately reflect the information in accruals and cash flows, in other words, earnings components. Sloan (1996) found that the market fixates on accruals more than cash flows, which leads to the conclusion that stock returns fail to fully reflect the information in earnings components. This conflicts with market efficiency. Bradshaw et al. (2001) also found

that the stock price could be manipulated by management through manipulated accruals. They stated that (p. 72):

> *It (manipulation of accruals) does, however, undermine the role of efficient market hypothesis, on which academics have relied on to play down many of controversial features of the accrual system that seem to preoccupy mangers and investors...Indeed, recent research suggests that firms successfully use earnings management to increase their stock prices during equity offerings*

Another problem in stock-returns based studies is that these studies estimate an *unexpected* part in accounting performance such as operating cash flow and earnings and then regress it on stock returns. The forecasting process for this part is different from one researcher to another; moreover different processes could lead to different results (Garrod et al. (2000); Bowen et al., (1986)). These reasons together call into question the use of the association between accounting numbers and stock returns (share price) as a criterion to evaluate the usefulness of accounting information. So some researchers have adopted the use of the predictive ability as alternative criterion to evaluate the usefulness of accounting numbers.

### 3.1.2 A Note on Predictive Ability: Earnings versus Cash Flow

The ultimate objective of accounting information is to facilitate the decision-making process which most times takes into consideration the prediction of the amounts, timing, and uncertainty of future cash flows. So accounting data should be evaluated in terms of their uses. Beaver et al. (1968, p.678) quoted form Paton (1922)

that:

> *Accounting is a highly purposive field and any assumption, principle, or procedure is accordingly justified if it adequately serves the end in view*

This encouraged the use of predictive ability as a criterion in earlier studies in accounting research: for instance, Brown (1966) used alternative measures of income to predict a firm's value (Beaver et al., (1968)). Early debate about the relevance of using accounting data as a criterion can be found in two main studies: Beaver et al. (1968) and Greenball (1971).

Beaver et al. argued that a prediction process is very important and essential for decision –making. According to Beaver et al. (1968, p.680):

> *A prediction can be made without making a decision, but a decision cannot be made without, at least implicitly, making a prediction*

Therefore the use of predictive ability as a criterion in the studies that aim to evaluate the relevance of accounting information will bring accounting closer to its aim of evaluation in terms of a decision-making criterion. However, Beaver et al. (1968) argued that this process has its own limitations. For example, the results can not be generalized out of the particular context. In other words, what is better in predicting a specific event (e.g. earnings), is not necessarily a better predictor of other events (e.g. cash flows). The results of these kinds of studies also should be interpreted carefully. In spite of these problems, they encouraged more studies in this field.

Greenball (1971) argued that using the predictive ability as an evaluation criterion was not relevant because accounting information did not aim to predict the future; its main aim was to measure past and present occurrences. However, it can be argued that Greenball's argument was before the issuance of Standard Financial Accounting Concepts no. 1 (SFAC no.1) which states that among the objectives of accounting information is the providing of information useful in assessing future cash flows.

However, decision makers are not the only groups who are interested in forecasting accounting numbers; researchers who conduct association studies require forecasting models to determine the unexpected part in performance measures such as earnings and cash flows. For these reasons a lot of studies devoted to developing models that provide accurate predictions for future cash flow or its surrogate have been carried out.

According to Watts and Zimmerman (1986, pp.130-134), the increased interest in forecasting earnings is due to: (i) their widespread use in valuation models such as CAPM, as a surrogate for future cash flows, (ii) their use as a surrogate for market expectations of future cash flows in information content studies, and (iii) their ability in explaining why management prefer one accounting method to another.

Past earnings, either annual or quarterly, have been used in time series models to predict future cash flows. The results of these studies indicate that quarterly earnings are a better predictor for future annual earnings than annual earnings itself. However, financial analysts' forecasts provide a better predictor for future earnings than time-series models (Watts and Zimmerman, 1986, pp. 146-154). The last conclusion indicates that other information could be useful in predicting future earnings rather than just earnings; this argument is found in Brown (1993) who

indicated that use of data from other financial statements can improve the accuracy of earnings forecasts.

As mentioned in the above discussion, future cash flow is used as an input in valuation models and information content studies. But researchers focus on forecasting earnings instead of directly forecasting future cash flows. This is because they assumed that future earnings equal future cash flows. This assumption is valid under extreme conditions according to Watts and Zimmerman (1986, p.131) who provided the following example to illustrate these conditions:

> *Assume a static firm. Its assets consist of N assets each with an economic and book life of T years and a cost of $I. Further assume the machines' ages are distributed uniformly from 0 years to T-1 years and the firm will replace each machine at the end of its life at a cost of I. Depreciation is the firm's only accrual and by replacing the machines infinitely in the future, the firm expects to generate cash flows of C infinitely into the future. The markets expected rate of return for the firm for all periods is constant. Under these assumptions, the firm's expected accounting earnings each year in the future (A) are:*
>
> $$A = C + I - D$$
>
> *Where D is the depreciation expense, I is added because C is total cash flows including outlays for investment, I. Hence, C+I is operating cash flows. Since the ages of the firm's machines are always uniformly distributed across T years the depreciation each year must be equal to the cost of one machine (I) regardless of the depreciation method adopted. Hence, we have*
>
> $$A = C$$

*for all years in the future. The expected accounting earnings (A) are equal to the expected cash flows (C) forever into the future*

Earlier studies that examined the usefulness of cash flow data (e.g. Ball and Brown, (1968); Beaver and Dukes, (1972); and Pattel and Kaplan, (1977)) concluded that cash flow had no information content in terms of its relation with stock returns. These results enhanced by the FASB 1978 assertion that accrual earnings information provides a better predictor for future cash flows than cash flow information itself.

A considerable number of studies have been carried out to examine the validity of the FASB (1978) assertion. For the purpose of this study, these studies will be grouped under two main headings: *Share-price studies* and *predictive studies*.

The remainder of this chapter is organized as follows: section 3.2 reviews and discusses the studies that used share price as a benchmark to evaluate the usefulness of cash flow data. Section 3.3 is devoted to the studies that used the predictive method in evaluating the usefulness of cash flow. Section 3.4 summarizes the chapter.

## 3.2 Empirical Evidence from Share-Price Studies

These studies test the association between abnormal returns and unexpected earnings and cash flows. If unexpected earnings are more highly associated with abnormal returns than unexpected current cash flows, unexpected earnings are a better index for the change in future cash flows than current cash flows itself (Watts and Zimmerman, 1986).

The study of Ball and Brown (1968) is considered one of the first empirical studies to investigate the information content of accounting numbers. They measured

the association between annual earnings and abnormal returns. Using operating earnings as the proxy for operating cash flows, they reported that earnings have a higher correlation with abnormal stock returns than cash flow (i.e. operating earnings), which implied that earnings have information content. Beaver and Dukes (1972) used a different proxy for operating cash flows. They defined cash flow as earnings plus depreciation, depletion and amortization charge, and the change in deferred tax account. They reported the same result as Ball and Brown (1968) in that unexpected earnings are more highly associated with abnormal returns than unexpected operating cash flows. While these two early studies investigated the information content of accounting numbers, Patell and Kaplan (1977) examined whether cash flows have information content beyond that already existing in earnings. They calculated cash flows as earnings after extraordinary items plus depreciation and deferred tax minus unremitted earnings of unconsolidated industries plus other adjustments. They found that operating cash flows provide no information beyond that existing in earnings.

As can be seen, these earlier results indicated that accounting earnings are a better predictor for future cash flows than current cash flow data. However, these results used a naïve proxy for cash flows which might explain why they failed to provide evidence on the usefulness of cash flow data. More recent studies have used more accurate proxies for cash flow and they provide some evidence for the usefulness of cash flow data. For the purpose of clarification, the recent studies will be divided into two main subheadings according to the main aim of the study: subsections 3.2.1 look at studies that mainly aim to examine the usefulness of earnings versus cash flow, and subsections 3.2.2 looks at studies that aim to explore the usefulness of accruals.

### 3.2.1 The Information Content of Earnings versus Cash Flow

**Bowen et al. (1987)**

They compared two accrual measures (net income and working capital from operations), and two cash flow measures (operating cash flows and cash flows after investment), in explaining the variation in cumulated abnormal returns (CAR). They used the following statistical model

$$CAR = \alpha + \beta_1 UI + \beta_2 UWCO + \beta_3 UOCF + \beta_4 UCAI + \varepsilon$$

Where *CAR* is cumulated abnormal earnings, *UI* is unexpected accounting income, *UWCO* is unexpected working capital form operations, *UOCF* is unexpected operating cash flow, and *UCAI* is unexpected cash flow after investment.

They used the random walk model to estimate the unexpected part in each variable except for operating cash flows where they used past working capital from operation instead of cash flows. They were depending on their previous conclusion — Bowen et al. (1986) — that working capital from operations is a better predictor for future cash flows than current cash flows itself.

Eventually they concluded that cash flow data revealed usefulness in explaining the variation in stock prices. Moreover, it contains incremental information beyond that contained in accrual measures (*WCFO* and earnings). The results also indicate that the accrual measures jointly and separately have incremental information content beyond that contained in cash flow measures. Finally they concluded that working capital from operations has no incremental information beyond that contained in earnings.

**Ali (1994)**

He extended Bowen et al. (1987) by using non-linear regression in addition to linear regression used in prior studies. Based on US data for the period 1974-88, he examined the incremental information content of earnings, operating cash flows and working capital from operations. He used the same model used in Bowen et al. (1987) except he did not use the *UCAI*; he used the change in the variables as measures of the unexpected part (i.e. variables follow a random walk model). The results of the linear model were consistent with Bowen et al. (1987) except that : (1)working capital from operations had incremental information content beyond that contained in earnings, and (2) cash flow from operations had no incremental information content relative to earnings, and working capital from operations. He suggested that these differences in the results were due to the differences in the sample and the period of the study. In the non linear model, he grouped the sample into two groups according to the level of the change in the absolute value for earnings. The first group, high- change in earnings group, contained the observations that were above the median. The second group contained all the observations that were below the median. The same method was used to divide the sample according to the change in cash flows, and the change in working capital from operations.

The results indicated that the incremental information content of earnings (working capital from operations) was not a function of the change in earnings (working capital from operations). Meanwhile, cash flow from operations has incremental information content only in low -years change in operating cash flows. He also concluded that the non linear model better specified the association between stock returns and the variables of the study.

**Pfeiffer et al. (1998)**

While prior studies employed the random walk model as a proxy for the market's expectations, they developed a model ( serial independency model) based on auto- and cross correlations between earnings components, to perform as the market's expectations for earnings, cash flow and working capital from operation. Specifically they used the following model:

$$C_{jt} = \beta_0 + \beta_1 CFO_{jt-1} + \beta_2 CA_{jt-1} + \beta_3 NCA_{jt-1} + \varepsilon_{jt}$$

Where *C* equals either operating cash flow (*CFO*), current accruals *(CA)*, or non-current accruals *(NCA)*.

The explanatory power for the model in explaining the variation in future cash flow was 26%. Comparing the predictions of the above model with the random walk model's predictions for earnings, cash flow and working capital from operation revealed that the model based on cash flow and accruals outperformed the model based only on historic (past) data.

In the second stage they used the same model used in Ali (1994) but replaced the random walk model's expectation with their model expectations. The results indicated that their prediction model improves the ability of the variables in explaining the variation in stock returns. When the random walk model was used to estimate the unexpected part, the adjusted $R^2$ was 5% which increased to 11% when the serial independency models were used. Moreover, operating cash flows revealed a more significant relation with stock returns. In the case of the random walk model, the coefficient of operating cash flow was insignificantly negative with stock return which is consistent with Ali (1994). When the serial independency models were used operating cash flow's coefficient was significantly positive.

As in Ali (1994) they divided the whole sample into two groups according to

the magnitude of change in earnings /working capital from operation/ operating cash flow. Contrary to Ali's results they reported that operating cash flow had incremental information content over earnings and working capital from operations in both groups: high and low change in earnings, cash flow, and working capital from operations. From the above results they concluded that Ali's inability to detect the incremental information content for operating cash flow is due to his inability to estimate accurately the market's expectations.

**Board et al. (1989)**

Based on 39 UK firms over the period 1961-1977, they examined the relationship between earnings measures and abnormal returns. They also re-estimated the models of the study based on US data over the period 1965-1982.

In the first stage of their study they examined the information content of unexpected accounting income (UAI), unexpected working capital from operations or 'Fund flow' (UFF), and unexpected operating cash flows (UCF). They used the following univariate linear regression model:

$$CAR = \alpha + \beta X + \varepsilon$$

Where $X$ is UAI, *UFF*, or *UCF*. They used the change in the *AI* (FF or *CF*) to calculate the *UAI* (*UFF* or *UCF*).

The results revealed that, based on UK data, both net income and fund flow separately have information content while the cash flow revealed no information content. The same pattern of results was reported based on US data although the US evidence was more powerful. The UAI, based on UK data, showed a significant relation with stock returns for only 9 out of 16 years while for US data it showed a

significant relation in all 18 years. UCF had a significant relation with stock returns in 1 year, for UK data, and 5 years for US data.

In the second stage, they investigated the incremental information content for the variables. They applied the following steps to measure the incremental information content of earnings over cash flows: (i) regressed CAR on CF; (ii) regressed the CF on AI, and (iii) the residuals from the second regression were regressed on the residuals from the first regression. Based on UK data the results show that: net income revealed information content over the other two variables; cash flows never had incremental explanatory power over the other two measures; finally, fund flow had incremental information content over operating cash flows and accounting income, although for the latter just in one year out of sixteen. The same core results were obtained from US data though they were more powerful. The accounting income variable (AI) exhibited explanatory power over the other two measures, meanwhile none of them exhibited incremental explanatory power over it. The FF had incremental information content over CF in 17 out of 18 years while CF never had incremental information over FF.

**Board and Day (1989)**

Based on 39 UK firms over the period 1961-1977, employed the same first two measures and methodology used in Board et al. (1989) except they replaced the cash flow with net quick assets which is defined as working capital from operations plus the changes in stock and work in progress.

The results were consistent with prior UK evidence in that net income and working capital from operations, separately, had information content, while the net

quick assets had no information content. In respect to the incremental information content for the different measures, the results were also consistent with the previous study. Net income had incremental information content over working capital from operations (net quick assets) in 5 years (8 years), working capital from operations had incremental information content over net quick asset (net income) in 7 years (one year), and finally the net quick asset revealed incremental information over that existing in net income (working capital form operations) in two years (3 years).

The above two UK studies, which are considered the first UK studies that examined the incremental information content for cash flows and earnings, concluded that cash flows have neither information content nor incremental information content beyond that existing in earnings.

**Ali and Pope (1995)**

This study used 247 UK firms over the period 1984-90, to examine the association between stock returns and earnings, cash flows and working capital from operations. They developed Board and Day (1989) through the following three innovations: (i) resetting the linearity assumption between returns and earnings; (ii) using both the change and the level of earning figures; (iii) using time-varying parameters in the earnings-returns model instead of constraining the parameters to be constant across years. Based on these innovations they developed four models. Each model contained one of these innovations except the fourth one, which contained all three innovations. The basic OLS model for the study was:

$$RET = \alpha + \beta_1 \Delta X + \beta_2 X + \varepsilon$$

Where RET is market-adjusted return, X earnings (E), operating cash flows (CFO), or working capital form operations (WCFO).

They pointed out that, for all the models, operating cash flows from operations have the weakest ability in explaining the variation in stock return meanwhile earnings have the highest ability in explaining the variation in stock returns. In fact the adjusted $R^2$ for the fourth model, which assumed the non-linear correlation between stock returns and the change in earnings variables in addition the time-varying parameters, was 20.84%. Meanwhile, it was 15.77% and 5.25% for WCFO and CFO respectively. The basic model, which assumed linearity and constrained parameters, reported a substantially lower adjusted $R^2$ for E and WCFO, where it was 15.23% and 9.92% respectively. It was 4.06% for CFO, which is slightly different from the fourth-model's adjusted $R^2$. The above result indicated that using a non-linear model, time-varying parameters and the change and the level of variables together improves the explanatory power for earnings variables but to different degrees.

To examine the incremental information content for the study's variables they employed multivariate regression. The basic multivariate model was

$$RET = \alpha + \beta_1 \Delta E + \beta_2 E + \beta_3 \Delta OCF + \beta_4 OCF + \beta_5 \Delta WCFO + \beta_6 WCFO + \varepsilon$$

They concluded that both earnings and working capital from operations have incremental information content in the four multivariate models beyond each other. However, operating cash flows have incremental information content only in the fourth model, although its coefficients were significant in three years out of seven.

In summary, the results of this study are consistent with Board and Day in that earnings and fund flows have significant associations with stock returns and earnings

had the highest association with stock returns. On the other hand the results indicated that operating cash flows have incremental information content over that in earnings and working capital from operations, which is inconsistent with prior UK studies.

**Clubb (1995)**

Clubb investigated the incremental information content of earnings and cash flow measures. He used operating cash flows, financing and investing cash flows as variables for cash flows. The sample of the study consisted from 48 UK firms over the period 1955-1984. The main questions of the study were:

- Do earnings have information content over that existing in cash or fund flows in relation to company share prices (stock return)?
- Do cash flows or fund flows have information content over that existing in earnings in relation to company share prices (stock return)?

The main independent variables were: unexpected earnings, unexpected working capital from operations, unexpected long- term accruals, unexpected operating cash flows, unexpected investing cash flows, and unexpected finance flows. The dependent variable was unexpected return measured using the market model.

The results of the study indicated that earnings, cash and fund flow had information content in relation to company share prices. Earnings components (long term accruals and working capital from operations) together had incremental information content beyond that in aggregate earnings and unexpected cash flow variables. Consistent with Board et al. (1989) long- term accruals had information content over that existing in working capital from operations. The components of unexpected dividends (unexpected operating cash flows, unexpected investing cash

flows, and unexpected finance flows) revealed little information content beyond that in aggregate unexpected dividends. Unexpected investing and financing cash flows had no incremental information content beyond that in unexpected aggregated dividends, while operating cash flows had incremental information content beyond that contained in aggregate dividends.

The results also indicated that aggregate dividends revealed information content over that existing in aggregate earnings, which implied that operating cash flows have incremental information content beyond that in earnings. However, the results did not provide strong evidence on the usefulness of operating cash flows.

**Charitou and Clubb (1999)**

They used UK data over the period 1985-92 to examine the relationship between security returns, cash flows and earnings. Following Dechow (1994) they measured this relation for different measurement intervals: one year, two year and four year. They developed the Dechow study by examining the incremental information content of accounting earnings and cash flow measures. They used univariate models to examine the information content for: earnings, operating cash flows, change in cash, and equity cash earnings.

The results indicated that earnings had the highest ability in explaining the variation in stock returns (defined as the change in the share price over the fiscal year, plus dividends). Operating cash flows and the change in cash had information content in explaining the variation in stock returns while the equity cash earnings (defined as operating cash flows less investment) had a weak relation with stock returns. Regarding the effect of increasing the measurement interval, they pointed out that as

they use longer intervals, the adjusted $R^2$ increased for all the models, which is consistent with Dechow (1994).

The multivariate analysis revealed that operating cash flow had incremental information content beyond that in earnings. They reported also that the information content over earnings increased as the measurement interval increased. In other words, they pointed out that adjusted $R^2$ for the models explaining variation in stock return increased as they added cash flow variables to earnings.

**Charitou et al. (2001)**

They investigated the value relevance of operating cash flow and earnings under three contextual variables: (1) earnings permanence, (2) earnings growth, and (3) firm size. Based on UK data over the period 1985-1993 they employed the following basic linear regression:

$$RET_{it} = \alpha_0 + \beta_1 E_{it} + \beta_2 \Delta E_{it} + \beta_3 OCF_{it} + \beta_4 \Delta OCF_{it} + \beta_5 MB_{it-1} + \beta_6 MV_{it-1} + \varepsilon_{it}$$

Where RET is realized return, E, and ΔE are earnings and change in earnings respectively; OCF, and ΔOCF are operating cash flow and change in operating cash flow; MB is market to book ratio as a measure of firm growth, and MV is market value of equity at the beginning of fiscal year.

They estimated the above model by using both pooled and year- by- year regression. The results revealed that earnings had incremental information content over cash flow while operating cash flow revealed incremental information content beyond earnings when pooled data was used. The results also revealed that prior operating cash flow was significantly positively associated with stock returns. The

results also indicated that firm size and market to book ratio (risk proxies) improve the explanatory power of the model.

In their examination for the effect of contextual factors on the relation between stock return and the independent variables, they divided the whole sample into two groups according to the magnitude of the contextual variables. For instance, to examine the effect of earnings permanence, the first group contained observations where the absolute change in earnings (used as measure for earnings permanence) was above the yearly cross- sectional median. The second group contained the observations that were below the yearly cross-sectional median.

Eventually, they concluded that when earnings were transitory the information content for earnings significantly decreased. There was no evidence to support the US results that the information content for operating cash flow increased. Moreover, the results revealed that operating cash flow had no significant association with stock return in the two groups. With regard to the effect of earnings growth, which was defined as the natural logarithm of the market value/ book value ratio, the results revealed that the importance of earnings as an explanatory variable for security returns increased when earnings growth was high. Pooled results indicated that the coefficient for operating cash flow was positively significant for the low growth group and increased for high growth observations.

Finally, firm size results revealed that the information content of earnings decreased as the firm size of the company, measured by the natural logarithm of market value, increased. The information content of operating cash flow was not affected by firm size.

### 3.2.2 The Information Content of Accruals

While the above studies examined the incremental information content of cash flow beyond earnings, the main concern of the following studies is to examine the incremental information content of accruals beyond earnings and cash flow.

**Wilson (1987)**

Based on US data for firms for the years 1981 and 1982 (322 firm-year observations), Wilson investigated the incremental information content of earnings components beyond that in earnings itself. He used a new method based on the idea that earnings information became known to investors before funds information. He noticed that The Wall Street Journal published earnings figures before the earnings components became available to the public via the Security Exchange Commission; this implied that accruals information was available in the market before the information required for calculating cash flows. He decomposed aggregate earnings into operating cash flows (working capital from operation) and short term accruals (and long term accruals).

He employed two approaches: cross sectional, and portfolio approaches. In the first step of the cross sectional approach he calculated the forecast error (unexpected part) by using the following equation:

$$F_{it} = \alpha + \sum_{k=1}^{4} \mathrm{B}_k W_{ik} + \varepsilon$$

Where F is either the fourth -quarter working capital from operations, or the fourth-quarter operating cash flows, and W is vector of the fourth -quarter earnings and

revenues in addition to four quarters from: operating cash flow, non-current accruals, revenues, current accruals, and annual capital expenditure (used to take into consideration the effect of expansions). The four quarters comprised the three quarters of the current year and the fourth quarter of the previous year.

Then he regressed the market model residuals (RET) on the residuals from the above equation as in the following model:

$$RET = \alpha + \beta\varepsilon + e$$

Regarding the portfolio approach he grouped the sample into three sub-samples, according to the magnitude of the forecast error: high, medium and low forecast error for operating cash flows or working capital from operations. The findings of the two approaches indicated that operating cash flows had explanatory power for the stock return while the working capital from operation had no information content. He also concluded that total short term accruals (long term accruals) and operating cash flows (working capital from operation), taken together, have (have not) incremental information content beyond that contained in earnings itself. But he did not report whether the accruals have incremental information content over fund flow.

**Wilson (1986)**

In a complementary study, Wilson explored the incremental information content of earnings components. The main aims of the study were to answer the following two questions: (i) do total accruals have incremental information content beyond that in earnings?, and (ii) do total accruals have incremental information content beyond that in fund flows?

He used the same methodology used in Wilson (1987) to calculate the forecast error for the fund flows. In addition he used two returns models. In the first one he used a narrow window around the release date for financial statements. In the second one the narrow window was around the fourth-quarter earnings release date.

The results of this study indicated that non-current accruals had no incremental information content beyond that existing in working capital from operations while current accruals revealed significant incremental information beyond that existing in operating cash flows. The result also confirmed Wilson (1987) that operating cash flows and aggregate accruals had incremental information content beyond earnings.

In addition the results revealed that aggregate accruals and operating cash flows had incremental information content beyond each other. These findings confirmed the usefulness of decomposing earnings into accruals and operating cash flows. Although he did not test whether the usefulness of aggregate accruals stems from short term accruals or long term accruals, he argued that short term accruals are most likely the source for this usefulness. He also argued that his conclusions may be affected by macroeconomic factors, especially since the year of his study witnessed a recession.

**Rayburn (1986)**

Rayburn used US data to examine the information content for accruals and operating cash flows. The variables of the study were: operating cash flows (OCF), short term accruals (WCFO), and aggregate long term accruals, which were decomposed into depreciation (DEPR) and deferred tax (DTAX). The associations between these variables and cumulative abnormal returns were calculated. She used

two time series models to calculate the forecast error for the variables of the study (i.e. the unexpected part). The first one, which was called the holdout model, used all the variables of the study (OCF, WCFO, DEPR, and DTAX) to estimate expected values for variables. The second assumed variables follow a random walk model.

In her first analysis, she included operating cash flows and aggregate accruals in the first model. Using either the random walk or the holdout model to calculate the forecast error of the variables, the coefficient for aggregate accruals and operating cash flows were significant which indicated that both of them have information content consistent with Wilson (1986 and 1987). The operating cash flows revealed a positive relation with stock returns where the aggregate accruals had a negative relation. In the second model, aggregate accruals were decomposed into short-term accruals, and long-term accruals (depreciation, and deferred tax). The results were sensitive to the expectations models used. When the holdout model was used, only the coefficients of cash flows and short -term accruals were significantly positive (i.e. had information content). On the other hand, when the random walk model was used, all the independent variables had information content. This difference in the result between the two models used as surrogates the market expectations may be caused by the outliers. When she deleted the outliers from the sample and then re-estimated the holdout model she reported the same results as for the random walk model regarding the usefulness of long term accruals components. Rayburn's results indicate that the value relevance of aggregate accruals stem from both short and long term accruals which is inconsistent with Wilson (1986).

**Bernard and Stober (1989)**

They developed Wilson's studies by extending the period of the study to 8 years (32 quarter) instead of 2 years (8 quarters) and by increasing the size of the sample to 170 US firms. They used the same methodology used in Wilson's studies. In addition to investigating the usefulness of decomposing earnings into its components, they also investigated Wilson's (1986) arguments that macroeconomic conditions may affect the relation between stock prices and operating cash flows.

The results of the study contrast with Wilson's results. They reported an insignificant negative coefficient for operating cash flows. In other words, they concluded that operating cash flows did not have information content as Wilson reported in his studies. Regarding the effect of macroeconomics, the results provided no evidence that supported the effect of macroeconomic condition on the value relevance of operating cash flows. They also examined the relation between market-adjusted return and unexpected components of short term- accruals: unexpected receivables, unexpected inventory and unexpected payables. The results indicated that these components have no predictive power for stock-price.

**Dechow (1994)**

Based on US data over the period 1960-89 she examined the role of accruals in improving the ability of cash flow as a performance measure. Her study was based on the argument that the difference between earnings and cash flows is the accruals. This difference is a result of necessary accrual adjustments to comply with the matching and recognition principles in order to reach the earnings figure. But the cash flow process considers these adjustments as non cash transactions so they should be

eliminated from earnings figures to reach operating cash flows. The adjustments process is also a subjective process. Managements can use it to manipulate the accounting income. This manipulation can be used either to convey good news to the market or to overstate the reported earnings. The fact that earnings might be vulnerable to earnings manipulation is expected to decrease the importance of earnings as a performance measure and at the same time makes cash flow a better indicator of a firm's performance. On the other hand cash flow figures could contain cash belonging to last year or to the coming year, or to both at the same time, which could make it a poor performance measure.

Based on this argument she concluded that cash flows suffer from matching and timing problems as a result of eliminating the accruals adjustments. This problem is expected to increase as the importance of accruals increases. She argued that the importance of accruals increases in three situations: (1) when earnings are reported for a short interval, which is defined as one quarter or one year; (2) when the absolute magnitude of aggregate accruals increases; (3) when the length of the operating cash cycle increases. In all three situations she hypothesized that earnings should outperform cash flows as a corporate performance measure.

In the empirical analysis she used share price as the benchmark pre-assuming that the stock market is efficient. The independent variables were earnings and realized cash flows. She pointed out that the measure that has the higher association ($R^2$) with stock return is considered a better indicator for a firm's performance. Specifically the following univariate model was used:

$$R_{i,t} = \alpha + \beta X_{i,t} + e_{i,t}$$

Where $X$ either earnings per share, operating cash flows per share, or net cash flows

per share. R represents stock return over the time interval.

The empirical results confirmed her hypotheses that accruals improve the ability of cash flows as performance measures. Actually she reported that as the measurement interval increased the correlation between cash flows (earnings) and stock returns increased. However, earnings had a higher correlation with stock return than cash flow measures for short and long interval measures.

Regarding the effect of aggregate accruals, she divided the whole sample into quintiles according to its absolute level. The reported results (table 5, p.28) indicated that in moving from the first group (which contained the lowest magnitude of accruals) to the fifth group (which contained the highest magnitude of accruals) the adjusted $R^2$ significantly declined for net cash flows. Meanwhile, it did not change significantly for earnings. She conducted a further analysis to examine the effect of accruals components, short and long term accruals, on the association between the variables of the study. The same above procedure was used. The results show as the absolute magnitude of short term accruals increased the adjusted $R^2$ for cash flows decreased. However, long term accruals had no such significant effect. As for aggregate accruals, the components of accruals had no significant effect on the association between earnings and stock returns.

To investigate the effect of the length of the operating cash cycle, she first grouped the sample into 58 different industries. Then she re-estimated the above model for each industry. She found the correlation coefficients between the obtained adjusted $R^2$ and the average operating cash cycle for each industry. When the operating cash flow was the independent variable, the correlation coefficient was significantly negative. When earnings were the independent variable, the correlation coefficient was positive but insignificant.

Overall, her findings indicated that the relation between stock return and cash flow decreased as the magnitude of accruals increases and the length of the operating cash cycle increased. On the other hand the relation between earnings and stock return was not sensitive either to the magnitude of accruals or to the length of the operating cash cycle. The conclusion of this study was consistent with Wilson (1987 and 1986) and Rayburn (1986) in that long-term accruals have no value relevance.

**Guay and Sidhu (2001)**

The above US studies provide evidence on the information content of aggregate accruals. However this usefulness stems from current accruals more than non-current accruals. Contrary to this conclusion Guay and Sidhu (2001) provided evidence, based on US data over the period 1962 – 1995, supporting the usefulness of long term accruals. They compare the ability of four models in explaining the variation in stock returns. The first model contained aggregate earnings (E). In the second model the earnings were decomposed into working capital from operations (WCFO) and long term accruals (LTA). The third model contained operating cash flows (OCF) and short and long term accruals. Finally the fourth model contained the operating cash flows, short term accruals (STA), depreciation (DEPR), deferred tax (DT) and other long-term accruals (OLTA). They used the following hierarchy models:

$$\text{Return} = \alpha + \beta E + \varepsilon$$

$$\text{Return} = \alpha + \beta_1 WCFO + \beta_2 LTA + \varepsilon$$

$$\text{Return} = \alpha + \beta_1 OCF + \beta_2 STA + \beta_3 LTA + \varepsilon$$

$$\text{Return} = \alpha + \beta_1 OCF + \beta_2 STA + \beta_3 DEPR + \beta_4 DT + \beta_5 OLTA + \varepsilon$$

The basic analysis revealed that the fourth model had the highest explanatory power for stock returns. The adjusted $R^2$s were: 9.64%, 10.67%, 10.8% and 10.87% for the first, the second, the third, and the forth model respectively. They pointed out that the differences between adjusted $R^2$s were significant which implied that the long term accruals had incremental information content over that existing either in working capital from operations, short term accruals, operating cash flows, or aggregate accruals.

The results also indicated that the components of long term accruals had incremental information content beyond that already contained in aggregate long-term accruals. They also re-examined Dechow's (1994) conclusion that long term accruals did not mitigate the matching and timing problems in cash flows. They used two-year and five-year interval measurements. The results were consistent with Dechow (1994) in that the ability of all the study's models increased as the interval measurement increased. On the other hand they reported that long term accruals mitigated the matching and timing problems in cash flows, which was at odds with Dechow (1994).

**McLeay et al. (1997)**

They used UK data over the period 1975 -1993, to examine if current and non-current accruals (CA and NCA respectively) have incremental information content beyond that in aggregate earnings. They developed the following three models:

$$\text{Re}turn = \alpha + \beta_1 UE + \varepsilon$$

$$\text{Re}turn = \alpha + \beta_2 UE + \beta_2 UCA + \varepsilon$$

$$\text{Re}turn = \alpha + \beta_1 UE + \beta_2 UCA + \beta_3 UNCA + \varepsilon$$

Where UE= unexpected earnings; UNCA= unexpected non-current accruals; and UCA= unexpected current accruals. The dependent variable for the three models was stock return. As in any event study the unexpected part of these variables should be calculated. In previous US and UK studies, the random walk model was the main method used for this purpose (e.g., Bowen et al. (1987), Rayburn (1986), and Board et al. (1989)). In this study they developed integrated moving average (IMA) and exponentially-weighted moving average (EWMA) models in addition to the random walk model.

Although the main concentration of the study was to improve the adjusted $R^2$ by using different methods to measure the amount of surprise in the variables, the empirical results revealed that short and long-term accruals have incremental information content over that in earnings. This conclusion was not affected either by the models used to estimate the unexpected part (RW, IMA or EWMA) or by using non linear models.

**Garrod et al. (2000)**

They used the basic Edward-Bell-Ohlson (EBO) model to measure the value relevance of earnings' components. They developed the following three econometric models:

$$P = \alpha + \beta_1 BV + \beta_2 E + \varepsilon$$

$$P = \alpha + \beta_1 BV + \beta_2 OE + \beta_3 OA + \varepsilon$$

$$P = \alpha + \beta_1 BV + \beta_2 OCF + \beta_3 CA + \beta_4 NCA + \beta_5 CE + \beta_6 OA + \varepsilon$$

Where P= firm price per share for ordinary equity; BV= book value; E= earnings; OE= operating earnings; OA= operating assets; OCF= operating cash flows; CA=

current accruals; NCA= non-current accruals; and CE= capital expenditure. All the explanatory variables were deflated by the number of outstanding ordinary shares.

By using a cross sectional analysis of UK data over the period 1992-96 they concluded that disaggregating earnings into cash flows and short and long-term accruals increased significantly the explanatory power for the model. However, this increase mainly stems from decomposing earnings into operating earnings and operating assets rather than from decomposing earnings into cash flows and accruals' components. Actually the adjusted $R^2$ for the models that contained only earnings was 51%. It increased to 64% when earnings decomposed into operating earnings and operating assets, and to 65% when operating earnings replaced by OCF, CA, NCA and CE.

They also investigated whether the value relevance for cash flows and earnings' components was affected by the magnitude and the sign of the three following contextual variables: (i) operating cash flows, (ii) earnings, and (iii) short term accruals. They first divided the total sample into two sup-samples according to the sign of the contextual variables: positive and negative groups. Then the positive sample was divided into four equal groups (quartiles) according to the magnitude of the variable. The first of these groups contained the lowest positive values for the contextual variable while the fourth group contained the highest positive values. The above three models were carried out under each contextual variable.

The results indicated that there is no value difference between short –term accruals and operating cash flows but long-term accruals were valued differently from operating cash flows in extreme cases when the contextual variables were either negative or highly positive.

### 3.2.3 Share-Price Studies: Summary of Developments

To sum up, since 1968 an extensive amount of research has been conducted into the information content of earnings components. The above studies are based on the relation between earnings' components and share prices, and they provide mixed evidence on the usefulness of cash flow, long –term and short-term accruals. These studies and their main findings are summarised in Tables 3.1 and 3.2.

Bowen et al. (1987), Ali (1994), Ali and Pope (1995), among others have examined the usefulness of cash flow and earnings and found that cash flows have information content. On the other hand Board et al. (1989), Board and Day (1989), Bernard and Stober (1989) and Clubb (1995) found that cash flow had no information content beyond that existing in earnings. With regard to the usefulness of accruals, Wilson (1986) and Dechow (1994) found that short term accruals have information content while long term accruals have no information content. On the other hand, Guay and Sidhu (2001) and McLeay et al. (1997) found that both short and long term-accruals have information content.

According to Pfeiffer et al. (1998) there are reasons to believe that a dollar of operating cash flows should be more highly valued than a dollar of current accruals. The failure to find consistent evidence on the usefulness of decomposing earnings into accruals and cash flows has motivated researchers (e.g., Bearnard and Stober (1989), Ali (1994), McLeay et al. (1997), Pfeiffer et al. (1998)) to take into consideration the effect of other factors that might affect the value relevance of cash flows. From the above studies these factors could be summarized into the following points:

1. Non-liner relationship: Ali(1994) and Ali and Pope (1995) based on US and UK data respectively concluded that when assuming the relationship between

cash flow and stock returns is non-linear, they found evidence on the usefulness of cash flow. The lack of control for such non-linearities is major limitations in previous studies.

2. Contextual factor effect: Wilson (1986, 1987) indicated that the value relevance of cash flows could be affected by other factors such as macroeconomic conditions but did not test this. Although Board and Stober (1989) provide evidence which did not support Wilson's arguments , later studies take into consideration other factors like the magnitude of accruals, length of operating cash cycle ( e.g. Dechow (1994); Garrod et al. (2000)). Additional factors like earnings permanence and growth also were examined (e.g. Charitou et al. (2001). In general, the results revealed that the value relevance of operating cash flow is influenced by such contextual variables.

3. Development of the expectation models : different expectation models used as proxies for market expectations lead to different results regarding the value relevance of earnings' components in general and cash flow especially. For instance, Rayburn (1986) reported different results for different expectations models. McLeay et al. (1997) reported that the random walk model, which is commonly used in information content studies, is a poor proxy for market expectations. Pfeiffer et al. (1998) who used the same model in Ali (1994) reported the same conclusion. Moreover they provide evidence on the usefulness of cash flow using linear and non-linear models.

# Table 3.1
## The accumulated empirical evidence from share-price studies earnings and cash flows
### (Share price or stock return is the benchmark)

| Author (s) | Market | Period | Main Item (s) examined | Main Conclusions |
|---|---|---|---|---|
| Bowen et al. 1987 | US | 1972-81 | E, WCO, OCF, & CAI | Cash flow data and accruals have incremental information content beyond each other. However, WCO has no incremental information content beyond earnings. |
| Board et al., 1989 | UK& US | 1961-77&1965-82 | E, WCO, & OCF | Earnings and WCO separately have incremental information content beyond that already existing on OCF. OCF does not have incremental information content beyond earnings or WCO. |
| Board and Day, 1989 | UK | 1961-77 | E, WCO, & NQA | NQA does not have incremental information content beyond that already existing in E or WCO. E and WCO have incremental information content beyond that already existing in NQA. |
| Ali, 1994 | US | 1974-88 | E, WCO, & OCF | The results of the linear model reveal that WCO has incremental information content beyond that already existing in E. OCF does not have incremental information content beyond that already existing in either E or WCO. The results of non-linear analysis reveal similar results. |
| Ali and Pope,1995 | UK | 1984-90 | E, WCO, & OCF | OCF has incremental information content beyond that already existing in E and WCO. |
| Clubb,1995 | UK | 1955-84 | E,& OCF | OCF have incremental information content beyond that already existing in E |
| Pfeiffer et al., 1998 | US | 1980-96 | E, WCO, & OCF | OCF have incremental information content beyond that already existing in either E or WCO. Ali's (1994) results are affected by using different measures for market expectations. |
| Charitou and Clubb, 1999 | UK | 1985-92 | E & OCF | OCF have incremental information content beyond E. |
| Charitou et al., 2001 | UK | 1985-93 | E & OCF | Weak evidence on the incremental information content of OCF beyond E. |

E= Earnings. WCO= working capital from operating, OCF= operating cash flows, CAI= cash flow after investment. NQA= net quick assets.

# Table 3.2
# The accumulated empirical evidence from share-price studies on accruals
## (Share price or stock return is the benchmark)

| Author (s) | Market | Period | Main Item (s) examined | Main Conclusions |
|---|---|---|---|---|
| Rayburn, 1986 | US | 1963-82 | OCF, CA, & NCA | Both OCF and total accruals have incremental information content over each other. CA has incremental information content beyond NCA. |
| Wilson, 1986& 1987 | US | 1981-82 | OCF, WCO, CA, & NCA | Accruals and OCF have incremental information content beyond earnings. CA has incremental information content beyond OCF. WCO does not have incremental information content beyond E. |
| Bernard and Stober, 1989 | US | 1977-84 | OCF. WCO, CA, & NCA | Wilson's results (see above) are sensitive to change in the test period of the study. |
| Dechow, 1994 | US | 1960-89 | E & OCF | The value relevance of OCF decreases as the magnitude of both aggregate accruals and operating cash cycle increases. Short term accruals have information content while long term accruals do not have information content. |
| McLeay et al., 1997 | UK | 1975 -93 | E, CA, & NCA | CA has incremental information content beyond earnings. NCA have incremental information content beyond earnings. CA and NCA have incremental information content beyond each other. |
| Garrod et al., 2000 | UK | 1992-96 | E, OCF, CA, & NCA | Decomposing earnings into operating cash flows and accruals has value relevance in extreme cases i.e. where performance of the company is highly positive or negative. Long term accruals have information content but short accruals do not have information content. |
| Guay and Sidhu, 2001 | US | 1962 -95 | E, WCO, OCF, CA, NCA, & DEP | NCA have incremental information content beyond OCF, WCO, or CA. The components of NCA have incremental information content beyond NCA |

E= earnings. WCO= working capital from operating, OCF= operating cash flows, CAI= cash flow after investment. NQA= net quick assets. CA= current accruals. NCA= non-current accruals, DEP= depreciation.

## 3.3 Empirical Evidence from Predictive Studies

The following studies use future cash flow as the dependent variable, to measure the usefulness of accounting data.

**Greenberg et al. (1986)**

They used US data for the period 1964-82 to examine the ability of earnings and cash flows in predicting future cash flows. They used one lag from either earnings or cash flows as the independent variable, while the dependent variable was operating cash flow. Based on comparing the coefficient of earnings with cash flows' coefficient, they concluded that earnings data were a better predictor for future cash flows than current cash flows itself.

**Bowen et al. (1986)**

They examined the relationship between accounting earnings and cash flows, for a sample of US firms over the period 1971-81. They used the following traditional definitions of cash flows: net income before extra ordinary items and discontinued operations plus depreciation (NIBEI); net income plus depreciation and amortization (NIDPR); and working capital from operations (WCFO). In addition, they employed three recent measures of cash flows: cash flow from operation (CFO); cash flow after investment (CFAI); and the change in cash and short-term marketable securities($\Delta C$). Their aims were to answer the following questions:

1. Are the traditional cash flow measures used in prior studies highly correlated with alternative measures of cash flows that have been advocated by academics and practitioners?
2. Are accrual accounting earnings and cash flow measures highly correlated?
3. Do earnings or cash flow data best-predict future cash flows?

For the first question the results indicate that traditional measures of cash flows (NIDEI, WCFO) are poor proxies for OCF and CFAI. Regarding the second question, all the variables were correlated with the accrual measure NIBEI.

The results indicated that traditional measures of cash flows (WCFO, NIDPR) are more highly correlated with accrual earnings than alternative measures (CFO, CFAI, and ΔC).The results also revealed that the correlation between traditional measures and recently developed measures is lower than the correlation between traditional measures and accrual earnings. Finally they used the following model to predict future cash flows for one and two periods ahead:

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

Where $Y_{i,t+1}$ represents future cash flows, and $X$ represents the predictor variable. Then they calculated absolute forecast errors to compare the predictive ability of different variables.

Eventually, they concluded that the traditional measures of cash flows, WCFO and NIDPR, were better predictors for future cash flows from operations than cash flows from operations itself, and better than net income before extraordinary items. Their results came against the FSAB 95 assertion that earnings are a better predictor

for future cash flows than current cash flow itself. However, the reported results of the study are based on naïve model predictions which just used one lagged data of the variables of the study.

**Arnold et al. (1991)**

They used the same methodology used in Bowen et al. (1986) to assess the relation between different measures of cash flows and earnings, and to assess the predictive ability for these measures. The analysis was based on 171 UK firms over the period 1965-84. They used the following variables for cash flows: net income after depreciation and current taxation but before long term interest and dividends (NI); working capital from operation (WO); net quick cash flow (NQ); operating cash flows (CO); cash flow from operation and investment (which equals operating cash flow minus investments) (CI); change in cash and equivalent of cash (CC); and entity cash flows (CIC), which equals CI- CC.

The correlation analysis based on first differences revealed that working capital from operations had the largest correlation with net income while the equity cash flow had the lowest correlation. In general, cash flow measures, except working capital from operations, had a low correlation with net income, which is consistent with Bowen et al. (1986). Then they compared the ability of variables in predicting cash flow measures for one and two years ahead. As in Bowen, they used the random walk model for predicting future cash flow variables, and then they calculated the absolute forecast errors. The results show that all cash flow measures except for operating cash flows and net quick flow are well described by a random walk mode. Working capital from operation was the best predictor for future operating cash flows

and net quick cash flows. These results can be expressed numerically in the following models

$$Y_{t+1} = Y_t + e$$

$$X_{t+1} = WO_t + e$$

Where $Y$ represents CI, CC, or CIC, and X represents CO or NQ.

These results are also consistent with Bowen et al. (1986) in that accruals earnings did not outperform cash flows in predicting future cash flows.

**Finger (1994)**

Finger used annual US data over the period 1935-87 to investigate the incremental information content for both earnings and operating cash flows through comparing their ability in predicting future operating cash flows. She used the following firm specific regression models:

$$OCF_t = \alpha + \sum_{i=1}^{N} \beta_i X_{t-i} + \varepsilon_t$$

$$OCF_t = \alpha + \sum_{i=1}^{N} \beta_i Earnings_{t-i} + \sum_{i=1}^{N} \gamma_i OCF_{t-i} + \varepsilon_t$$

Where $X$ is either operating cash flows ($OCF$) or earnings, and $i$=lags.

She used two lags of earnings or future cash flows in the univariate model and used both lagged one year and two year earnings and cash flows in the multivariate model to predict future cash flows. She computed the coefficients based on 15 observations which were then used to predict future cash flows up to eight years ahead. Then she computed the root mean square error (RMSE) for one, four and eight-years ahead.

Based on comparing the RMSE for each model, she concluded that for the short term, (one to two years ahead) operating cash flows were better than earnings in predicting future cash flows. For the long term (four to eight years ahead) operating cash flows and earnings are similar in their ability to predict future cash flows. She pointed out that adding earnings to cash flows did not improve the ability of cash flows in predicting future cash flows. However, earnings have significant power in predicting future cash flows but did not outperform cash flows as FASB (1978) claims.

**Lorek et al. (1993)**

Based on US data they developed univariate autoregressive-integrated-moving –average models (ARIMA) to predict future cash flows. They used quarterly cash flow data over the period 1976-84. They compare the predictions of their model with Wilson's model and other time-series models. Then they calculated the mean absolute percentage errors (MAPE).

They concluded that their proposed model, based on quarterly cash flow data, performed better than the multivariate cross -sectional models used in other studies (e.g., Wilson, 1987 and 1986, Rayburn, 1986).

**Lorek and Willinger (1996)**

They extended the Lorek et al. (1993) by developing new multivariate and time-series models in addition to the ARIMA model to forecast future cash flows. Their sample started from the second quarter in 1979 and ended in 1991. The period from 1979 until 1988 was used to estimate the coefficients of the models. The rest of

the period was considered as the holdout sample. They employed five multivariate models: three univariate models which were based only on past quarterly cash flow data; a multivariate cross-sectional model used in prior studies (Wilson, 1986, 1987); and a multivariate time-series model (MULT) which can expressed in the following equation:

$$CF_t = a + b_1(CF_{t-1}) + b_2(CF_{t-4}) + b_3(OIBD_{t-1}) + b_4(OIBD_{t-4}) + b_5(REC_{t-1}) + b_6(INV_{t-1}) + b_7(PAY_{t-1}) + \varepsilon_t$$

Where CF is operating cash flow, OIBD is operating income before depreciation, REC is accounts receivables, INV is inventory, PAY is accounts payable and t is a current quarter. They excluded depreciation from earnings because they based their models on prior results (e.g., Rayburn (1986), Wilson, 1986) that indicated that non-current accruals have little information content.

Based on mean absolute errors, they concluded that their MULT model was the best predictor for future cash flows. They also carried out two regressions. In the first one they used all the variables in MULT as independent variables and in the second one they used only cash flow variables ($CF_{t-1} and CF_{t-4}$ ) as independent variables. The adjusted $R^2$ values were 31.6% and 11.7% for the first and the second models, respectively.

Lorek's results support the FASB (1978) assertion that accrual data helps predict future cash flows. These results are inconsistent with Finger (1994) who reported that the model which contained cash flow only is a better predictor for future cash flows than the model containing both accrual and cash flow variables. However, Finger's conclusions were based on annual data while Lorek's conclusion is based on quarterly data.

**Dechow et al. (1998)**

They developed a theoretical model to explain the relation between earnings and its components. The model was based on the assumption that sales follow a random walk. By using the accounts receivable, accounts payable and inventory they were able to calculate the correlation coefficient between earnings components. In addition, they predict that current earnings will be a better predictor for future cash flows than current cash flows itself. Based on annual US data for 1963-92 they examined their model. In the first stage they used univariate and multivariate models to predict future cash flows. They used the following model:

$$OCF_t = X_{t-k}$$

Where X represents either operating cash flows or earnings and k= 1, 2, or 3 year lags.

Based on the above model they predict future cash flows for each firm, then the average mean standard deviation for the forecast error was calculated. They concluded that for the whole sample earnings had the smallest forecast error for horizons between 1 and 3 years. This implied that current earnings is a better predictor for future cash flows than current cash flows itself, which is inconsistent with Finger (1994).

They also used firm-specific multiple regression to examine the predictive ability of cash flows in conjunction with earnings. The following multivariate regression model was used:

$$OCF_{i,t+k} = \alpha_{i,0} + \alpha_{i,1} OCF_{i,t} + \alpha_{i,2} E_{i,t} + e_{i,t+k}$$

Based on the mean coefficients of cash flows and earnings they reported the same conclusion as before. While the coefficient of cash flows was not always significantly positive, it was significantly positive for earnings.

In order to examine the effect of the operating cash cycle's length, they partitioned the sample into quartiles according to its length. Then they re-estimated the above two models for each quartile. They concluded that as the length of the operating cycle increased, the superiority of earnings over cash flows increased. This conclusion is consistent with Dechow (1994) although she used a different benchmark (i.e. stock returns).

In the second stage of their analysis they calculated the serial and cross correlations between change in earnings, change in aggregate accruals and change in current and future cash flows. Then they compared each computed correlation from their model with the actual correlation.

The results of comparison show that the absolute difference between the predicted and the actual correlation is significantly greater than zero. Two major conflicts between the predicted and the actual correlation were in the cross – correlation between change in earnings and cash flows. The actual correlation coefficient between the change in earnings and the change in cash flows (change in future cash flows) was significantly positive but small ( significantly negative but very low) while the predicted sign was negative and large ( positive and large). The shortage in significance between the change in current earnings and the change in future cash flows conflicts with their prior conclusion that earnings were a better predictor for future cash flows than cash flows. This inconsistency in the results was explained by measurement error in the variables of the study.

**Barth et al. (2001)**

They build on Dechow (1998) to examine the predictive ability of cash flows and accruals components with regard to future cash flows. They extended Dechow's study by examining the incremental information content for earnings components over aggregate earnings. They also examine directly the information content for the components of long term and short term accruals. The sample of the study consists of all industrial US firms over the period 1987-96. They developed the following hierarchy models:

$$OCF_{i,t+1} = \alpha_0 + \sum_{\tau=0}^{K} \alpha_{1,t-\tau} E_{i,t-\tau} + \varepsilon_{i,t+1} \qquad \text{EQ 1}$$

$$OCF_{i,t+1} = \alpha_0 + \sum_{\tau=0}^{K} \alpha_{1,t-\tau} OCF_{i,t-\tau} + \sum_{\tau=0}^{K} \alpha_{2,t-\tau} Accruals_{i,t-\tau} + \varepsilon_{i,t+1} \qquad \text{EQ 2}$$

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 OCF_{i,t} + \alpha_2 AR_{i,t} + \alpha_3 INV_{i,t} + \alpha_4 AP_{i,t} + \alpha_5 DEPR + \alpha_6 AMORT_{i,t} + \alpha_5 OTHER_{i,t} + \varepsilon_{i,t+1} \qquad \text{EQ 3}$$

Where E= earnings; OCF= operating cash flows; AR= change in accounts receivable; INV= change in inventory; AP= change in accounts payable; DEPR= depreciation; AMORT= amortization; and OTHER= other accruals. All the variables of the study were deflated by the average book value of total assets.

With their EQ 1 they aimed to examine the usefulness of lagged earnings in predicting future cash flows. In the second model, lagged values of operating cash flows and aggregate accruals were predicted to have incremental information content over that existing in current and lagged values of aggregate earnings. Finally their theoretical analysis suggested that the last model would have the highest ability in predicting future cash flows.

Based on pooled data they concluded that current and up to six lags of aggregate earnings had information content in predicting future cash flows. The reported adjusted $R^2$ increased monotonically from 15% for current earnings to 19% for current and six lags of earnings. For current cash flows and aggregate accruals together the adjusted $R^2$ was 27%, which exceeds that for current and six lags of aggregate earnings. In EQ 2, using up to three lags of cash flows and aggregate accruals increased the adjusted $R^2$. This indicates that past cash flows and past aggregate accruals revealed value added in predicting future cash flows. The results revealed that the third model had the highest ability in explaining the variation in future cash flows, with an adjusted $R^2$ of 35%. Moreover, all the independent variables for this model were significantly positively correlated with next year's future cash flows except for accounts payable which was significantly negatively correlated.

Comparing the adjusted $R^2$ for the three models raised the question of whether the superiority of current cash flows and accruals components followed from disaggregating cash flows from aggregate earnings, or from disaggregating accruals. To provide empirical evidence, they restricted the coefficients in the models 2 and 3 to be zero for the unwanted variables.

The results indicated that the components of accruals explained 11% of the variation in future cash flows, the aggregate accruals explained 2%, while the cash flows explained 24%. Based on these results they concluded that the superiority of model 3 over the other two models stems from: (i) disaggregating earnings into cash flows and accruals; and (ii) disaggregating accruals into its major components.

The results also revealed that cash flows alone had incremental information content over that existing in aggregate earnings. Their results were robust to many

factors such as: variations in the length of the operating cash cycle; the industry membership; and different dependent variables in addition to future cash flows. Regarding the last factor, the above models were re-examined using different dependent variables: discounted cash flows, market value to equity, and stock returns. The results confirm the superiority of current cash flows and accruals' components over the other two models. The main difference in the results was the superiority of earnings relative to cash flows. When the dependent variables were either discounted cash flows or future cash flows, cash flows alone outperformed aggregate earnings alone. Consistent with prior share-price based studies, when market value-to-equity or stock return was the dependent variable, aggregate earnings outperformed cash flows. They commented on this difference:

> *This difference in finding likely is attributable to the difference in the sign of DEPR coefficient – DEPR is subtracted to arrive EARN, not added- rather than to sample selection or variable definitions* (p.29)

### 3.3.1 Predictive Studies: Summary

To sum up, studies which use future operating cash flow as a benchmark to evaluate the usefulness of accounting data have provided important insights. These studies are summarised in Table 3.3.

<u>1- Cash Flows versus Earnings</u>

It can be noticed that most of the these studies (e.g., Greenberg (1986), Bowen (1986), Lorek (1993, 1996)) did not support the FASB assertion that earnings is the best predictor for future cash flow. It can be noticed too that current evidence (Lorek (1996) and Barth (2001)) revealed that multivariate models based on cash flow data

and accruals data are superior predictors for future cash flow. In the UK, there are few studies that have used operating cash flow as the dependent variable. However, as was mentioned in Arnold et al. (1991) working capital from operations is found to be a better predictor than operating cash flow.

## 2- Model Development

In statistical terms, the studies discussed above use different statistical tools to draw their conclusions. It can be noted that the following three tools were used: the adjusted $R^2$, coefficient tests, and forecast accuracy tests. $R^2$ tests reflect the ability of a model in explaining the variation in future cash flow. This is used in studies such as Barth et al. (2001). The coefficient of a variable reflects the contribution of this variable to the model as a whole. These are used in Greenberg et al. (1986). Finally, the accuracy tests are used to evaluate the efficiency of the model in forecasting future cash flow. These are used in Bowen et al. (1986), Arnold (1991), and Finger (1994) among others. Some studies used a combination of these tools, such as Lorek and Willinger (1996) who used the $R^2$ and accuracy tests, and Dechow et al. (1998) who used the coefficient and accuracy tests.

Predictions studies are often problematic due to the lack of sufficient time-series data. The OLS based $R^2$ and coefficient tests provide a more suitable methodology when dealing with a cross section data set, and have been widely used in the most recent US studies.

# Table 3.3
# The accumulated empirical evidence on earnings cash flows, and accruals
## (Actual future cash flow is the benchmark)

| Author (s) | Market | Period | Main Item (s) examined | Main Conclusions |
|---|---|---|---|---|
| Greenberg et al.,1986 | US | 1964-82 | E & OCF | E is better than OCF in predicting future cash flows |
| Bowen et al., 1986 | US | 1971-81 | E, EDA, WCO, OCF, & CAI | WCO and EDA are better than either E or OCF in predicting future cash flows. |
| Arnold et al., 1991 | UK | 1965-84 | E, WCO, & OCF | WCO is better than either E or OCF in predicting future cash flows |
| Lorek et al., 1993 | US | 1976-84 | E & OCF | Quarterly OCF data is better than models used in Wilson (1986, & 1987) in predicting future cash flows. |
| Finger, 1994 | US | 1935-87 | E & OCF | OCF is better than E in predicting future cash flows. |
| Lorek and Willinger, 1996 | US | 1979-91 | OI, OCF, AR, AP, & INV | A Model containing OI, OCF, AR, AP, and INV together is better than a model based only on past OCF data, in predicting future cash flows. |
| Dechow et al., 1998 | US | 1963-92 | E & OCF | E is better than OCF in predicting future cash flows. |
| Barth et al., 2001 | US | 1987-96 | E, OCF, AGGACC, AR, AP, INV, and DEP | OCF is better than E in explaining the variation in future cash flows. Accruals and OCF together are better either than E alone or OCF alone in explaining the variation in future cash flows. |

E= Earnings. EDA= net income plus depreciation and amortization, WCO= working capital from operating, OCF= operating cash flows, CAI= cash flow after investment. NQA= net quick assets. OI= operating income. AR= accounts receivable, AP= accounts payable, INV= inventory. AGGACC= aggregate accruals.

## 3.4 Summary and Conclusion

This chapter reviewed the empirical studies that examined the incremental information content of earnings' components. For the purpose of clarification, these studies were grouped into two main categories according to the method used: share-price related studies and predictive studies.

The results of share-price studies were inconclusive regarding the usefulness of cash flow and accruals. These studies assumed that the share price efficiently reflects all the expected future cash flows. This assumption has to be questioned since a number of studies have concluded that markets are not efficient, so the inference of share-price studies about the usefulness of cash flow is questionable. In addition, the share-price studies assume that equity investors are the main users of accounting information so the value relevance of earnings' components should be measured by its association with share price. This assumption contradicts accounting setters who state that the objective of accounting information, such as earnings and cash flow, is to help a varied range of decision makers.

Predictive studies on the other hand do not assume either market efficiency or that equity investors are the only users. The results of these studies (i.e. predictive studies) generally indicate that cash flow and accruals together are the best predictor for future cash flow. In other words, the results indicate that the components of earnings have incremental information content beyond each other. Regarding the value relevance of earnings versus cash flows, the results were inconclusive. Some studies revealed that earnings is better than current cash flow in predicting future cash flow (e.g. Dechow et al., 1998), and other studies revealed that cash flow is better. (e.g., Barth et al. (2001) Finger, (1994))

In general the empirical studies (i.e. share-price and predictive studies) reported mixed results on the value relevance of cash flow and accruals. The results of these studies also revealed that the value relevance of cash flow is affected by contextual variable such as the magnitude of accruals and earnings, which provides some explanation as to why some studies may fail in detecting the value relevance of cash flow data.

Finally, it must be noted here that most researchers had to calculate their own estimates of operating cash flows from existing accounting disclosures, pre-assuming that there is articulation between cash flow and income statements and the balance sheet. This procedure is likely to have been a source of measurement error. Recent evidence shows that there is no such articulation, which calls into question the results of these studies. According to Bahnson et al. (1996), for different reasons cash flow does not always articulate with income statements and balance sheets. They point out that the measurement error produced from estimating operating cash flow may be the reason why prior studies failed to detect the information content of cash flows. They called for replication of prior studies using reported instead of derived cash flow data. They stated that:

> *While it is possible that future research based on reported OCF will not reverse the findings of these earlier studies, the fact remains that the literature is deficient until that research is replicated with reported measure instead of estimates. The authors of those studies (or other researchers) may wish to repeat them using reported OCF instead of Cleary questionable estimates that were originally used. Until these new studies are performed, the usefulness of the original findings is suspected* (p.8)

Cheng et al. (1997) empirically examined the arguments of Bahnson et al. They used US data over the period 1988-1993. In the first stage they examined the incremental information content of reported cash flow beyond earnings. As in Ali (1994) they used a multivariate model based on the level and the change in earnings and reported operating cash flow. The results indicated that earnings and reported operating cash flow have incremental information content beyond each other. Earnings and reported operating cash flow had a significant positive relation with unexpected returns.

In the second stage they replaced reported operating cash flow with derived cash flow from income statement and balance sheet data. The results revealed that the estimated operating cash flow have incremental information content beyond earnings. Finally, they examined the incremental information content of estimated operating cash flow beyond reported cash flow. They used a multivariate model which contained earnings, estimated and reported operating cash flow numbers. The results revealed that estimated operating cash flow numbers have no incremental information content beyond earnings after controlling for reported operating cash flow. In addition, estimated operating cash flow had an insignificant relation with annual unexpected returns while reported operating cash flow had a positive significant relation.

Overall, based on the evidence reported in this chapter, the general conclusion can be made that the issue of the value relevance of earnings, cash flows and accruals are far from fully resolved, particularly in UK. More evidence that takes into new innovations (i.e. predictive method, actual cash flow data, and the effect of contextual factors) is needed to better understand whether the decomposition of earnings into its

components will provide new information to the users of financial accounting statements.

# Chapter 4

# Research Methodology

## 4.1 Introduction

As can be noted from the previous chapter, two main methods have been used to examine the usefulness of earnings, accruals, and cash flow data. Share-price and predictive studies can provide different results regarding value relevance, as noted in Barth et al. (2001); however, use of the predictive method to evaluate the value relevance of UK cash flows is very limited[1]. This study will build upon the previous literature in that the predictive method will be used in order to examine the usefulness of earnings' components for UK firms.

Most prior studies that used UK data evaluated the value relevance for cash flow by using stock returns or share prices. According to Holthausen and Watt (2001), researchers use these criteria because they consider equity investors to be the main users of accounting numbers. However, accounting setters usually take a broader view. For instance, the Accounting Standard Committee (1975) published what is known as *a corporate report* which identified the main users of accounting data as follows: equity investors, loan creditors, employees, the analyst's advisor, the business contact group, the government, and the public including tax payers and consumers among others (Alexander and Britton, 1999, pp.9-17). Holthausen and Watts (2001) argued that the criteria used to evaluate the value relevance of

[1] There is no published UK study that used the predictive method to evaluate the value relevance of earning' components.

accounting information should be based on the objectives of this information as mentioned by accounting setters. With regard to cash flow statements, accounting setters assert that the main objective is to help accounting users in predicting future cash flows and to assess the financial position of a firm. Moreover, behavioural research results (e.g., Lee, (1981) and McEnroe (1989, 1996)) indicate that the main users of cash flow information are bankers and lenders. For these reasons, using actual future cash flow data as the focus of attention may be more appropriate than the stock price or stock return. Kothari (2001, p.171) in this context states:

> *An important stated objective of financial accounting standards is that information should be helpful to users in assessing the amount, timing, and uncertainty of future cash flows. An operational interpretation of this criterion is to compare performance measures on the basis of their correlation with future cash flows...if a researcher employs correlation with future cash flows as the criterion to evaluate alternative performance measures, then the performance measure's correlation with prices would serve as a complementary test*

The remainder of this chapter is structured as follows. Section 4.2 provides the theoretical framework for hypotheses development. Section 4.3 presents the OLS models used in testing the hypotheses. Section 4.4 presents fixed effects models used in testing the hypotheses. Section 4.5 provides a discussion of the measurement of variables and their definition. Section 4.6 discusses the sample selection procedures. Section 4.7 provides a discussion for the diagnostic test used in this study. Section 4.8

provides a discussion for the tools used in selecting between the models. Finally, section 4.9 summarizes the chapter.

## 4.2 Development of Hypotheses

A theoretical framework has been developed in a number of important US studies which examine the link between accounting data and future cash flows. The analysis starts by asserting that accounting accruals represent the difference between operating cash flows and earnings. Numerically this can be expressed in the following terms:

$$\textit{Cash flows}^2 = \textit{operating earnings} + \textit{depreciation charges} - \textit{increase in stocks} - \textit{Increase in debtors} + \textit{increase in creditors} \quad (4.1)$$

Accruals data are affected by many factors. Applying different accounting policies can result in measurement variations. For instance, depreciation charges can be affected by the evaluation of an asset's useful life, and the method of depreciation used. By applying accepted accounting policies, management can increase or decrease reported earnings for a particular fiscal year. For instance, revenue recognition implies that companies should report revenues as the goods are shipped or delivered to customers. Shipping goods before the end of the accounting period will increase the reported earnings for the current period, and delaying the shipping to the next period will decrease the reported earnings for the current period. The same applies to expenses: increasing the research and development expenses for this year will

[2] According to FRS1, operating cash flows can be prepared into two methods: direct and indirect. The above equation represents the indirect method. Fore more details see section 2.3.

decrease the current period reported earnings; while deferring them to next year will increase the reported earnings for the current period (see Penman, 2001, p.597).

As can be seen, earnings are vulnerable to management manipulation. This manipulation may not be easily detectable by investors or even by professional analysts. Hirst and Hopkins (2000) conducted experimental research to examine if buy-side analysts were able to detect management manipulation. Three hypothetical industrial companies were constructed. The companies were identical in all things except the amount and the source of earnings' growth. The first company reported zero growth in earnings during the previous three years. The second reported 11 percent growth for the previous three years as a result of selling available-for-sale securities and at the same time buying the same amount of marketable-securities. The third reported 11 percent growth in earnings during the previous three years as a result of increasing sales. The second company 'managed' its level of earnings by using accepted accounting policies which allowed it to recognize the holding gains for the available-for-sale securities as it sells them. The first company had the same holding gains but did not sell the securities.

Relevant data for these three companies, including the balance sheet and cash flow statements, were sent to 47 buy-side equity analysts and portfolio managers: each company's data were sent to 16 analysts, on average. The analysts were asked to provide their judgments on stock prices, reported earnings quality and the potential growth for these companies. The results revealed that the analysts failed to distinguish between the company that managed its reported earnings and the other two companies. For instance the expected stock prices and the potential growth for the second and the third companies were not significantly different.

Opportunistic manipulation, caused by the discretion of managers over accruals, also affects the quality of earnings. Green (1999) examined the effect of quality of earnings on the value relevance of UK cash flows disclosures. Green reported that if the quality of earnings is defined as the relation between profitability and cash generating ability, then the decomposition of earnings into cash flows and accruals has incremental information content beyond earnings data alone, when the relation between profit-generating ability and cash generating ability is low.

The above discussion reveals that earnings can be an unreliable indicator of future cash flows. However, the role of accruals is to comply with the revenue recognition and matching accounting principles. The revenue recognition principle implies that all revenues should be reported in income statements as soon as the services are performed. The matching principle requires companies to report the expenses that generated the revenues in the same period. The aim of these two principles is to allocate revenues and expenses to appropriate accounting periods, regardless of the actual dates for cash payments or receipts. Thus, accruals may give earnings an advantage over cash flows in predicting future cash flows. Actual cash flows may be more volatile, from a year-on-year perspective, than accounting earnings. This could lead to cash flow data being less useful than earnings, as a guide to future performance and cash flow generating ability.

Dechow et al. (1998) have provided the following theoretical framework.[3] It assumes that current earnings ($E_t$) are a constant proportion of current sales ($S_t$) and that sales follow a random walk.

$$E_t = \pi S_t \quad \text{and} \quad S_t = S_{t-1} + \varepsilon_t \tag{4.2}$$

[3] It is not my intention to present all of the theoretical workings here, but to provide a brief overview of the analysis. Interested readers are referred to the original article.

Where $\pi$ represents the constant proportion of sales (i.e. net profit margin on sales), and $\varepsilon$ is a random shock (change in sales) with a mean of zero. The model considers accounts receivable, accounts payable and inventory from the balance sheet. The change in accounts receivable depends on sales, and the change in accounts payable depends on the change in purchases. Purchases depend on the relevant period's inventory, which depends on next period expected sales, and any deviation of the target inventory from the actual inventory.

Dechow et al. show that cash flows can be represented as a function of earnings, and net operating cash flows resulting from combining the cash inflows from uncollected sales and the cash outflows from unpaid purchases. This is expressed in the following equation:

$$OCF_t = \pi S_t - [\alpha + (1-\pi)\gamma_1 - \beta(1-\pi)]\varepsilon_t + \gamma_1(1-\pi)[\beta + \gamma_2(1-\beta)]\Delta\varepsilon_t + \beta\gamma_1\gamma_2(1-\pi)\Delta\varepsilon_{t-1} \quad (4.3)$$

Where $\alpha$ is the proportion of sales remaining uncollected[4]; $\beta$ is the proportion of purchases remaining unpaid; $\gamma_1$ is a constant proportion of the next period's predicted cost of sales; $\gamma_2$ is a fraction of the current sales shock. The values of $\gamma_1$ and $\gamma_2$ reflect inventory policy:

> *We assume that a firm's inventory at the end of period t consists of a target level and a deviation from that target. Target inventory is a constant fraction $\gamma_1$ of next period's forecasted cost of sales.....$\gamma_2$ is a constant that captures the speed with which a firm adjusts its inventory to the target level. If $\gamma_2$ is 0*

[4] As Dechow et al. (1998, p.136) state, the relation between sales and cash flows from sales will not be one-to-one because many sales are made on credit. It is assumed that a fraction of these remain uncollected at the end of the year.

*the firm does not deviate from the target, while if $\gamma_2 = 1$, the firm makes no inventory adjustment.* (Dechow et al., 1998, p.136)

In their conclusion, Dechow et al. (1998) ignored the effect of changes in accruals resulting from the current shock to sales, and changes in shocks from lagged periods (the third and the fourth parts in equation 3). They suggest that empirically these two terms are close to zero, and if it is assumed that the shock term $\gamma_t$ has a prior-period expected value of zero and is uncorrelated with future shocks, then the best prediction[5] of $OCF_{t+1}$ is $\pi S_t = E_t$. This suggests that current earnings are the best estimate of future cash flows.

Barth, Cram and Nelson (2001) (hence forth BCN) argued that this conclusion was based on assumptions with severe limitations. Equation 3 can be used to predict future cash flows as follows:

$$OCF_{t+1} = \pi S_{t+1} - [\alpha + (1-\pi)\gamma_1 - \beta(1-\pi)]\varepsilon_{t+1} + \gamma_1(1-\pi)[\beta + \gamma_2(1-\beta)]\Delta\varepsilon_{t+1} + \beta\gamma_1\gamma_2(1-\pi)\Delta\varepsilon_t \quad (4.4)$$

They pointed out that the expected change in the shock to sales ($\Delta\varepsilon_{t+1}$) equals the negative value of the current sales' shock ($-\varepsilon_t$), and the current change in the sales shock equals the difference between past and current sales shocks ($\Delta\varepsilon_t = \varepsilon_t - \varepsilon_{t-1}$): these values will only equal zero by chance. The inventory changes between two lags will affect the associated payments which are omitted in Dechow et al. (1998). Having reworked the model to account for their criticisms of the original study, they derive a term for the expected value of $OCF_{t+1}$, which includes $OCF_t$ and differenced

[5] That is to say, the time *t* expectation of $CF_{t+1}$.

values for three balance sheet accruals - accounts payable, accounts receivable and inventory. Thus, two major conclusions are drawn: (i) contrary to the conclusion of Dechow, et al. (1998), current cash flows is *not* an unbiased estimator for future cash flows, and (ii) there is likely to be incremental information in $OCF_t$ and certain individual components of accruals, with regard to the prediction of future cash flows ($OCF_{t+1}$).

Barth et al. (2001) also develop an algebraic model to explain the linkage between expected future cash flows, and the current values of earnings components. Interested readers are referred to the original article for the full workings – and to Dechow, et al (1998) who first introduced the model – but it can be noted here that the following equation is produced which explains expected future cash flows as a function of the change in accounts receivable (AR), accounts payable (AP) and inventory (INV).

$$E[OCF_{t+1}] = OCF_t + \{1-(1-\beta)\gamma_1.\gamma_2.(1-\pi).\alpha^{-1}\}.AR_t + (1-\beta).INV_t - AP_t \quad (4.5)$$

where $\alpha$ is the proportion of sales remaining uncollected; $\pi$ represents a constant proportion of sales (net profit margin on sales), $\beta$ is the proportion of purchases remaining unpaid; $\gamma_1$ is a constant proportion of the next period's predicted cost of sales; and $\gamma_2$ is a fraction of the current sales shock. The last two values, $\gamma_1$ and $\gamma_2$, reflect inventory policy (see also Dechow et al., 1998, p.136).

Given the assumptions of the Barth, et al. analysis, the model implies that expected future cash flows are a positive function of current cash flows, changes in

accounts receivable and inventory levels, and a negative function of changes in accounts payable.

The model does not include depreciation (DEP). However, Barth, et al. state that long term investments are normally made on the expectation that they will generate higher cash flows than would have been the case using the firm's existing asset base, and since depreciation is intended to help match the costs of investments to their benefits, they expect cash inflows for an investment to exceed depreciation (on average) and so there should be a positive association between $E[OCF_t]$ and DEP. This suggestion has support from a previous study, by Feltham and Ohlson (1996).

Thus, it is expected that future cash flows will be positively associated with current cash flows, depreciation and changes in inventory and accounts receivable. It is also expected that future cash flows will be negatively associated with the change in accounts payable. These expectations will be examined in the empirical analysis for this study.

To sum up, the analysis above is concerned with understanding the link between future cash flows, and current earnings data. Specifically, with regard to earnings it is possible to identify five major components — OCF, AR, AP, INV, and DEP — and then hypothesise the role of each with regard to future cash flows. This a major aim of this study to examine the explanatory power of these explanatory variables, i.e. the predictions gains from disaggregating earnings into its components parts.

Using the above framework, prior US and UK studies, which used the predictive method provide inconclusive results regarding the incremental information content of earnings, cash flows and accruals beyond earnings alone. There is evidence indicating that earnings alone is better than cash flows alone in predicting future cash

flows (e.g. Greenberg et al (1986), Dechow et al (1998)). Other studies suggest that previous working capital is better than cash flows or earnings in predicting future cash flows (e.g. Bowen et al (1986); Arnold et al (1991)). Finally, other studies conclude that a combination of current cash flow data and accruals data outperform earnings alone and cash flows alone in predicting future cash flows (e.g. Lorek and Willinger (1996); Barth et al. (2001)).

Building on the above theoretical framework, the following four hypotheses are developed (in alternative form) to test UK financial data, as FRS1 asserts that cash flows alone is not the best predictor for future cash flows but a combination of cash flow data and accruals is considered a better predictor than any other single variable.

**H 1: The main two components of aggregate earnings together – cash flows and aggregate accruals- outperform earnings alone in explaining future cash flows.**

**H 2: The individual components of aggregate accruals (change in accounts payable, change in accounts receivable, change in inventory, and depreciation) have incremental information content beyond that existing in aggregate accruals.**

**H 3: cash flow data alone outperform earnings alone in explaining future cash flows.**

**H 4: A combination of cash flow data and the main components of accruals are the best predictor for future cash flows, relative to earnings and cash flows alone, or cash flows and aggregate accruals.**

## 4.3 Cash Flows Forecasting Model: OLS Frameworks

Testing the ability of earnings in predicting future cash flows requires a model that employs earnings as an independent variable (Bowen et al., 1986; Finger, 1994; Dechow et al., 1998; BCN). In general this model is:

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \qquad \text{[Model 1]}$$

$OCF_{t+j}$ is future operating cash flows at one-year, two –year or three year ahead. $E_t$ is current earnings. To examine whether the main two components of earnings –cash flows and aggregate accruals- have incremental information content beyond earnings alone, model 2 is introduced:

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \qquad \text{[Model 2]}$$

AGGACC is aggregate accruals. This model is derived from model 1 by replacing aggregate earnings with its main components which are operating cash flows and aggregate accruals.

To examine the incremental information content of the components of accruals, following BCN[6] model 2 is transformed into the following model:

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \qquad \text{[Model 3]}$$

[6] There are another studies provide models where a combination of cash flows and accruals data are used as independent variables e.g. Wilson (1986, 1987) and Lorek and Willinger (1996). However, The model used in BCN is adopted here because it helps in achieving different aims. Fore instance, this model is used as test for the incremental information content of aggregate accruals. It is also used as tool to test FRS 1 claim as the model contains variables from income statements (*DEP*) and balance sheets (*AP, AR, INV*).

*AP, AR, INV, DEP,* and *OTHER* are change in accounts payable, change in accounts receivable, change in inventory, depreciation, and other accruals, respectively.

Finally, testing the ability of cash flows in predicting future cash flows can be achieved by employing the following model (Finger (1994), Dechow et al (1998):

$$OCF_{i,t+j} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+j} \qquad \text{[Model 4]}$$

Models 1 to 4 use accounting data for year *t* to explain operating cash flows for future period's *t+1, t+2* and *t+3*. Since this study deals with cash flow data disclosed under FRS1 (1991, revised 1996) the time series of observations-per-firm is relatively short, and so this study does not utilize horizons beyond *t+3*. However, this is not a major limitation. Firstly, even the US study by BCN, which has a larger sample of firms, limits the horizon to *t+4* (see Barth, et al., Table 7). Secondly, an inspection of any database of analysts' forecasts (e.g. I/B/E/S) reveals that few analysts provide detailed projections of corporate performance more than two years beyond a company's current fiscal year.

## 4.4 Cash Flow Forecasting Model: Panel Data Analysis

The data set used for this study is pooled across firms and years. It can be considered an unbalanced panel data set, since not all firms provide data for all years between 1991 and 2000. The OLS regression models described in the previous section assume that model parameters remain constant across all firms. If there are systematic differences between firms, then the disturbance terms across the whole data set will not fulfil the assumptions required for OLS estimation.

A popular method for dealing with firm-specific variation within a panel of data is the fixed effects approach to model estimation. This procedure allows the intercept term within a regression model to vary across individual firms, while the slopes remain constant across all observations. The significance of group effects (i.e. firm specific differences) can be tested using an F-test of the null-hypothesis that all intercepts are the same (see Greene, 1997, p. 617).

Another popular alternative estimation method is the random effects model. This is also appropriate for panel data. In the random effects model, it is assumed that there is a single common intercept term, but that the intercepts for individual firms vary from this common intercept in a random manner. While the distinction between the fixed effects and random effects model may be explained in theoretical terms, when analyzing actual economic data sets it is not always obvious which model best suits the underlying data profile. The following extract from Greene (1997, pp.632-33) relates to this issue:

> *It has been suggested that the distinction between fixed and random effects models is an erroneous interpretation. Mundlak (1978) argues that we should always treat the individual effects as random. ..... On the other hand, the fixed effects approach has one considerable virtue. There is no justification for treating the individual effects as uncorrelated with the regressors, as is assumed in the random effects model.*

A test for the null hypothesis of no correlation has been developed by Hausman (1978). The test statistic is asymptotically distributed as chi-squared and the test is based on the Wald criterion (Greene, 1997, p. 633).

The same OLS models will be re-estimated under panel data methods, however, as these methods allow for the intercept to vary across firms the form of the models 1 to 4 will be:

$$OCF_{i,t+j} = \alpha_{0,i} + \alpha_1 E_{i,t} + u_{i,t+j} \quad \text{[Model 1P]}$$

$$OCF_{i,t+j} = \beta_{0,i} + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \quad \text{[Model 2P]}$$

$$OCF_{i,t+j} = \gamma_{0,i} + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3P]}$$

$$OCF_{i,t+j} = \delta_{0,t} + \delta_1 OCF_{i,t} + \mu_{i,t+j} \quad \text{[Model 4P]}$$

## 4.5 Variables Measurement and Definition

In this study, all the variables used in the models are extracted from Cash Flow Statements, and Income Statements. These variables have been taken from the financial database, *Datastream*. The variables and their definition are as defined by Datastream. All Datastream codes are given in parentheses.

*OCF*: Operating cash flows which equals net cash inflow/outflow minus cash from non-operating activities, (1015 = 1009 – 1014).

*E*: earnings, defined as after tax profit adjusted for exceptional/extraordinary items, non-operating provisions and exchange profits/losses, (175 = 155+ [156 or 622]-172. Where item 155 is pre-tax profit (excluding associates), item (622) 156 is associates pre-tax profit, and item 172 is total tax charge (adjusted)

*AP*: accounts payable that show the increase or decrease in creditors during the year,(417).

*INV*: change in stock, (445).

*AR*: change in accounts receivable, (448).

*DEP*: depreciation on tangible assets, (402).

*Aggacc*: total accrual, which is calculated manually based on the following equation:

$$Aggacc = E - OCF$$

*OTHER*: represent other accruals. Following BCN it is defined as follows:

$$OTHER = E - (OCF + AR + INV - AP - DEP)$$

For the empirical analysis employed here, earnings are defined as after-tax profit, adjusted for items which do not relate to the normal trading activities of the company. Specifically, this excludes extraordinary items and income from discontinued operations to be consistent with the definition employed in recent US studies (e.g. Barth, et al. 2001). However, a question which arises is whether or not the general findings of such studies are unduly sensitive to earnings definitions.

One study of this problem is provided by Dechow (1994, pp.33-35) which examines the impact of one-off changes on the relationship between earnings changes and stock returns (reflecting information about for future cash flows). She finds that the inclusion of such one-off changes reduces the association, and so it makes sense for extraordinary items and discontinued operations to be excluded from any earnings definition employed here. However, it should also be noted that while Dechow finds that variations in earnings definitions may impact on the strength of the association, it does not affect the direction (i.e. the sign) of the relationship. Thus, positive associations are reported across all test periods (see Table 8).

Following on from this last point, the UK study by Charitou, et al. (2001) also examines the issue of earnings definition, with regard to its association with future

cash flows (as proxied by stock returns). Their main analysis employs a measure of operating earnings from the Global Vantage database, defined as net income before extraordinary items, discontinued operations, special and non-operating items. However, they go on to note that:

> *"This earnings variable differs slightly from that used by ... [US researchers]. We reran several regressions using an earnings before extraordinary items variable broadly comparable to that used by ... [US researchers] and found no qualitative differences in our results." (p.590).*

As a result, they conclude that such tests are not significantly affected by such minor differences in earnings definitions. So both Dechow (1994) and Charitou, et al. (2001) find that minor differences in earnings definitions do not materially affect the direction of associations (with regard to cash flow proxies) or the overall conclusions drawn from such studies.

Following prior studies such as Garrod et al (2000), all the variables of the study are deflated by the number of outstanding ordinary shares at the end of the financial year. The number of outstanding ordinary shares is obtained from Datastream (item code: 301).

## 4.6 Sample Selection

The study sample consists of all non-financial UK companies listed on the London Stock Exchange for the period 1991 to 2000. To avoid survivorship bias, the sample includes all firms that left the listing some time during this period. This is because one of the aims of this study is to examine the effect of a firm's financial position on the value relevance of earnings, cash flows and accruals. The data is also not restricted to any firm size or financial year-end date. Restricting the sample to December year end causes the sample to be biased toward larger firms as indicated by Strong and Walker (1993). Excluding financial companies is in-line with all prior market-based-research studies. This exclusion is due to the variation between the components of financial statements between industrial and financial companies. UK companies started publishing cash flow statements in accordance with FRS1 in 1992, but some companies voluntary published these in 1991. These are included here also.

The original number of observations of the sample was 13,113. The observations are excluded if:

1. The company does not report cash flow statements for two successive years, $t+1$ and $t$. (5690 observations are)
2. Any of the components of accruals, *AR*, *AP*, *INV*, *DEP*, is not reported in cash flows statements for year $t$. (115 observations)
3. The absolute standardized residual for all the models is more than 3. ( 117 observations)

After applying the above criteria, the original number of observations reduced to 7191 when predicting one-year ahead. When predicting two-years and three-years ahead, the number of observations reduced to 5977 and 4857, respectively.

## 4.7 Diagnostic Test

This study uses pooled cross sectional data in order to test the hypotheses of the study. This procedure implies some limitations. For instance the pooled regression assumes that coefficients are constant over time and across firms. This assumption may affect the relation between the variables of the study[7]. Another problem caused by using cross sectional analysis is heteroscedasticity. To reduce this problem all the variables of the study are deflated by the number of outstanding shares at the end of the accounting period. In addition, White's (1980) heteroscedasticity-corrected variances and standard errors are computed to generate robust t-values[8].

Models may also suffer from multicollinearity and autocorrelation problems. Regarding autocorrelation, the Durbin – Watson test is used. The d factor is generally around two, which indicates that there is no first- order autocorrelation, either positive or negative (Gujarati, 1995, p.423). In detecting multicollinearity there are many methods mentioned in econometric theory. One popular method is the variance inflation factor (VIF). The variance inflation factor (VIF) has been calculated and the results show, in general, there is no serious multicollinearity. In fact the values of VIF for most variables are less than 10, which is acceptable (Gujarati, 1995,p.338). However, this measure alone is not sufficient for detecting multicollinearity, as high multicollinearity — as measured by high VIF — might not cause high standard errors (Gujarati, 1995, p. 339). A superior method by which to assess multicollinearity is the *condition number* proposed by Belsley et al. (1980). Values greater than 20 are generally considered to indicate potential problems with multicollinearity (see

[7] This problem is been partially solved by using panel data framework as it is mentioned in section 4.4. In addition in the next chapter a time trend is added to the models to control the noise caused by the variation in year.

[8] The White (1980) is also used to generate robust t-value in panel data method (e.g. fixed effect regression). see Greene, 1997, pp. 635-36.

Greene, 1997: pp. 40 and 422-23). The condition number is used in this study as the main indicator for multicollinearity. The condition numbers reported in this study reveal that there is no serious multicollinearity problem in the data[9].

## 4.8 Hypotheses Testing

The usefulness of the variables in this study is measured by its ability in explaining the variation in future cash flows. Therefore, the objective of this study is to select the model that has the greatest ability in explaining the variation in future cash flows. If earnings alone explain more of the cash flow variation than cash flows and aggregate accruals together, then decomposing earnings into cash flows and aggregate accruals adds no information beyond that exiting in aggregate earnings.

BCN compare the explanatory power of their models using the adjusted R-squared (adjusted $R^2$)[10]. While this metric of explanatory power is well understood and is popular in the literature, it has received criticism in some quarters. A common criticism is that it does not sufficiently penalize the addition of new variables: any new variable which generates a t-value in excess of unity tends to increase the adjusted $R^2$. Another alternative widely used measure is the *Akaike information criterion (AIC)*. AIC is calculated by using the following equation (Körösi et al, 1982, p. 186):

$$AIC = \frac{2}{T} LogL(\theta) + \frac{2}{T} K \qquad (4.6)$$

Where $L(\theta)$ denotes the (maximum) value of the likelihood function at $\theta$. $K$ is the number of regressors, $T$ is the number of observation. Larger/smaller values for AIC

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[9] Regarding panel data analysis, using panel data method by itself (e.g. fixed effects method) reduce classical econometric problem such as multicollinearity (Körösi et al, 1982, p. 194).
[10] Hence forth the term of adjusted $R^2$ and $R^2$ will be used interchangeably.

are associated with inferior/superior explanatory power. In order to provide more comprehensive evidence both adjusted $R^2$ and AIC will be employed in this study. A similar method is *the Schwarz information criterion.* This criterion is very similar to AIC and it will also used in the main analysis. However, as the adjusted $R^2$ is more common in use in prior studies, particularly BCN, and to avoid repetition in the case of similarity in the results, the discussion focuses only on the results of adjusted $R^2$.

Based on $R^2$ value, model 2 (for instance) is better than model 4 if it has larger $R^2$. This will imply that aggregate accruals have incremental information content beyond that existing in cash flows alone. However, this inference is not essentially true. This is because of the problem described earlier in this section. Numerically, the difference in $R^2$ between model 2 and model 4 is[11]:

$$R_2^2 - R_4^2 = \left(\hat{t}_2^{\,2} - 1\right)\frac{1 - R_2^2}{T - K + 1} \qquad (4.7)$$

Where $t$ is the t ratio for the new variable (aggregate accruals in the example). It can be seen that the increase in $R^2$ is possible although the new variable is not significant at reasonable probability levels i.e.0.01 and 0.05. In fact, the increase in $R^2$ will occur when t-value exceeds ±1 (Körösi et al, 1982, p. 186-187). However, the F test can be performed to capture any significant increase or decrease in $R^2$ as a result of adding or dropping variables. Using the same example, the difference in $R^2$ between model 2 and 4 can be examine using the F-test as follows (Gujarati, 1995, pp, 248-261):

$$F = \frac{(R_2^2 - R_4^2)/\,number\ of\ new\ regressors}{1 - R_2^2 \Big/ (n - number\ of\ parameters\ in\ the\ new\ \mathrm{mod}el)} \qquad (4.8)$$

If the F-value is significant at a reasonable level, then addition of aggregate accruals (*AGGACC*) provides incremental explanatory power beyond that already contained in

[11] It should be noted that model 2 is the general model and model 4 is the restricted one.

cash flow variables (*OCF*). However, this test is only applied if the models are nested e.g. model 4 is nested within model 2 because constraining AGGACC to be zero in model 2 reduces it to model 4. Non-nested model means that none of the models are nested within each other e.g. model 1 and model 4.

There are two methods that can be used in selecting between non-nested models: the discrimination approach and the encompassing approach. According to the discrimination approach, competing models are ranked according to the chosen criteria e.g. adjusted $R^2$, then the first ranked one will be the best one. The encompassing approach is based on the idea that a model can be considered superior to a rival model (s) if it can account for the salient features of rival model (s) (Harvey, 1990, chap. 5). The non-nested F-test, Cox type test, J-test, Vuong-test, and Biddle, Seow and Siegel (BSS-test) are examples of encompassing tests. However, the J-test (1981), Vuong-test (1989) and BSS-test (1995) are the most common methods in use in the studies that examined the information content of accounting measures.

The J-test was developed by Davidson and Mackinnon (1981). This test is implemented in two stages. Consider applying the J-test to determine whether *E* alone (model 1) is superior to *OCF* alone (model 4) in explaining future cash flows' variation. In the first stage, model 1 is estimated first to obtain the estimated future cash flows ($OCF_{t+1,E}$). Then running the following multiple regression of future cash flows ($OCF_{t+1}$) on cash flows (*OCF*) and estimated future cash flows ($OCF_{t+1,E}$),

$$OCF_{t,t+1} = \delta_0 + \delta_1 OCF_{t,t} + \lambda OCF_{t+1,E} + \mu_{t,t+1} \qquad (4.9)$$

Using the t-test, if the value of $\lambda=0$ this implies that *E* does not have any information about future cash flows that does not already exists in *OCF*. In the next stage, model 4 is estimated first to obtain the estimated future cash flows ($OCF_{t+1,\,OCF}$). Then running the following multiple regression of $OCF_{t+1}$ on E and $OCF_{t+1,OCF}$,

$$OCF_{t,t+j} = \alpha_0 + \alpha_1 E_{t,t} + \chi OCF_{t+1,OCF} + u_{t,t+j} \qquad (4.10)$$

Again, based on the t-test, if the value of $\chi$=0 this implies that *OCF* has no incremental information content beyond that already existing in *E*. In these circumstances, the results of the J-test can not distinguish between the two models. In general, the possible results of performing equation 4.8 and 4.9 can be illustrated in following table:

| Hypothesis: $\lambda$=0 | Hypothesis: $\chi$=0 | |
|---|---|---|
| | Do not reject | Reject |
| Do not reject | Can not distinguish | Reject model 1 in favour of model 4 |
| Reject | Reject model 4 in favour of model 1 | Can not distinguish |

As can be seen, the results of the J-test are inconclusive either when $\lambda$ and $\chi$ are significant, or when $\lambda$ and $\chi$ are insignificant (Gujarati, 1995, pp. 490-494).

The Vuong- test proposed by Vuong (1989) aims to test the null hypothesis that the competing models have the same explanatory power with the alternative hypothesis that one of them is closer to a true model. This test allows for the competing models to have explanatory power but provides direction concerning which of them is better compared to the other.

The Vuong test is based on the Kullback-Leibler (1951)[12] information criteria. Vuong defines the KLIC as:

$$KLIC = E_0 [\log h_0 (Y_t|X_t)]. - E_0 [\log f (Y_t|X_t; 0*)] \qquad (4.11)$$

Where the first part of the equation is the true but unknown model and the second part is the expectation under the true model, and 0* are the pseudo-true values of 0 (the estimates of 0 when f (Yt|Xt ) is not the true model). Therefore, the model that

[12] The aim here is not to explain the theoretical frame work for this model, but to provide a simple explanation how this test is working and how it is been used in discriminating between the models used in this study. For more details see Vuong (1989), and Dechow (1994, appendix 2).

maximizes the second part of equation 4.10 should be chosen. In other words, the model (e.g. model 4) should be selected over the rival model (e.g. model 1) if the average log likelihood of model 4 is significantly greater than the average log likelihood of model 1. In order to examine whether model 4 is better than model 1, the actual Vuong's Z- test is calculated by following these steps (Vuong 1989, Dechow 1994, appendix 2).

First, the difference in log likelihood between model 4 and model 1 is computed as follows:

$$LR = \log[L(R_{OCF})] - \log[L(R_E)] \tag{4.12}$$

And then an estimate of the variance of LR, $\acute{\omega}^2$ is calculated:

$$\omega_n^2 = \frac{1}{n}\sum_{i=1}^{n}\left[\log(\sigma_{OCF}^2) - \frac{1}{2}\log(\sigma_E^2) + \frac{1}{2}\frac{(e_{OCFi})^2}{\sigma_{OCF}^2} - \frac{1}{2}\frac{(e_{Ei})^2}{\sigma_E^2}\right]^2 - \left[\frac{1}{n}LR\right]^2 \tag{4.13}$$

Where $\sigma^2_{OCF}$ and $\sigma^2_E$ are the residual variance of regressing future cash flows on cash flows and earnings, respectively, where $e_{OCF}$ and $e_E$ are the estimated residuals.

Finally, Vuong's Z-statistic is computed using the following equation:

$$Z = \frac{1}{\sqrt{n}}\frac{LR}{\omega_n} \tag{4.14}$$

As can be seen, the Vuong test statistic is simply the average log-likelihood ratio suitably normalized. As mentioned earlier, this test is directional. Considering model 4 and model 1 as our example, if the value of Z is positive and significant, the test indicates that model 4 is better than model 1 and therefore should be selected. On the other hand, if the value of Z is negative and significant, model 1 should be the selected one. Z will equal zero if the two competing model have the same explanatory power.

Vuong indicated that if competing models have different numbers of regressors, a correction should be made to equation 12. He also suggested one of the methods that corresponds either to Akaike (1973) or Schwarz (1978) information criteria. As in this study, the models 1 to 4 have different number of coefficients, the test is corrected for the degrees of freedom as follows:

$$L\overline{R} = \{\log[L(R_{\alpha CF})] - \log[L(R_E)]\} - \left[\log n\left(\frac{p}{2}\right) - \log n\left(\frac{g}{2}\right)\right] \qquad (4.15)$$

Where p and g are the number of estimated coefficients is model 4 and model 1 respectively. This correction corresponds to Schwarz (1978) information criteria[13].

A recent development model selection technique is the BSS-test (1995). This test aims to assess the relative information content. As in the Vuong-test, the BSS-test compares the ability of two explanatory variables (adjusted $R^2$) to explain the variation in the dependent variable (future cash flows, in this study).

As this study contains nested and non-nested models, the F and Vuong tests could be used. However, as the Vuong-test is valid for selecting between nested and non-nested models, it will be used in this study for sake of consistency[14].

## 4.9 Summary

This chapter provides the theoretical framework for hypothesis testing. It also explains the methods that will be used in the next chapter to examine the relative information content of the components of earnings. Finally, there is a discussion on the methods used in selecting the model that has more ability in explaining future cash flows. Chapter 5 provides a discussion of the empirical results based on the issues discussed in this chapter.

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[13] Akaike (1973) correction is p-g. Either using Akaike or Schwarz the inferences drawn in this study remain unchanged.
[14] Unreported F-tests between the nested models yield the same inferences.

# Chapter 5

# The Value Relevance of Earnings' Components

## 5.1 Introduction

The aim of this chapter is to report the main body of results for the study. The value relevance of earnings' components will be evaluated by measuring their ability in explaining the variation in future cash flows. Prior chapters provided the theoretical background for this subject. In this chapter the hypotheses that have already been developed in chapter 4 will be empirically tested.

Results reported in this chapter provide evidence that in the UK, the components of earnings have incremental information content beyond that which already exists in aggregate earnings. Furthermore, the components of earnings have incremental information beyond each other in predicting future cash flows. The results also provide empirical support for FRS1's claim that current cash flows and accruals are a better predictor of future cash flows than cash flows alone.

The remainder of this chapter is organized as follows: section 5.2 provides a discussion of the sample characteristics, section 5.3 provides empirical evidence on the value relevance of decomposing earnings into its components. This includes the results of analyzing models under both ordinary least squares (OLS) and fixed effects frameworks in order to provide a more comprehensive analysis. Section 5.4 provides a further examination of the results obtained in section 5.3 in terms of the incremental information content of accruals. Section 5.5 provides an empirical examination of

hypotheses 3. This includes comparing the value relevance of earnings and cash flows in predicting future cash flows. Section 5.6 provides empirical discussion of FRS1's claim. Section 5.7 provides more analysis by using first difference form. Finally section 5.8 summarizes the chapter.

## 5.2 Descriptive Statistics

Table 5.1 reports the characteristics for the variables used in this study. Panel A provides the descriptive statistics for the variables used in the models. The values of the variables have each been deflated by the number of shares outstanding at the end of each period consistent with Garrod et al.. The mean value of earnings (*E*) is 1.227 with the standard deviation 3.227. This value ranges from a minimum -39.05 to a maximum of 109.32, with a median of 0.689. Operating cash flows (*OCF*) has a mean value of 2.497 with a standard deviation of 5.366 and a median of 1.303. The minimum value is -29.147 and the maximum value is 159.165. Consistent with prior studies (for instance, Dechow (1994), Dechow et al. (1998), and BCN) these numbers reveal that *OCF* has a larger mean and median, with a larger standard deviation than *E*. This is primary because of accruals. Accruals reduce earnings' value, especially depreciation, and at the same time smooth earnings' values which as a result reduce earnings' volatility. Aggregate accruals (*AGGACC*) has a mean (median) value of -1.271(-0.641) with a standard deviation of 3.026. The components of short term accruals — change in accounts payable (*AP*), change in accounts receivable (*AR*), and change in inventory (*INV*) — have mean values of 0.323, 0.419, and 0.174 respectively with standard deviations 2.015, 2.039, and 1.435. The mean value of the

long term accruals component, depreciation (*DEP*), is 0.823 with a standard deviation of 1.499.

Panel B shows the correlation matrix for the set of independent variables. Earnings are significantly positively correlated with operating cash flow. Operating cash flow is significantly positively correlated with depreciation, and change in accounts payable, accounts receivable and inventory. On the other hand, aggregate accruals and other accruals are significantly negatively correlated with operating cash flow. The Pearson (*Spearman*) correlation coefficient between *OCF* and *AGGACC* is -0.85 *(-0.79)*. The correlation between *OCF* and the components of aggregate accruals are under 0.50 except for between *OCF* and *DEP* and *OTHER*. The correlation coefficients may suggest that there will be a multicollinearity problem. However, these correlations are not used to assess the potential problem of multicollinearity. Examining simple bivariate correlations in a conventional matrix does not take account of each variable's correlation with all other explanatory variables. Therefore, as discussed in chapter 4, the condition number is used in this study.

Finally, Panel C presents the bivariate correlation coefficients between one-year-ahead operating cash flow (the dependent variables for all forecasting models) and the independent variables. As can be seen, all the explanatory variables are significantly correlated with future cash flows. Current operating cash flows (*OCF*) have the highest Pearson (*Spearman*) correlation with future cash flow, 0.87 (*0.78*). Earnings (*E*) have a Pearson (*Spearman*) correlation coefficient of 0.83 (*0.77*). Aggregate accruals (*AGGACC*) and other accruals (*OTHER*) are negatively correlated with future cash flows.

# Table 5.1

## Descriptive Statistics
### (Sample of 7191 Firm-Year Observations, 1991-2000)

### Panel A: Descriptive Statistics

| Variable ** | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **E** | 1.23 | 0.69 | 3.23 | -39.05 | 109.31 |
| **OCF** | 2.49 | 1.30 | 5.37 | -29.15 | 159.16 |
| **AGGACC** | -1.27 | -0.64 | 3.03 | -53.42 | 26.43 |
| **AP** | 0.32 | 0.07 | 2.01 | -31.17 | 40.95 |
| **AR** | 0.422 | 0.09 | 2.04 | -18.89 | 39.55 |
| **INV** | 0.17 | 0.01 | 1.43 | -20.96 | 50.87 |
| **DEP** | 0.82 | 0.42 | 1.49 | 0.00 | 34.10 |
| **OTHER** | -0.72 | -0.35 | 1.72 | -49.02 | 16.42 |

### Panel B: Correlation Matrix between Independent Variables

Pearson Correlation Coefficient in Regular Type

*Spearman Rank (non-parametric) Correlation Coefficients in Italic*

| Variables | E | OCF | AGGACC | AP | AR | INV | DEP | OTHER |
|---|---|---|---|---|---|---|---|---|
| **E** | | 0.87* | -0.47* | 0.19* | 0.22* | 0.18* | 0.51* | -0.58* |
| **OCF** | *0.81** | | -0.85* | 0.25* | 0.06* | 0.01 | 0.68* | -0.69* |
| **AGGACC** | *-0.41** | *-0.79** | | -0.24* | 0.12* | 0.17* | -0.67* | 0.61* |
| **AP** | *0.21** | *0.22** | *-0.19** | | 0.62* | 0.31* | 0.12* | -0.13* |
| **AR** | *0.31** | *0.12** | *0.09** | *0.52** | | 0.13* | 0.16* | -0.22* |
| **INV** | *0.22** | *0.02** | *0.17** | *0.34** | *0.27** | | 0.10* | -0.24 |
| **DEP** | *0.59** | *0.69** | *-0.62** | *0.13** | *0.19** | *0.06** | | -0.44* |
| **OTHER** | *-0.67** | *-0.71** | *0.57** | *-0.17** | *-0.27** | *-0.19** | *-0.52** | |

# Table 5.1 Continued

## Panel C: Correlation Matrix between Dependent Variable ($OCF_{t+1}$) and Independent Variables

| Variable | E | OCF | AGGACC | AP | AR | INV | DEP | OTHER |
|---|---|---|---|---|---|---|---|---|
| $OCF_{t+1}$ | 0.835* | 0.869* | -0.649* | 0.185* | 0.181* | 0.096* | 0.66* | -0.645* |
| OCFt+1 | *0.77** | *0.781** | *-0.547** | *0.149** | *0.223** | *0.109** | *0.662** | *-0.66** |

** All the variables are deflated by the number of outstanding share.

*Indicates that a correlation coefficient is significant at the 0.01 level.

Where variables are defined as follows (*Datastream codes*) and are deflated by the number of ordinary share outstanding (*301*):

E=Earning= after-tax profit, adjusted for items, which do not relate to the normal trading activities of the company, net of adjusted tax (*175*).

OCF=Operating cash flows= net cash inflow/outflow from operating activities excluding non-operating activities (*1015 = 1009 – 1014*).

AP=Accounts payable=change in creditors during the year (*417*).

AR=Accounts receivable=change in debtors during the year (448).

INV=Inventory= change in inventory (*445*).

DEP: Depreciation on tangible assets. (*402*).

Aggacc=Aggregate accruals=E – OCF.

OTHER= Other accruals=E – (OCF+AR+INV-AP-DEP).

On the other hand, the individual components of accruals are positively correlated with future cash flows. It must be noted that the bivariate correlation coefficient of independent variables with the dependent variable do not provide reliable indicators of association in a manner which controls for additional explanatory variables. The main conclusions of this study will be derived from appropriate multivariate models, estimated using OLS and a fixed effects methodology.

Overall, the results reported in this section have a similar trend to the results obtained by BCN.

## 5.3 The Relative Ability of Accruals versus Earnings

As discussed in section 4.2.2, hypothesis 1 states that the predictive ability of operating cash flows and aggregate accruals together in predicting future cash flows is higher than it is for earnings alone. Hypothesis 2 predicts that more disaggregation for aggregate accruals is expected to improve the ability of a model in explaining the variation in future cash flows. These hypotheses are examined in this section by running the following pooled cross-sectional regressions under both OLS and fixed effects methodologies

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \qquad \text{[Model 1]}$$

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \qquad \text{[Model 2]}$$

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \qquad \text{[Model 3]}$$

Where $j$ is 1, 2, or 3. In Model 1 current earnings ($E$) is the independent variable. Model 2 contains aggregate accruals ($AGGACC$) in addition to current

operating cash flow (*OCF*). Model 2 is used to evaluate the usefulness of disaggregating earnings into operating cash flows and aggregate accruals, and it is also used to evaluate the contribution of aggregate accruals versus operating cash flow when they are used together in explaining the variation in future cash flow. Model 3 contains operating cash flow in addition to the main components of aggregate accruals: change in accounts payable (*AP*), change in accounts receivable (*AR*), change in inventory (*INV*), depreciation (*DEP*) and other accruals (*OTHER*). This model evaluates the value relevance of various accounting information (disaggregated accruals) extracted from the financial statements to predict future cash flows.

The next subsection provides a discussion of OLS results and subsection 5.3.2 provides a discussion of fixed effect's results.

### 5.3.1 The Results of OLS Estimation

Prior studies normally use OLS analysis (e.g. BCN). To provide comparable results with these studies the results of this section are reported under an OLS framework. Table 5.2, summarizes the results for the three models. Panels A, B and C provide, respectively, the results of regression one-year, two-year, and three- year ahead cash flows on current earnings, and cash flows and accruals. The Akaike information criterion (AIC), Schwarz information criterion (SIC), and adjusted $R^2$ are provided in addition to Vuong's Z-statistic to determine which model has more explanatory power. The values of the *condition number* (*CN*) also are provided as a diagnostic test of multicollinearity.

Before proceeding in examining hypotheses 1 and 2, it can be noted that *CN* statistics indicate that there is no serious multicollinearity in the models. The value of

*CN* ranges from 1.99 to 10.06. Also noticeable is that, in general, all the coefficients of the explanatory variables are significant at the 0.05 level and have the same reported signs as in BCN. Coefficients for *E*, *OCF*, *AR*, *INV* and *DEP* have significant positive signs while *AP* has a significant negative sign. BCN do not predict the sign of *AGGACC* and *OTHER*, however, their results reveal that the sign of these two variables are positive and significant which is consistent with the results of this study.

For comparison with the above results, the results of BCN are reproduced in Appendix A1. Finally, the general result is that there is a decrease in the explanatory power as the forecast horizon increases, consistent with BCN and Dechow, et al. (1998). This can be seen in the decrease in the values of $R^2$ and in the increase of the values of AIC and SIC. For instance, in Panel A the values of $R^2$, AIC and SIC for model 3 are 80.7%, 4.56, and 1.73 respectively. For the same model in Panel C, the value of $R^2$ falls to 61.8% and the values of AIC and SIC increase to 4.98 and 2.16 respectively. As the three criteria provide the same conclusion, the discussion will focus on $R^2$ values since it is the common tool in prior studies. However, if there is any conflict between these three tools, it will be highlighted.

Now, turning back to test hypotheses 1, the results as reported in Table 5.2 show that the $R^2$ for model 2 is larger than the $R^2$ for model 1, which indicates that the components of earnings have incremental information content. For instance, when $OCF_{t+1}$ is the dependent variable the $R^2$ for model 1 (earnings only) is 69.8% which increases to 78.1% when *E* is decomposed into *OCF* and AGGACC (model 2). However, the simple comparison between $R^2$ for the two models is not sufficient to provide a statistical comparison of the results. As discussed in section 4.4, Vuong's test provides a test of statistical inference for the results. For each Panel in Table 5.2, the incremental $R^2$ and the results of Vuong's test of the non-nested models are

## Table 5.2

## Summary results for regressions of future cash flows on current earnings, cash flows and accruals
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \quad \text{[Model 1]}$$

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \quad \text{[Model 2]}$$

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

### Panel A: Regression of earnings, cash flows and accruals with one-year -ahead cash flows

| | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC | SIC | CN | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | 0.89* | 1.39* | | | | | | | | 69.8 | 5.01 | 2.17 | 1.99 | 7191 |
| | (21.42) | (48.97) | | | | | | | | 16167 | | | | |
| Mode 2 | 0.47* | | 1.13* | 0.55* | | | | | | 78.1 | 4.68 | 1.85 | 4.71 | 7191 |
| | (12.24) | | (46.26) | (12.74) | | | | | | 12850 | | | | |
| Model 3 | 0.17* | | 0.98* | | -0.72* | 0.76* | 0.58* | 0.02 | 0.33* | 80.7 | 4.56 | 1.73 | 10.06 | 7191 |
| | (4.01) | | (28.93) | | (-12.1) | (12.94) | (6.84) | (0.35) | (3.14) | 5015 | | | | |
| | | | Model 2 vs. Model 1 | | | Model 3 vs. Model 2 | | | Model 3 vs. Model 1 | | | | | |
| Incremental $R^2$% | | | 8.3* | | | 2.6* | | | 10.9* | | | | | |
| Vuong's Z-statistics | | | 9.05 | | | 4.7 | | | 11 | | | | | |

## Table 5.2 Continued

### Panel B: regression of earnings, cash flows and accruals with two-year-ahead cash flows

| | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC | SBIC | CN | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | 0.97* | 1.43* | | | | | | | | *57.7 | 5.11 | 2.28 | 2.61 | 5977 |
| | (16.8) | (30.5) | | | | | | | | 8137 | | | | |
| Mode 2 | 0.59* | | 1.19* | 0.62* | | | | | | *65.5 | 4.91 | 2.07 | 6.64 | 5977 |
| | (10.12) | | (25.42) | (8.02) | | | | | | 5664 | | | | |
| Model 3 | 0.2* | | 0.93* | | -0.74* | 0.83* | 0.69* | 0.2** | 0.16 | *69.9 | 4.77 | 1.94 | 8.14 | 5977 |
| | (4.22) | | (22.1) | | (-10.1) | (10.46)0 | (8.93) | (2.17) | (1.61) | 2317 | | | | |
| | | | Model 2 vs. Model 1 | | | Model 3 vs. Model 2 | | | Model 3 vs. Model 1 | | | | | |
| Incremental $R^2$% | | | 7.8* | | | 4.4* | | | 12.2* | | | | | |
| Vuong's Z-statistics | | | 13.39 | | | 11.44 | | | 18 | | | | | |

## Table 5.2 Continued

### Panel C: Regression of earnings, cash flows and accruals with three-year -ahead cash flows

| | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC | SBIC | CN | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | 1.12* | 1.44* | | | | | | | | 49.5 | 5.26 | 2.43 | 2.67 | 4857 |
| | (16.3) | (23.1) | | | | | | | | 4762 | | | | |
| Mode 2 | 0.68* | | 1.16* | 0.51* | | | | | | 58.5 | 5.09 | 2.23 | 6.04 | 4857 |
| | (10.4) | | (20.6) | (5.81) | | | | | | 3428 | | | | |
| Model 3 | 0.35* | | 0.93* | | -0.65* | 0.67* | 0.66* | 0.31* | 0.18 | 61.8 | 4.98 | 2.16 | 8.67 | 4857 |
| | (5.7) | | (16) | | (-6.2) | (6.5) | (6.51) | (2.62) | (1.3) | 1313 | | | | |
| | | | Model 2 vs. Model 1 | | Model 3 vs. Model 2 | | | Model 3 vs. Model 1 | | | | | | |
| Incremental $R^2$% | | | 9* | | 3.3* | | | 12.3* | | | | | | |
| Vuong's Z-statistics | | | 12.64 | | 15.5 | | | 8.42 | | | | | | |

*Significant at level 0.01.

**Significant at level 0.05.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

Figures under line represent F-value.

Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

CN: is a condition number for multicollinearity diagnostic proposed by Belsley et al. (1980).

NOB: is the number of observations

presented. For instance in Panel A, the results show that the difference in $R^2$ between models 2 and 1 is 8.3% with Vuong's Z-statistic (9.05) which is significant at the 0.01 level. This leads to the conclusion that *OCF* and *AGGACC* together perform significantly better than *E* in predicting future cash flows. This conclusion remains unchanged for two-year or three-year ahead cash flows. For the comparison with the above results, the results of BNC are provided in Appendix A2. The $R^2$ for the BCN in A2 is lower than the $R^2$ for the models in this study. This difference may be due to differences in sample size, eliminating outliers and choice of deflator between two studies. BCN use 10,164 firm-year observations compared to 7,191 in this study. They also use different criteria in excluding outliers. They exclude all observations with sales less that $10 million, share price less than $1, earnings or cash flows in the upper and lower one percent of their distribution, and studentized residuals greater than three in absolute value. Whereas in this study only the observations with standardized residual greater than three in absolute value are excluded. Moreover, BCN use average total assets as the deflator whereas this study use the number of shares outstanding as this gives superior normalization than total assets[1]. Despite these differences, the tenor of the results as reported in this section are similar to those reported in BCN.

The above results confirm prior price-based studies' conclusions that decomposing earning into cash flows and accruals improves the ability of a model in explaining future cash flows (e.g. Wilson, (1986 and 1987); Guay and Sidhu (2001), McLeay et al. (1997); Green (1999), and Garrod et al. (2000)).

Hypothesis 2 implies that the components of aggregate accruals together (*AP*, *AR*, *INV*, *DEP*, and *OTHER*) have incremental information content beyond that

[1] I follow Garrod et al. (2001) in using the number of shares outstanding as deflator. However, the main inferences in this study are unaffected when the same criteria used in BCN used in this study. And they also remain unchanged when the average total assets is used as deflator.

existing in aggregate accruals. This hypothesis also implies that the predictive ability of cash flows and the components of aggregate accruals is more than for aggregate earnings alone.

The first implication is tested by comparing the adjusted $R^2$s of models 2 and 3. Again referring to Panel A, it can be seen that the adjusted $R^2$ of model 3 is 80.7%, which is more than the adjusted $R^2$ of model 2. Vuong's Z-statistic (4.7) reveals that the difference between the $R^2$s of these two models (2.6%) is significant at the 0.01 level. This leads to the conclusion that aggregate accruals mask the information content of individual accruals' components. This conclusion is not affected when predicting two-year or three-year ahead cash flows.

The second implication of hypothesis 2 is tested by comparing the $R^2$s of models 1 and 3. The result of the comparison reveals that model 3 is significantly better than model 1 in explaining one-year-ahead future cash flows. Again, the result remains unchanged when two-year or three-year ahead cash flow is the dependent variable. These results together lead to the acceptance of hypothesis 2, and to the conclusion that model 3 performs significantly better than models 1 or 2 in explaining the variation in future cash flows. Again, the tenor of this result is very close to that of BCN, as can be seen in Appendix A2.

Prior price-based studies that investigate the information content of accruals components usually decomposed total accruals into short and long term accruals, not individual components, which increases the difficulties of comparing the above results with these earlier studies' results. However, the results in Table 5.2 reveal that the components of short term accruals (*AP, AR, and INV*) are relevant as explanatory variables in explaining one-year, two-year and three-year ahead cash flows. On the other hand, the long-term accruals component (*DEP*) is relevant as an explanatory

variable when two-year or three-year ahead cash flows are the dependent variable. Furthermore, the coefficients' values of accruals' components indicate that short term accruals are valued more than long term accruals in explaining future cash flows. For instance, in Panel A the coefficients (and t-value) of *AP*, *AR*, *INV* and *DEP* are -0.72 (-12.1), 0.76 (12.94), and 0.58 (6.84), and 0.02 (0.35) respectively.

Overall, the results indicate that both short and long term accruals are useful in predicting future cash flows. This result is in line with some prior price-based US and UK studies (Guay and Sidhu, (2001); Board et al., (1989); McLeay et al., (1997)). At the same time the findings are contrary to other price-based US and UK studies (Rayburn, (1986); Dechow, (1994); Garrod et al., (2000)). Rayburn and Dechow reported in their studies that short term accruals have information content but long term accruals have no information content. Contrary to them, Garrod et al. reported that long term accruals have information content but short term accruals have no information content.

To sum up, the results in this section provide empirical evidence on the usefulness of decomposing earnings into operating cash flows and aggregate accruals. They also provide empirical evidence on the usefulness of decomposing aggregate accruals into its main components. BNC's results, reproduced in Appendices A1 and A2, reveal the same pattern.

### 5.3.2 The Results of Fixed Effects Estimation

As discussed in chapter 4, estimating models 1 to 3 using a fixed effects methodology aims to examine if the OLS results are sensitive to the validity of its assumption that intercept parameters are constant across firms. Table 5.3 presents the results of the fixed effects regression. Panels A, B and C provide the results for the regression of one-year, two-year and three-year- ahead cash flows on earnings, cash flows and accruals.

Before presenting a test of hypotheses 1 and 2 under the fixed effects framework, a test of the validity of using the fixed effects methodology is performed. In chapter 4, it is argued that the justification of using fixed effects method is that the parameters (intercept) of the models may vary across individual firms. This assumption can be empirically tested using the F-test of the null-hypothesis that all intercepts are the same (see Greene, 1997, p.617). It has also been mentioned in chapter 4 that a random effects method is considered an alternative analysis to capture firm specific effect. Random effects assume that there is no correlation between the individual effects and the explanatory variables. Hausman's (1978) test is used to examine the validity of this assumption on the data. This test statistic is asymptotically distributed as chi-squared and the test is based on the Wald criterion (Greene, 1997, p.633). In Table 5.3, columns 11 and 12 present the result of F and Hausman tests. As can be seen, the results reject the null hypotheses for all the models at the 0.01 level. In other words, the results support using the fixed effects method since there is variation in the intercepts and there is correlation between the individual effects and the regressors.

## Table 5.3

## Summary results for regressions of future cash flows on current earnings, cash flows and accruals by using fixed effects model

**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+j} = \alpha_{0,i} + \alpha_1 E_{i,t} + u_{i,t+j} \quad \text{[Model 1P]}$$

$$OCF_{i,t+j} = \beta_{0,i} + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \quad \text{[Model 2P]}$$

$$OCF_{i,t+j} = \gamma_{0,i} + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3P]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

### Panel A: Regression of earnings, cash flows and accruals with one-year -ahead cash flows

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.84* | | | | | | | | 83.1 | *5.9 | *20.7 | 7191 |
| | (11.54) | | | | | | | | | | | |
| **Mode 2P** | | 0.82* | 0.62* | | | | | | 83.66 | *3.11 | *29.8 | 7191 |
| | | (13.81) | (10.36) | | | | | | | | | |
| **Model 3P** | | 0.58* | | -0.67* | 0.63* | 0.57* | 0.39* | 0.2* | 85.48 | *3.05 | *89.8 | 7191 |
| | | (13.31) | | (-9.95) | (8.82) | (8.07) | (3.6) | (2.7) | | | | |

## Table 5.3 Continued

**Panel B: Regression of earnings, cash flows and accruals with two-year -ahead cash flows**

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.48* | | | | | | | | 81 | 7.73* | 60.1* | 5977 |
| | (7.9) | | | | | | | | | | | |
| **Mode 2P** | | 0.48* | 0.5* | | | | | | 81 | 5.48* | 111* | 5977 |
| | | (7.91) | (6.49) | | | | | | | | | |
| **Model 3P** | | 0.34* | | -0.39* | 0.55* | 0.36* | 0.15 | 0.17 | 81.7 | 4.51* | 112* | 5977 |
| | | (5.51) | | (-4.6) | (6.45) | (4.72) | (1.14) | (1.4) | | | | |

**Panel C: Regression of earnings, cash flows and accruals with three-year -ahead cash flows**

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.22* | | | | | | | | 81.5 | 9.31* | 67* | 4857 |
| | (3.43) | | | | | | | | | | | |
| **Mode 2P** | | 0.23* | 0.18** | | | | | | 81.5 | 6.97* | 93* | 4857 |
| | | (3.43) | (2.21) | | | | | | | | | |
| **Model 3P** | | 0.18* | | -0.17 | 0.16 | 0.16 | 0.07 | 0.07 | 81.5 | 6.12* | 105* | 4857 |
| | | (2.55) | | (-1.71) | (1.74) | (1.73) | (0.42) | (0.48) | | | | |

*Significant at level 0.01.

** Significant at level 0.05.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

A general overview of Table 5.3 reveals that the fixed effects method generates similar results to those produced by OLS analysis. All the explanatory variables for the models are significant at the 0.05 level and have the expected signs. Again, *E, OCF, AR, INV, DEP, AGGACC and OTHER* have positive signs while AP has a negative sign. It can also be seen that there is a decrease in the predictive ability of the models as the horizon increases to two-year and three-year ahead. For instance, the adjusted $R^2$s for model 3 are 85.5%, 81.7%, and 81.5% when predicting one-year, two-year, and three-year-ahead cash flow respectively.

The notable effect of using the fixed effects method is an increase in the explanatory power of the models as measured by adjusted $R^2$. Recalling from Table 5.2, Panel A, the adjusted $R^2$s of models 1, 2, and 3 are 69.8%, 78.1%, and 80.7% respectively. In Table 5.3, Panel A, it can be seen that $R^2$s for these models are 83.1%, 83.7%, and 85.5%. This increase is not a surprise as the fixed effects methodology controls the firm's specific effect by allowing the intercepts to vary across firms. A consequence of this process is to eliminate a large portion of the variation in $OCF_{t+1}$ which remained unexplained within the OLS framework.

As in section 5.3.1, testing hypothesis 1 is performed by comparing the adjusted $R^2$ of models 1 and 2[2]. Any increase in $R^2$ of model 2 over model 1 is considered as an indicator of incremental information content. However, under the fixed effect framework is not possible to perform Vuong's test to determine which model has significantly more explanatory power. This is because the Vuong's test is based on loglikehold ratios, which can not be computed under the fixed effects method. As can be seen in Panel A, the $R^2$ of model 1 is 83.1% and increases to 83.7% when aggregate earnings decomposed into cash flows and aggregate accruals.

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[2] AIC and SBIC can not be calculated under the fixed effects method.

It can be seen also that the coefficients (t-value) of *OCF* and *AGGACC* respectively are 0.82 (13.81) and 0.62 (10.36), which are significant at the 0.01 level. The results in Panels B and C in the same table reveal that decomposing *E* into *OCF* and *AGGACC* generates no increase in adjusted $R^2$. However, the coefficients of *OCF* and *AGGACC* remain positive and significant at level 0.01. Comparing this result to the one reported in Table 5.2 indicates that the gain of disaggregating *E* into *OCF* and *AGGACC* is less notable under the fixed effects framework. This may suggest that the value relevance of disaggregating earnings is conditional on a firm's characteristics[3]. Overall the results of the fixed effects methodology provide support for the previous OLS results in that *OCF* and *AGGACC* together perform better than *E* in predicting future cash flows.

Regarding hypothesis 3, the adjusted $R^2$ of model 3 is greater than it is for models 1 and 2 when the dependent variable is $OCF_{t+1}$ or $OCF_{t+2}$. In Panel C, the results reveal that model 3 is not better than model 1 or model 2 in explaining $OCF_{t+3}$. This result, in general, supports the OLS result in that model 3 is better than the other two models in explaining future cash flows although the superiority is reduced. This result gives another indication on the effect of a firm's characteristics on the value relevance of earnings' decomposition.

The results as presented in Table 5.3 also confirm the OLS result that short and long-term accruals have information content in predicting future cash flows. They also support the original results in that short term accruals are valued more than long-term accruals. It can be seen that the coefficients of all short-term accruals' components (*AP, AR, and INV*) are significant while the coefficient of long-term accruals (*DEP*) is only significant when $OCF_{t+1}$ is the dependent variable.

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[3] This issue will be discussed later in the next chapter.

Though the fixed effects procedure allows for the intercepts to vary across firms, time trends in the level of cash flows represent another possible source of variation in the models. One approach to this issue is simply to introduce year-specific dummy variables to capture year-on-year variations. This makes sense if there are no prior beliefs about the direction or nature of this temporal variation. However, it makes sense to represent temporal variation through a single trend variable in this study. The period 1991-2000 saw the UK economy emerging from a deep recession, and this growth appears to be reflected in the levels of companies' cash flows. If *OCF* is regressed on a measure of time (i.e. *YEAR*), the coefficient (t-value) of time measure is 0.064 (2.42) which is significant at a 0.01 level.

Models 1, 2 and 3 are re-estimated controlling for firm effects and the time trend. As in the previous methods future operating cash flows for one-year-ahead, two-year-ahead and three-year-ahead are all used as the dependent variables in these models. The results are presented in Table 5.4. As can be seen, the results of the F and Hausman tests support usage of the fixed effects method. Consistent with expectations, the coefficient of the time variable (*YEAR*) is significantly positive for all the models. The results also reveal that including a trend variable *YEAR* generates an increase in adjusted $R^2$ in models 1, 2, and 3, albeit by a small amount. For instance the $R^2$ for model 2 increases to 83.14%. Overall, adding a time trend variable (*YEAR*) to the models 1 to 3 improves the ability of the models and at the same time the results of the original OLS analysis remain unchanged.

To sum up, the results of this section confirm the conclusions of prior studies, both predictive and price-based studies, in that earnings components (cash flows and accruals) have incremental information content over that existing in aggregate earnings alone. The results also reveal that employing a fixed effects methodology

improves significantly the ability of models 1, 2, and 3 in explaining the variation in future cash flows. However, model 1 shows the highest and more notable improvement in adjusted $R^2$. This leads to a notable decrease of the superiority of model 2 and 3 over model 1. Finally, the above results provide an earlier indication that a firm's characteristics may impact on value relevance of decomposing earnings into its components.

## Table 5.4

**Summary results for regressions of future cash flows on current earnings, cash flows and accruals, and time trend by using fixed effects model**
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+j} = \alpha_{0,i} + \alpha_1 E_{i,t} + \alpha_2 YEAR_{i,t} + u_{i,t+j} \quad \text{[Model 1P]}$$

$$OCF_{i,t+j} = \beta_{0,i} + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + \beta_3 YEAR_{i,t} + u_{i,t+j} \quad \text{[Model 2P]}$$

$$OCF_{i,t+j} = \gamma_{0,i} + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + \gamma_7 YEAR_{i,t} + u_{i,t+j} \quad \text{[Model 3P]}$$

**Panel A: Regression of earnings, cash flows and accruals, and time trend with one-year -ahead cash flows**

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.83* | | | | | | | | 0.05* | 83.1 | 5.93* | 63.4* | 7191 |
| | (11.19) | | | | | | | | (4.26) | | | | |
| **Mode 2P** | | 0.8* | 0.61* | | | | | | 0.05* | 83.7 | 3.13* | 61.2* | 7191 |
| | | (13.33) | (10.13) | | | | | | (3.65) | | | | |
| **Model 3P** | | 0.58* | | -0.66* | 0.62* | 0.57* | 0.39* | 0.2* | 0.02* | 85.5 | 3.04* | 95.9* | 7191 |
| | | (13.08) | | (-9.83) | (8.82) | (7.99) | (3.57) | (2.68) | (1.55) | | | | |

## Table 5.4 Continued

**Panel B: Regression of earnings, cash flows and accruals, and time trend with two-year -ahead cash flows**

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.46* | | | | | | | | 0.07* | 81.1 | 7.78* | 98.8* | 5977 |
| | (7.36) | | | | | | | | (4.54) | | | | |
| **Mode 2P** | | 0.46* | 0.48* | | | | | | 0.07* | 81.1 | 5.53* | 154* | 5977 |
| | | (7.36) | (6.15) | | | | | | (4.57) | | | | |
| **Model 3P** | | 0.32* | | -0.37* | 0.54* | 0.34* | 0.16 | 0.15 | 0.06* | 81.8 | 4.53* | 145* | 5977 |
| | | (5.08) | | (-4.33) | (6.21) | (4.37) | (1.19) | (1.27) | (4.1) | | | | |

**Panel C: Regression of earnings, cash flows and accruals, and time trend with three-year -ahead cash flows**

| | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1P** | 0.2* | | | | | | | | 0.07* | 81.5 | 9.32* | 100* | 4857 |
| | (2.99) | | | | | | | | (3.56) | | | | |
| **Mode 2P** | | 0.2* | 0.15* | | | | | | 0.07* | 81.6 | 7* | 125* | 4857 |
| | | (2.99) | (1.87) | | | | | | (3.55) | | | | |
| **Model 3P** | | 0.16* | | -0.15 | 0.14 | 0.14 | 0.08 | 0.06 | 0.07* | 81.6 | 6.14* | 154* | 4857 |
| | | (2.21) | | (-1.49) | (1.5) | (1.44) | (0.5) | (0.37) | (3.47) | | | | |

* Significant at 0.01.level.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## 5.4 The Incremental Information Content of Accruals

The discussion in the previous section reveals that the components of accruals have incremental information content beyond aggregate accruals, and these components jointly with cash flows have incremental information content beyond that existing in aggregate earnings. The results also reveal that these components, short and long term accruals, have information content in predicting future cash flows. However, there is no direct evidence on the incremental information for accruals over aggregate earnings. Previous models (2 and 3) contain *OCF* as an explanatory variable so it is not clear if the increase in adjusted $R^2$ is a result of decomposing accruals into its components or a result of separating *OCF* from *E*. To provide direct evidence on the importance of separating accruals from aggregate earnings, the following three models are created based on model 1[4]:

$$OCF_{t+1} = \alpha_{0,i} + \alpha_1 E_t + \alpha_2 AR + \alpha_3 INV + \alpha_4 AP + \varepsilon_{t+1} \quad \text{[Model 1a]}$$

$$OCF_{t+1} = \alpha_{0,i} + \alpha_1 E_t + \alpha_2 DEP + \varepsilon_{t+1} \quad \text{[Model 1b]}$$

$$OCF_{t+j} = \alpha_{0,i} + \alpha_1 E_t + \alpha_2 AR + \alpha_3\ INV + \alpha_4 AP + \alpha_5 DEP + \varepsilon_{t+j} \quad \text{[Model 1c]}$$

Where *j=1, 2, 3* and the variables are defined thus: operating cash flows *(OCF);* earnings *(E);* change in accounts payable *(AP*); change in accounts receivable *(AR);* change in inventory *(INV);* and depreciation *(DEP).* All the variables are deflated by the number of outstanding ordinary shares.

As can be seen, there is no direct explanatory role for current *OCF* in the above three models, all of which are variation on model 1. Model 1a is designed to evaluate the incremental information content for the components of short term

[4] The explanatory variable OTHER is excluded from the models because: (1) its components are mixed between short and long term accruals; (2) it was included in the original model because none of the other explanatory variables include this data, but earnings (E) do include it implicitly.

accruals over earnings. Model 1b is used to determine if long term accruals have incremental information content beyond which already exists in earnings. Finally, model 1c is introduced to examine if short term accruals (long term accruals) have incremental information content beyond that which exists in long term accruals (short term accruals).

The results in the previous section reveal that controlling for firm specific effects and time trends improves the ability of models in explaining future cash flows. Following this line, models 1a, 1b and 1c are estimated with the fixed effects method and with adding the trend variable (*YEAR*) to each model. The results of these estimations are presented in Table 5.5. For the sake of brevity, the results of two-year and three -year-ahead cash flows for model 1c are only included in Table 5.5. The results of model 1P (earnings only) which have been presented already are included again in Table 5.5 as a point of reference.

Panel A in the table provides the results of running the models when $OCF_{t+1}$ is the dependent variable. As can be seen, adding *AP*, *AR*, and *INV* to the model 1 leads to a small increase in the adjusted $R^2$ from 83.14% to 83.23%. The signs of the coefficients are consistent with those reported in the original analysis. The coefficients on *E*, *AR*, *INV*, and time trend variable (*YEAR*) are positive and the coefficient on *AP* is negative. While the coefficients of *E*, *AP* and *YEAR* are all significant at the 0.05 level, the coefficient of *AR* and *INV* are not significant at any reasonable probability level. In general, the results reveal that short term accruals have information content beyond that which exists in aggregate earnings. In model 1b, there is a larger increase as a result of adding *DEP* to model 1 than occurs for the short-term accruals components. The $R^2$ increases from 83.14% to 84.9%. As in the prior analysis, the coefficients of *E*, *DEP*, and *YEAR* are all positive and significant at

## Table 5.5

## Summary results for regressions of future cash flows on earnings, accruals and time trend by using fixed effects model

**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{t+1} = \alpha_{0,i} + \alpha_1 . E_t + \alpha_2 AR + \alpha_3 INV + \alpha_4 AP + \varepsilon_{t+1} \quad \text{[Model 1a]}$$

$$OCF_{t+1} = \alpha_{0,i} + \alpha_1 . E_t + \alpha_2 DEP + \varepsilon_{+1t} \quad \text{[Model 1b]}$$

$$OCF_{,it+j} = \alpha_{0,i} + \alpha_1 . E_t + \alpha_2 AR + \alpha_3 \ INV + \alpha_4 AP + \alpha_5 DEP + \varepsilon_{t+j} \quad \text{[Model 1c]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1*

**Panel A: Regression of earnings, cash flows and accruals, and time trend with one-year -ahead cash flows**

| | E(+) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.83* | | | | | | 0.05* | 83.14 | 5.93* | 63.4* |
| | (11.19) | | | | | | (4.26) | | | |
| **Model 1a** | 0.82* | -0.11 | 0.03 | 0.04 | | | 0.05* | 83.23 | 5.77* | 57.8* |
| | (10.51) | (-1.69) | (0.42) | (0.64) | | | (4.15) | | | |
| **Mode 1b** | 0.67* | | | | 1.02* | | 0.03** | 84.9 | 4.08* | 67.8* |
| | (13.06) | | | | (10.47) | | (2.38) | | | |
| **Model 1c** | 0.65* | -0.14* | 0.09 | 0.03 | 1.04* | | 0.03** | 84.99 | 3.88* | 77.2* |
| | (12.85) | (-2.38) | (1.53) | (0.4) | (10.13) | | (2.19) | | | |

## Table 5.5 Continued

**Panel B: Regression of earnings, cash flows and accruals, and time trend with two-year -ahead cash flows**

| | E(+) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.46* | | | | | | 0.07* | 81.1 | 7.78* | 98.8* |
| | (7.36) | | | | | | (4.54) | | | |
| **Model 1c** | 0.35* | -0.064 | 0.236* | 0.029 | 0.477* | | 0.064* | 81.7 | 5.37* | 119* |
| | (5.74) | (-1.17) | (3.87) | (0.474) | (3.99) | | (4.2) | | | |

**Panel C: Regression of earnings, cash flows and accruals, and time trend with three-year -ahead cash flows**

| | E(+) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Year(+) | Adj.$R^2$% | F-test | Hausman test |
|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.2* | | | | | | 0.07* | 81.5 | 9.32* | 100* |
| | (2.99) | | | | | | (3.56) | | | |
| **Model 1c** | 0.19* | 0.0017 | -0.0097 | -0.024 | 0.28 | | 0.067* | 81.6 | 6.67* | 132* |
| | (2.67) | (0.03) | (-0.12) | (-0.34) | (1.83) | | (3.51) | | | |

*Significant at 0.01.level.

** Significant at 0.05 level.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

the 0.05 level. These results indicate that long term accruals' components have information content beyond that which exists in aggregate earnings. It also suggests that long-term accruals components may have greater explanatory power than short term accruals components for the variation in future cash flows.

However, more direct evidence on the incremental information content of short and long term accruals over each other can be gained from the results of model 1c. As can be seen, adding all the components of accruals to earnings raises the adjusted $R^2$ to 84.99%, which is greater than for any other earnings-based model. In addition, the sign of the coefficients of the explanatory variables remain unchanged. Again, the estimated coefficients of *E*, *AR*, *INV*, *DEP,* and time trend variable *(YEAR)* have positive signs and the estimated coefficient of *AP* is negative. The estimated coefficients of *E*, *AP*, *DEP*, and YEAR remain significant at the 0.05 level. While the estimated coefficient of *INV* remains insignificant at any reasonable probability level, the estimated coefficient of *AR* becomes significant at the 0.063 level. Panel B in the same table provides the results of model 1c for two-year-ahead cash flow. As can be seen, the signs and the significance levels of *E*, *DEP*, *INV*, and *YEAR* remain unchanged. However, there is stronger evidence for the role of *AR* and at the same time weaker evidence for the role of *AP* than was the case in Panel A. While the coefficient of *AR* becomes significant at the 0.05 level, the coefficient of *AP* becomes insignificant at any reasonable probability level. In Panel C, the results reveal that the coefficients of *E*, *DEP* and *YEAR* are significant and positive while the components of short term accruals have no significant coefficients. The results of model 1c in Panels A, B, and C reveal that the coefficient and t-value of *DEP* are greater than for any short term accruals components. Interestingly, these results together suggest that long term accruals' components are more useful than short term accruals' components in

explaining future cash flows. Unreported results reveal that these results are not altered by including the explanatory variable *OTHER* to the model.

The results in this section are similar to those derived from the previous OLS and fixed effects analysis in that the coefficients for *E*, *AR*, *INV*, *DEP* and the time trend variable (*YEAR*) are positive, and negative for *AP*. The results presented in Table 5.5 provide direct and stronger evidence on the role of accruals in explaining future cash flows. Short term accruals and long term accruals separately have incremental information content beyond that existing in aggregate earnings. They also reveal that long-term accruals and short term accruals have incremental information content beyond each other. Furthermore, long-term accruals may be more useful than short term accruals in explaining future cash flows, which is consistent with Garrod et al. (2000). Finally, the results confirm the importance of including the time trend variable (*YEAR*) in the models.

## 5.5 The Relative Ability of Earnings versus Cash Flows

Recalling from section 4.2.2, hypothesis 3 states that current operating cash flows are a better than earnings in predicting future cash flows. This hypothesis is examined in this section by running the following pooled regression model:

$$OCF_{i,t+j} = \mu_0 + \mu_1 OCF_{i,t} + \varepsilon_{i,t+j} \qquad \text{[Model 4]}$$

Where $j$=1, 2, and 3, and $OCF_t$= operating cash flows for year $t$.

To provide comparable results with prior studies that examine the same issue (e.g. Finger (1994), Dechow et al. (1998)), model 4 is analyzed under an OLS

framework. At the same time, it is re-estimated using fixed effects and a time trend methodology.

The results of the OLS analysis are reported in Table 5.6, Panel A. As in the original analysis, the adjusted $R^2$, AIC and SIC are used in evaluating the predictive ability of the model. The results of analyzing models 1, 2, and 3 are reported in Table 5.2, however, the evaluation criteria, $R^2$, AIC and SBIC, for these models are re-reported in Table 5.6 as a point of reference.

Table 5.6, Panel A shows that the coefficients for *OCF* are positive and significant at the 0.01 level. In addition, the adjusted $R^2$s are 75.4%, 62.2% and 56.7% when $OCF_{t+1}$, $OCF_{t+2}$, and $OCF_{t+3}$ are the dependent variables, respectively. Comparison of models 1 and 4 provides a test for hypothesis 3. As can be seen in Panel A, where the dependent variable is $OCF_{t+1}$, the adjusted $R^2$, AIC and SIC for model 4 are 75.4%, 4.79, and 1.96 respectively: they are 69.8%, 5.01, and 2.17 for model 1. It is clear that the values of AIC and SIC for model 4 are lower than for model 1. In addition, the adjusted $R^2$ for model 4 is greater than for model 1 by 5.6%. The reported Vuong's Z-statistic (4.64) indicates that this difference is significant at the 0.01 level. These together lead to the conclusion that *OCF* performs significantly better than *E* in predicting one-year-ahead cash flows. This conclusion remains unchanged when the dependent variable is $OCF_{t+2}$ or $OCF_{t+3}$. These results reported in Table 5.6, Panel A are very similar to those reported in BNC. The results also are consistent with those prior US studies that used the predictive ability methodology in evaluating the value relevance of *OCF* and *E*, such as Finger (1994), Lorek, et al. (1993, 1996). It is also consistent with Arnold et al. (1991), the only UK study that used the same methodology, in that earnings are not superior to cash flow as predictors of future cash flows.

The above analysis, based on univariate models, does not provide evidence on whether *E* and *OCF* have incremental information content beyond each other. Prior predictive-studies (e.g. Finger, (1994); Dechow et al. (1998)) employ multivariate models containing both cash flow and earnings as explanatory variables, in order to assess the incremental information content of *OCF* and *E*. One approach of assessing the incremental information content is to compare the adjusted $R^2$ of this model with the adjusted $R^2$ with a model containing *OCF* (*E*) as the independent variable. Any significant increase will lead to the conclusion that *E* (*OCF*) has incremental information content beyond that which already exists in *OCF* (*E*). This multivariate model is equivalent to model 2 in this study. As the difference between earnings (*E*) and operating cash flows (*OCF*) is aggregate accruals (*AGGACC*) any incremental information content for *OCF* over *AGGACC* implies that *OCF* has incremental information content over *E* and vice versa. Based on this, comparing model 2 with model 3 provides insight into the incremental information content of *E* and *OCF*. Referring back to Table 5.2, it can be seen in model 2 that the coefficients of both *OCF* and *AGGACC* are always significant and positive. In Table 5.6, the results reveal that the adjusted $R^2$s for model 2 are higher than the adjusted $R^2$s for model 4. For instance, when $OCF_{t+1}$ is the dependent variable, the adjusted $R^2$ for model 2 exceeds that for model 4 by 2.7% and Vuong's Z-statistic shows that this increase is significant at a 0.01 level. Untabulated results also reveal that model 2 performs significantly better than *AGGACC* alone in predicting future cash flows. The adjusted $R^2$ is 42% when regressing $OCF_{t+1}$ on *AGGACC* only. These results lead to the conclusion that *OCF* (*E*) have incremental information content beyond *E* (*OCF*) in

## Table 5.6

### Explaining future cash flows with current cash flows
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \quad \text{[Model 1]}$$

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \quad \text{[Model 2]}$$

$$OCF_{i,t+j} = \mu_0 + \mu_1 OCF_{i,t} + \varepsilon_{i,t+j} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1*

**Panel A: summarizes the results of OLS analysis**

| | Explaining one-year-ahead cash flow | | | Explaining two-year-ahead cash flow | | | Explaining three-year-ahead cash flow | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model 4 | Model 1 | Model 2 | Model 4 | Model 1 | Model 2 | Model 4 | Model 1 | Model 2 |
| **Intercept** | 0.43* | | | 0.59* | | | 0.68* | | |
| | (8.89) | | | (9.18) | | | (10.29) | | |
| **OCF(+)** | 0.87* | | | 0.87* | | | 0.9* | | |
| | (44.7) | | | (29.54) | | | (26.33) | | |
| **adj.$R^2$%** | 75.4 | 69.8 | 78.1 | 62.2 | 57.7 | 65.5 | 56.7 | 49.5 | 58.5 |
| **AIC** | 4.79 | 5.01 | 4.68 | 4.99 | 5.11 | 4.91 | 5.11 | 5.26 | 5.09 |
| **SIC** | 1.96 | 2.17 | 1.85 | 2.16 | 2.28 | 2.07 | 2.28 | 2.43 | 2.23 |
| | | Model 4 vs. Model 1 | Model 2 vs. Model 4 | | Model 4 vs. Model 1 | Model 2 vs. Model 4 | | Model 4 vs. Model 1 | Model 2 vs. Model 4 |
| Incremental $R^2$ | | *5.6 | *2.7 | | *4.5 | *3.3 | | *7.2 | *1.8 |
| Vuong's Z-statistics | | 4.64 | 5.84 | | 4.72 | 7.83 | | 7.25 | 5.52 |

* Significant at level 0.01.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.
Figures under line represent F-value.
Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## Table 5.6 Continued

### Panel B: Summarizes the results of fixed effects analysis with time trend

| | Explaining one-year-ahead cash flow | | | Explaining two-year-ahead cash flow | | | Explaining three-year-ahead cash flow | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model 4 | Model 1 | Model 2 | Model 4 | Model 1 | Model 2 | Model 4 | Model 1 | Model 2 |
| OCF(+) | 0.42* | | | 0.14* | | | 0.01* | | |
| | (8.45) | | | (3.67) | | | (2.25) | | |
| Year(+) | 0.08* | | | 0.1* | | | 0.08* | | |
| | (5.93) | | | (6.5) | | | (4.24) | | |
| Adj.$R^2$% | 82 | 83.1 | 83.7 | 80.2 | 81.1 | 81.1 | 81.5 | 81.5 | 81.6 |

* Significant at level 0.01.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

predicting future cash flows. The results also indicate that *OCF* has greater explanatory power than *AGGACC* (and, by implication, *E* alone) in explaining the variation in future cash flows. Again, the above results are similar to those reported in BCN. Although there are differences in the methodology, the results are in line with prior US and UK price-based studies: Bowen, at al. (1987); Ali (1994); Dechow (1994); Sloan (1996); Pfeiffer et al. (1998); Ali and Pope (1995); and Charitou, et al. (2001). On the other hand the results are not consistent with Board et al. (1989), Board and Day (1989) and Clubb (1995).

Panel B in Table 5.6 presents the results of the re-estimated model 4 under a fixed effects framework with a time trend. The results of the F and Hausman tests reveal that the fixed effects model is a suitable method for analyzing model 4. As in the prior analysis, it can be seen that the coefficients on the time trend variable (*YEAR*) are always significant and positive which enhanced the importance of this variable in predicting future cash flows. In general, the results are similar to those reported under OLS analysis in that OCF has a significant and positive sign. *OCF* and *E* (*AGGACC*) have incremental information content beyond each other in predicting future cash flows. Finally, *OCF* are more useful than *AGGACC* in predicting future cash flows. On the other hand the results reveal a significant conflict with those reported under OLS analysis in Table 5.6. Under a fixed effects framework *OCF* alone is not better than *E* alone in predicting future cash flows. For instance in Panel A, the adjusted $R^2$ for model 1 exceeds that for model 4 by 1.1%. This is primarily because the addition of firm specific intercepts and time trends to model 1 notably increases its explanatory power. One explanation of this result is that earnings suffer more than cash flows from a fixed effects problem. This result suggests that the

superiority of *OCF* over *E* in predicting future cash flows is conditional on a firm's characteristics.

## 5.6 The Relative Ability of Accruals versus Cash Flows (Testing FRS1's Claim)

This section aims to examine hypothesis 4 which states that current cash flows and accruals together are a better predictor for future cash flows than cash flows alone. This is FRS1's claim. Recalling from section 2.2, ASB states in FRS1 (1991 revised in 1996) in appendix III paragraph 4:

> *Although cash flow statement shows information about the reporting entity's cash flows in the reporting period, it provides incomplete information for assessing future cash flows .cash flow statements should normally be used in conjunction with profit and loss accounts and balance sheets when making assessment of future cash flows*

In other words FRS1 states that current cash flows and accruals jointly are a better predictor for future cash flows. This claim can be empirically examined by comparing the explanatory power of cash flows alone (Model 4) with that for cash flows and accruals (Model 3).

The results in Table 5.7, Panel A reveal that model 3 has more predictive ability than model 1 in predicting one-year, two-year and three-year-ahead cash flows. For instance when $OCF_{t+1}$ is the dependent variable, the adjusted $R^2$ for model 3 is 80.7% which is higher than for model 1 (75.4%). Furthermore, the results of Vuong's

test (Z=7.43) reveal that model 3 performs significantly better than model 1 in predicting future cash flows. These results together support the claim of FRS1 that accruals improve the ability of cash flows in predicting future cash flows. The same conclusion is drawn when model 4 is re-estimated under a fixed effects framework as can be seen in Panel B in the same table. This gives an early indication that this conclusion is not conditional on a firm's characteristics.

Finally, one question that may arise is whether the superiority of model 3 over models 1, 2, and 4 is caused by the inclusion of information from the profit and loss account (*DEP*) and from the balance sheets (*AP*, *AR*, *INV*) or caused by decomposing earnings into *OCF* and the main components of accruals? If *OCF* and the main components of accruals have incremental information content beyond each other, the superiority of model 3 stems from separating *OCF* from *E* and from decomposing aggregate accruals into its main components. Comparing the adjusted $R^2$ for model 4 with that for model 3 reveals that the main components of accruals have incremental information content beyond that which exists in *OCF*. In untabulated results, the main components of accruals are able to explain 61% of the variation in future cash flows, which is less than the ability of model 3. These results reveal that accruals and cash flows in model 3 have incremental information beyond each other, which implies that the superiority of model 3 stems from the decomposing of aggregate accruals into its components and from separating operating cash flows from earnings.

## Table 5.7
## Summarizes the results of examining FRS 1's assertion
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3]}$$

$$OCF_{i,t+j} = \mu_0 + \mu_1 OCF_{i,t} + \varepsilon_{i,t+j} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

**Panel A: summarize the results of OLS analysis**

| | Explaining one-year-ahead cash flow | | Explaining two-year-ahead cash flow | | Explaining three-year-ahead cash flow | |
|---|---|---|---|---|---|---|
| | Model 4 | Model 3 | Model 4 | Model 3 | Model 4 | Model 3 |
| adj.$R^2$% | 75.4 | 80.7 | 62.2 | 69.9 | 56.7 | 61.8 |
| AIC | 4.79 | 4.56 | 4.99 | 4.77 | 5.11 | 4.98 |
| SIC | 1.96 | 1.73 | 2.16 | 1.94 | 2.28 | 2.16 |
| | Model 4 vs. Model 3 | | Model 4 vs. Model 3 | | Model 4 vs. Model 3 | |
| Incremental R2 | 5.3* | | 7.7* | | 5.1* | |
| Vuong's Z-statistics | 7.43 | | 12.49 | | 9.83 | |

**Panel B: Summarize the results of fixed effects analysis with time trend**

| | Explaining one-year-ahead cash flow | | Explaining two-year-ahead cash flow | | Explaining three-year-ahead cash flow | |
|---|---|---|---|---|---|---|
| | Model 4 | Model 3 | Model 4 | Model 3 | Model 4 | Model 3 |
| Adj.$R^2$% | 82 | 85.5 | 80.2 | 81.8 | 81.5 | 81.6 |

* Significant at the 0.01 level.
Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## 5.7 First Difference Analysis

Until now, all results have been based on *data levels* (following BCN). As discussed in chapter 3, Dechow et al. (1998) reported that earnings are a better forecaster for future cash flows than cash flows alone. However, they found that the correlation between earnings changes and cash flow changes is low and insignificant. This may suggest that the results reported in the prior analysis might change if first differences are employed in models 1 to 4[5]. This leads to a reduction in the number of observations to 5977 for one-year ahead.

Dechow et al. (1998)[6] only reported the correlation coefficients for first differences, rather than employing first differences in their models. To provide comparable results with their results, the simple bivariate correlation matrix is provided in Table 5.8. Panel A of the table summarized the coefficients of cross-sectional correlation while Panel B summarizes the coefficients of cross and serial correlation. As in prior analysis, Panel A shows that operating cash flow changes (*ΔOCF*) are significantly and positively correlated with earnings changes (*ΔE*), accounts payable changes (*ΔAP),* and with depreciation changes (*ΔDEP)*. On the other hand, changes in aggregate accruals (*ΔAGGACC)* and other accruals (*ΔOTHER)* are significantly correlated with *ΔOCF*. Interestingly, changes in accounts receivable (*ΔAR)* and inventory (*ΔINV)* are significantly correlated with *ΔOCF* where they are positively correlated with the level of cash flows. The results also reveal that while earnings changes have a relatively low positive correlation coefficient (0.36) with

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[5] It should be noted that in model 4 , the components of accruals (*AP, AR, INV*) are already in first differences form. So in this analysis they are in second differences form.

[6] It should be noted here that Dechow et al. (1998) reported in their study predicted and actual correlation coefficients. The comparison will be held here between the reported actual correlations rather the predicted one.

# Table 5.8

## Provides correlation coefficients between the variables of the study (First difference analysis)
**(Sample of 5977 Firm-Year Observations, 1991-2000)**

### Panel A: Correlation Matrix between independent Variables

Pearson correlation coefficient in regular type

*Spearman rank (non-parametric) correlation coefficients in italic*

| Variables | ΔE | ΔOCF | ΔAGGACC | ΔAP | ΔAR | ΔINV | ΔDEP | ΔOTHER |
|---|---|---|---|---|---|---|---|---|
| **ΔE** | | 0.359 | 0.187 | 0.058 | 0.196 | 0.154 | 0.093 | -0.031 |
| **ΔOCF** | *0.371* | | -0.85 | 0.213 | -0.289 | -0.334 | 0.21 | -0.243 |
| **ΔAGGACC** | *0.066* | *-0.808* | | -0.191 | 0.415 | 0.438 | -0.169 | 0.239 |
| **ΔAP** | *0.086* | *0.239* | *-0.239* | | 0.598 | 0.283 | -0.104 | 0.024 |
| **ΔAR** | *0.183* | *-0.198* | *0.323* | *0.457* | | 0.151 | -0.102 | -0.152 |
| **ΔINV** | *0.164* | *-0.222* | *0.317* | *0.282* | *0.143* | | 0.057 | -0.07 |
| **ΔDEP** | *0.094* | *0.193* | *-0.218* | *-0.006* | *-0.015* | *-0.024* | | 0.067 |
| **ΔOTHER** | *-0.285* | *-0.311* | *0.218* | *-0.027* | *-0.137* | *-0.1* | *-0.153* | |

### Panel B: Correlation Matrix between dependent variable ($OCF_{t+1}$) and independent variables

| Variable | ΔE | ΔOCF | ΔAGGACC | ΔAP | ΔAR | ΔINV | ΔDEP | ΔOTHER |
|---|---|---|---|---|---|---|---|---|
| **$\Delta OCF_{t+1}$** | 0.035 | -0.302 | 0.338 | -0.149 | 0.103 | 0.162 | 0.041 | 0.014 |
| **$\Delta OCF_{t+1}$** | *0.043* | *-0.24* | *0.287* | *-0.145* | *0.132* | *0.073* | *0.043* | *-0.035* |

Variables are defined as for table 5.1

cash flows changes, aggregate accruals changes have a highly negative correlation coefficient (-0.85). These results are similar to those reported in Dechow et al. (1998). For instance, the reported correlation coefficient between cash flow changes and aggregate accruals change is -0.88.

In Panel B in the same table, as in the prior analysis, the results reveal that all the independent variables are significantly correlated with future cash flows (the dependent variable). However, the absolute values of the correlation coefficients are notably less than those reported in Table 5.1, Panel C. For instance, while the maximum coefficient correlation is 0.87 in Table 5-1Panel C, it is 0.34 in Table 5.8-Panel B.

Consistent with Dechow et al. (1998) the change in aggregate earnings has a very low correlation coefficient with future cash flows. In the Dechow study it is -0.03 and in this study it is 0.035. The components of aggregate earnings, aggregate accruals and cash flows, separately have high a correlation coefficient with future cash flows. The correlation coefficient between aggregate accruals changes (cash flow changes) and future cash flows changes is 0.34 (-0.30), which in Dechow are 0.31 and -0.28, respectively. The negative serial correlation in cash flows is mainly caused by a timing effect. In general, firms provide a longer credit term to their customers than they receive from their suppliers. This means that the cost of sales is paid before collecting the revenues associated with these sales[7].

Overall, the results are similar to those reported in Dechow et al. (1998) in that earnings have a very low association with future cash flows. Aggregate accruals have the highest association with future cash flows. Finally, there is a negative serial

[7] Foe more details see Dechow et al. (1998).

correlation in cash flows changes. These results confirm the results of the original analysis that cash flow is better than earnings in predicting future cash flows.

However, as mentioned before, these correlations do not provide a reliable indication of the nature of the association between the dependent and the independent variables. Thus, the main conclusions in this section will be derived from re-estimating models 1 to 4 under an OLS framework. It should be noted that there is no need for a fixed effect framework here. The use of first differences eliminates the firm specific differences in the level of cash flows. This is confirmed by the results of F-test, not reported, which indicates no significant differences in intercept terms across the sample groupings. It also found the inclusion of a time trend variable (*YEAR*) generates a slope which is insignificantly different to zero, which indicates that the trend is well described by a linear function and is eliminated by a first differencing.

The results are presented in Table 5.9. Panel A summarizes the analysis of models 1 to 3. The results in this Panel reaffirm the original conclusions regarding the gains to disaggregating earnings. As the correlation coefficient reflects, the earnings changes ($\Delta E$) coefficient is insignificantly different to zero. Moreover, $\Delta E$ has little explanatory power in explaining $\Delta OCF_{t+1}$. The adjusted $R^2$ is 0.10%. This increases to 11.4% as a result of decomposing aggregate earnings into cash flows and aggregate accruals. Vuong's Z-statistic (4.59) indicates that model 2 perform significantly better than model 1. Further decomposition for aggregate accruals leads to further increases in explanatory power: the adjusted $R^2$ rises to 13.6%. Vuong's Z-statistic (1.88), is significant using a one-tail test, which is appropriate since the prior expectation in this study is that there are predictive gains to the disaggregation of accruals.

The results of examining the relative usefulness of cash flows versus aggregate earnings with respect to future cash flows are presented in Table 5.9,Panel

B. As can be seen, *ΔOCF* has a significant and negative coefficient. The adjusted $R^2$ is 9.1% which is significantly larger than that for model 1. Vuong's Z-statistic (4.49) is significant at the 0.01 level. These together, reaffirm the original conclusion that current cash flow alone is better than current aggregate earnings alone in predicting future cash flows. The results in this Panel also provide more evidence on the superiority of model 3 over the other models. In other words, more evidence on FRS1 is provided in this section.

## Table 5.9
## Summary results of regressions of future cash flows on current earnings, cash flows and accruals
## (First Difference Analysis)
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$\Delta OCF_{i,t+1} = \alpha_0 + \alpha_1 \Delta E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$\Delta OCF_{i,t+1} = \beta_0 + \beta_1 \Delta OCF_{i,t} + \beta_2 \Delta AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$\Delta OCF_{i,t+1} = \gamma_0 + \gamma_1 \Delta OCF_{i,t} + \gamma_2 \Delta AP_{i,t} + \gamma_3 \Delta INV_{i,t} + \gamma_4 \Delta AR_{i,t} + \gamma_5 \Delta DEP_{i,t} + \gamma_6 \Delta OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$\Delta OCF_{i,t+1} = \mu_0 + \mu_1 \Delta OCF_{i,t} + \varepsilon_{i,t+1} \quad \text{[Model 4]}$$

*Variables are defined as for Table 5.1*

**Panel A: Regression of earnings, cash flows and accruals with one-year -ahead cash flows**

| | Intercept | ΔE | ΔOCF | ΔAGGACC | ΔAP | ΔAR | ΔINV | ΔDEP | ΔOTHER | Adj.$R^2$% | AIC | SIC | CN | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | 0.12* | 0.67 | | | | | | | | 0.1 | 4.73 | 1.89 | 1.18 | 5977 |
| | (3.6) | (1.1) | | | | | | | | 7.19* | | | | |
| Mode 2 | 0.16* | | -0.06 | 0.32* | | | | | | 11.4 | 4.61 | 1.78 | 3 | 5977 |
| | (5.15) | | (-1.04) | (4.51) | | | | | | 387* | | | | |
| Model 3 | 0.13* | | -0.084 | | -0.39* | 0.31* | 0.34* | 0.16 | 0.13 | 13.6 | 4.59 | 1.76 | 4.68 | 5977 |
| | (4.29) | | (-1.51) | | (-5.23) | (3.36) | (4.62) | (1.4) | (1.29) | 157* | | | | |
| | | | Model 2 vs. Model 1 | | Model 3 vs. Model 2 | | | Model 3 vs. Model 1 | | | | | | |
| Incremental R2% | | | 11.3* | | 2.2 | | | 13.5* | | | | | | |
| Vuong's Z-statistics | | | 4.59 | | 1.88 | | | 4.85 | | | | | | |

## Table 5.9 Continued

### Panel B: Summarizes the results of regression future cash flows on current cash flows

| | Intercept | ΔOCF(+) | adj.$R^2$% | AIC | SIC | NOB |
|---|---|---|---|---|---|---|
| **Model 4** | 0.18* | -0.31* | 9.1 | 4.64 | 1.8 | 5977 |
| | (5.69) | (-8.9) | | | | |
| **Model 1** | | | 0.1 | 4.73 | 1.89 | 5977 |
| **Model 2** | | | 11.4 | 4.61 | 1.78 | 5977 |
| **Model 3** | | | 13.6 | 4.59 | 1.76 | 5977 |
| | Model 4 vs. Model 1 | | Model 2 vs. Model 4 | | Model 3 vs. Model 4 | |
| Incremental $R^2$% | 9* | | 2.3* | | 4.5* | |
| Vuong's Z-statistics | 4.48 | | 2.28 | | 2.83 | |

* Significant at level 0.01.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.
Figures under line represent F-value.
Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.
CN: is a condition number for multicollinearity diagnostic proposed by Belsley et al. (1980).

## 5.8 Summary and Conclusion

The results obtained in this chapter are consistent with the predictions discussed in chapter 4. The results of this study reveal that the components of aggregate earnings have incremental information content beyond that which exists in earnings with regard to explaining the variation in future cash flows. Moreover, the results show that accruals and cash flows have incremental information content beyond each other in explaining future cash flows. Strong evidence is obtained in this chapter to support the claim of FRS1(1991, revised 1996) that cash flows and accruals jointly perform better than earnings or cash flows alone in predicting future cash flows. However, the results show that not all the components of accruals have the same role in improving the ability of cash flows in predicting future cash flows.

Regarding the usefulness of current earnings and current cash flows in explaining the variation in future cash flows, the results of this chapter reveal that operating cash flows, reported under FRS1 (1991, revised 1996), significantly outperform reported accounting earnings in predicting future cash flows. However, interestingly, after controlling a possible source of variation in the data of this study using fixed effects and a time trend, the superiority of cash flows over earnings no longer exists.

An implication of the results in this section for accounting users and creditors is that the accounting data items studied here are not dominated by each other. On the contrary, they complement each other and so they should be used in conjunction with each other when estimating future cash flows. The results of this chapter also strongly support FRS1's claim that operating cash flows should be used in conjunction with accruals data when estimating future cash flows.

Overall, the results of this chapter provide empirical evidence to support the hypotheses developed in chapter 4. The general conclusion here is that neither earnings alone nor cash flows alone is a better predictor for future cash flows. Accruals, in conjunction with cash flows, perform better than these two performance measure in explaining future cash flows. However, this evidence is still limited and does not consider in detail the effect of a firm's characteristics such as industrial membership, a firm's performance level, the quality of earnings and a firm's financial position. The effect of these factors on the value relevance of earnings components in predicting future cash flows will be examined in the next two chapters.

# Chapter 6

# The Effect of Contextual Factors on the Explanatory Power of Earnings' Components

## 6.1 Introduction

One of the main conclusions in chapter 5 is that the superiority of operating cash flows and accruals over earnings in explaining the variation in future cash flows is conditional on a firm's characteristics. As an extension to this conclusion, this chapter examines a number of firm characteristics that may affect the value relevance of decomposing earnings into its components.

As discussed in section 3.2, prior studies (e.g. Rayburn; (1986); Wilson, (1986, 1987); Bowen et al. (1987); Board and Day, (1989); Bernard and Stober, (1989); Dechow, (1994)) provide inconclusive evidence on the value relevance of earnings components — cash flows and accruals. Bernard and Stober suggested that the lack of conclusive evidence on the value relevance of earnings components, especially cash flows, might be caused by the possibility that the relationship between cash flows and share price is too conditional to draw any general conclusion. In the same line, Charitou (1997) using UK data concluded that the value relevance of cash flows and earnings is significantly affected by firm-specific factors such as industry classification and earnings quality.

Prior studies reported evidence on the effect of different firms' characteristics on the value relevance of cash flows and accruals. Earnings permanence and quality both affect the value relevance of cash flows (Dechow, (1994); Cheng et al., (1996);

Ali, (1994); Ali and Pope, (1995); Green (1999); Charitou et al., (2001)). The level of cash flows also influences the value relevance of earnings (Wilson, (1986, 1987); Ali, (1994); Ali and Pope, (1995)), as does the length of the operating cash cycle. (Dechow, (1994), Dechow et al. (198); Barth et al. (2001)). To investigate whether the results conducted on the whole sample of firms are affected by firms' characteristics, models 1 to 4 are re-estimated after controlling for contextual factors which may affect the value relevance of cash flows and accruals in predicting future cash flows.

The remainder of this chapter is organized as follows: Section 6.2 investigates the effects of industrial classifications. Section 6.3 provides an empirical investigation of the effect of the length of the operating cash cycle. Section 6.4 investigates the effect of a firm's performance as measured by its earnings level. Section 6.5 investigates the effect of cash flow levels. Section 6.6 reports on the effect of earnings quality as measured by the magnitude of aggregate accruals. Finally, section 6.7 gives the summary and conclusions.

## 6.2 The Effect of Industrial Membership

Charitou (1997), using UK data, indicated that the value relevance of cash flows and earnings might be affected by industrial classification. The empirical evidence (e.g. Dechow (1994), Barth et al. (2001)) indicates that there is variation in the value relevance of earnings and cash flows across industries. This variation may be due to differences in accounting, operating, and financing policies. These differences may cause variation across industries in the mix and the type of accruals which affect the length of the operating cash cycle.

In order to examine the effect of industrial classifications, models 1 to 4 are

estimated for 7 industries identified in FTSE Actuaries Share Indices[1]. The results are summarized in Table 6.1. The results at the industry level are very close to those derived for the full sample. Panel A reveals that the coefficients of *E, OCF, AP, AR, INV*, and *DEP* have the predicted signs. The coefficients of *AGGACC* and *OTHER* also have the same signs as those reported in the main analysis. The slopes of *E, OCF, AR, INV,* and *AGGACC* have positive and significant signs in all industries. The slope of *AP* is negative and significant in all industries also. *DEP* has a positive coefficient in 5 out of 7 industries but it significant only in one industry.

Panel B presents the adjusted $R^2$s of estimating models 1 to 4 at the industry level, using $OCF_{t+1}$, $OCF_{t+2}$, and $OCF_{t+3}$ as dependent variables. In addition, Vuong's Z-statistic is provided. As can be seen, when $OCF_{t+1}$ is the dependent variable, the predictive ability of earnings, cash flows and accruals varies across industries. The adjusted $R^2$s for model 1 (model 4) range from 30.7% (45.7%) to 74.63% (81.2%). For model 2 (model 3) the adjusted $R^2$s range from 53.8% (60.9%) to 82.5% (84.7%). However, the separate-industry results are consistent with those drawn from the full sample. For most industries cash flows and the main components of accruals have the highest adjusted $R^2$. The second highest adjusted $R^2$ is associated with model 2. Finally, the adjusted $R^2$ associated with cash flows alone is higher than that associated with earnings alone in Resources, Basic, Services, General, and Information technology industries. However, the Vuong test reveals that in General and Information Technology industries, the Z-statistic is only significant at the 0.05 level using one tailed test. The results also reveal that earnings and cash flow have the same ability in predicting future cash flows in Consumer goods and Utilities.

This variation might be explained by different reasons reported in prior

[1] The original number reported in the Financial Times (2001) is 10, I excluded the financial sectors and I merged the cyclical and non-cyclical consumer goods (services) into consumer goods (services).

studies. For instance, DeFond and Hung (2001) found that for industries with high levels of fixed assets, cash flow is more relevant than earnings. This might provide an explanation of why cash flows outperform earnings in predicting next year cash flows in Basic Industries and Resources since both could be considered high-capital-intensive industries. However, earnings and cash flow have the same ability in predicting future cash flows in General Industries. Another explanation is provided by Dechow (1994) who concluded that differences in the length of the operating cash cycle among different industries causes differences in the value relevance of cash flows. She stated that:

> *"Earnings better reflects firm performance than cash from operations for firms in industries with long operating cycles"* (p.31)

Further investigation of this issue is presented in the following section.

## Table 6.1
## Summary results for regressions of future cash flows on current earnings, cash flows and accruals by Industry
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3*
*Variables are defined as for Table 5.1.*

**Panel A: Presents the coefficients of the variables**

| Sector 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.981* | 1.08** | | | | | | | | 49.27 | 4.6 |
| | (2.95) | (2.56) | | | | | | | | | |
| **Model 2** | 0.16 | | 1.08* | 0.14 | | | | | | 78.6 | 3.75 |
| | (1.46) | | (10.77) | (1.49) | | | | | | | |
| **Model 3** | -0.18** | | 0.86* | | -1.39* | 1.51* | -0.09 | 0.66** | 0.07 | 84.6 | 3.43 |
| | (-2.03) | | (6.82) | | (-4.47) | (4.12) | (-0.15) | (2.38) | (0.83) | | |
| **Model 4** | 0.12 | | 1.02* | | | | | | | 78.4 | 3.75 |
| | (1.19) | | (12.74) | | | | | | | | |
| **sector 2** | | | | | | | | | | | |
| **Model 1** | 1.07* | 0.9* | | | | | | | | 30.7 | 4.73 |
| | (7.76) | (5.82) | | | | | | | | | |
| **Model 2** | 0.49* | | 0.99* | 0.52* | | | | | | 53.8 | 4.33 |
| | (3.59) | | (9.9) | (6.37) | | | | | | | |
| **Model 3** | 0.15 | | 0.89* | | -0.72* | 0.59* | 0.58* | 0.03 | 0.1 | 60.9 | 4.17 |
| | (1.39) | | (10.06) | | (-5.47) | (3.14) | (5.23) | (0.14) | (0.59) | | |
| **Model 4** | 0.71* | | 0.6* | | | | | | | 45.71 | 4.49 |
| | (5.11) | | (7.67) | | | | | | | | |

## Table 6.1, Panel A, Continued

| Sector 3 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.81* | 1.26* | | | | | | | | 66.5 | 4.75 |
| | (8.59) | (15.18) | | | | | | | | | |
| **Model 2** | 0.52* | | 1.07* | 0.57* | | | | | | 72.6 | 4.55 |
| | (4.98) | | (13.88) | (4.6) | | | | | | | |
| **Model 3** | 0.17 | | 0.76* | | -0.62* | 0.68* | 0.38 | 0.34 | 0.028 | 77.2 | 4.37 |
| | (1.52) | | (9.86) | | (-3.12) | (4.69) | (1.58) | (1.52) | (0.2) | | |
| **Model 4** | 0.48* | | 0.82* | | | | | | | 69.4 | 4.66 |
| | (4.22) | | (13.69) | | | | | | | | |
| **Sector 4** | | | | | | | | | | | |
| **Model 1** | 0.84* | 1.36* | | | | | | | | 74.63 | 4.61 |
| | (11.72) | (23.33) | | | | | | | | | |
| **Model 2** | 0.49* | | 1.21* | 0.79* | | | | | | 77.91 | 4.47 |
| | (5.69) | | (27.85) | (8.28) | | | | | | | |
| **Model 3** | -0.09 | | 0.97* | | -1.05* | 0.97* | 0.97* | 0.32 | 0.47 | 82.33 | 4.25 |
| | (-1.2) | | (12.15) | | (-5.59) | (7.11) | (5.86) | (1.77) | (1.9) | | |
| **Model 4** | 0.23** | | 0.89* | | | | | | | 72.8 | 4.67 |
| | (2.32) | | (22.91) | | | | | | | | |
| **Sector 5** | | | | | | | | | | | |
| **Model 1** | 0.98* | 1.48* | | | | | | | | 73.97 | 5.19 |
| | (11.52) | (27.97) | | | | | | | | | |
| **Model 2** | 0.55* | | 1.11* | 0.45 | | | | | | 82.5 | 4.79 |
| | (8.69) | | (29.63) | (6.54) | | | | | | | |
| **Model 3** | 0.23* | | 0.99* | | -0.66* | 0.71* | 0.69* | 0.01 | 0.28** | 84.7 | 4.66 |
| | (4.29) | | (21.95) | | (-7.49) | (8.6) | (6.16) | (0.07) | (2.42) | | |
| **Model 4** | 0.53* | | 0.89* | | | | | | | 81.2 | 4.86 |
| | (6.92) | | (34.17) | | | | | | | | |
| **sector 6** | | | | | | | | | | | |
| **Model 1** | 1.24* | 1.23* | | | | | | | | 70.44 | 4.03 |
| | (6.74) | (10.79) | | | | | | | | | |
| **Model 2** | 0.87* | | 1.07* | 0.64** | | | | | | 72.65 | 3.96 |
| | (4.2) | | (6.51) | (1.96) | | | | | | | |
| **Model 3** | 0.81* | | 0.79* | | -0.74* | 0.6 | 0.66 | -0.13 | -0.17 | 73.8 | 3.93 |
| | (3.51) | | (2.98) | | (-2.76) | (0.98) | (0.63) | (-0.19) | (-0.27) | | |
| **Model 4** | 0.67* | | 0.84* | | | | | | | 70.38 | 4.03 |
| | (3.12) | | (9.41) | | | | | | | | |

**Table 6.1, Panel A, Continued**

| Sector 7 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.85* | 1.38* | | | | | | | | 62.8 | 5.48 |
| | (4.46) | (14.11) | | | | | | | | | |
| **Model 2** | 0.39** | | 1.19* | 0.62* | | | | | | 70.1 | 5.26 |
| | (2.24) | | (12.87) | (3.88) | | | | | | | |
| **Model 3** | 0.11 | | 1* | | -0.69* | 0.70* | -0.03 | -0.11 | 0.17 | 74 | 5.13 |
| | (0.83) | | (11.6) | | (-4.81) | (4.99) | (-0.18) | (-0.49) | -0.93 | | |
| **Model 4** | 0.38** | | 0.9* | | | | | | | 66.6 | 5.37 |
| | (2.29) | | (15.86) | | | | | | | | |

*Significant at level 0.01.

**Significant at level 0.05.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

Where:

Sector 1= Industrial Resources. (Number of observations is 182)

Sector 2= Basic Industries. (Number of observations is 832)

Sector 3= General Industries. (Number of observations is 1137)

Sector 4= Consumer Goods. (Number of observations is 1377)

Sector 5= Services. (Number of observations is 2931)

Sector 6= Utilities. (Number of observations is 174)

Sector 7= Information Technology. (Number of observations is 558)

## Table 6.1-Continued

### Panel B: Summarizes the Adjusted $R^2$% of performing models 1 to 4.by Industry And the results of Vuong's test

| One-year ahead | Model 1 | | Model 2 | | Model. 3 | | Model. 4 |
|---|---|---|---|---|---|---|---|
| **Sector 1** | 49.27 | | 78.6 | | 84.6 | | 78.4 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *29.33** | *6** | *35.33** | *29.13** | *0.2* | *6.2** | |
| *Vuong's Z-statistic* | *5.51* | *4.39* | *7.34* | *5.65* | *-1.29* | *6.18* | |
| **Sector 2** | 30.7 | | 53.8 | | 60.9 | | 45.71 |
| *The difference* | *23.1** | *7.1** | *30.2** | *15.01** | *8.09** | *15.19** | |
| *Vuong's Z-statistic* | *6.78* | *4.62* | *10.87* | *3.96* | *6.68* | *9.62* | |
| **Sector 3** | 66.5 | | 72.6 | | 77.2 | | 69.4 |
| *The difference* | *6.1** | *4.6** | *10.7** | *2.9* | *3.2** | *7.8** | |
| *Vuong's Z-statistic* | *5.89* | *5.32* | *8.26* | *1.86* | *3.96* | *7.84* | |
| **Sector 4** | 74.63 | | 77.91 | | 82.33 | | 72.8 |
| *The difference* | *3.28** | *4.42** | *7.7** | *-1.83* | *5.11** | *9.53** | |
| *Vuong's Z-statistic* | *5.82* | *8.21* | *11.05* | *-1.48* | *6.09* | *10.95* | |
| **Sector 5** | 73.97 | | 82.5 | | 84.7 | | 81.2 |
| *The difference* | *8.53** | *2.2** | *10.73** | *7.23** | *1.3** | *3.5** | |
| *Vuong's Z-statistic* | *14* | *7.97* | *16.9* | *9.45* | *6.48* | *10.49* | |
| **Sector 6** | 70.44 | | 72.65 | | 73.8 | | 70.38 |
| *The difference* | *2.21* | *1.15* | *3.36*** | *-0.06* | *2.27* | *3.42* | |
| *Vuong's Z-statistic* | *1.44* | *-1.26* | *2.03* | *-0.02* | *1.25* | *1.25* | |
| **Sector 7** | 62.8 | | 70.1 | | 74 | | 66.6 |
| *The difference* | *7.3** | *3.9** | *11.2** | *3.8* | *3.5** | *7.4** | |
| *Vuong's Z-statistic* | *5.01* | *3.45* | *7.88* | *1.8* | *3.72* | *5.87* | |

## Table 6.1, Panel B, Continued

| Two-year ahead | Model 1 | | Model 2 | | Model. 3 | | Model. 4 |
|---|---|---|---|---|---|---|---|
| **Sector 1** | 38.36 | | 71.48 | | 76.21 | | 71.67 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *33.12** | *4.73** | *37.85** | *33.31** | *-0.19* | *4.54* | |
| *Vuong's Z-statistic* | *5.51* | *1.48* | *5.98* | *5.83* | *0* | *0.77* | |
| **Sector 2** | 29.63 | | 46.51 | | 53.58 | | 33.92 |
| *The difference* | *16.88** | *7.07** | *23.95** | *4.29* | *12.59** | *19.66** | |
| *Vuong's Z-statistic* | *6.39* | *3.08* | *10.71* | *1.33* | *7.31* | *6.81* | |
| **Sector 3** | 67.57 | | 70.33 | | 77.85 | | 60.03 |
| *The difference* | *2.76** | *7.52** | *10.28** | *-7.54*** | *10.3** | *17.82** | |
| *Vuong's Z-statistic* | *3.4* | *5.43* | *6.7* | *-2.04* | *3.56* | *5.49* | |
| **Sector 4** | 63.64 | | 68.8 | | 73.79 | | 67.25 |
| *The difference* | *5.16** | *4.99** | *10.15** | *3.61*** | *1.55*** | *6.54** | |
| *Vuong's Z-statistic* | *4.77* | *4.93* | *8.3* | *2.44* | *2.44* | *4.79* | |
| **Sector 5** | 56.89 | | 65.73 | | 69.83 | | 63.89 |
| *The difference* | *8.84** | *4.1** | *12.94** | *7** | *1.84** | *5.94** | |
| *Vuong's Z-statistic* | *8.97* | *6.83* | *11.42* | *5.08* | *4.07* | *7.64* | |
| **Sector 6** | 63.95 | | 71.18 | | 75.19 | | 71.19 |
| *The difference* | *7.23** | *4.01* | *11.24** | *7.24** | *-0.01** | *4* | |
| *Vuong's Z-statistic* | *2.59* | *0.88* | *2.7* | *2.64* | *-2.66* | *0.34* | |
| **Sector 7** | 54.71 | | 60.01 | | 63.57 | | 57.69 |
| *The difference* | *5.3** | *3.56*** | *8.86** | *2.98* | *2.32** | *5.88** | |
| *Vuong's Z-statistic* | *3.49* | *2.16* | *4.42* | *1.47* | *2.6* | *2.98* | |

## Table 6.1, Panel B, Continued

| Three-year ahead | Model 1 | | Model 2 | | Model. 3 | | Model. 4 |
|---|---|---|---|---|---|---|---|
| **Sector 1** | 58.8 | | 65.67 | | 72.99 | | 65.36 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *6.87** | *7.32* | *14.19** | *6.56*** | *0.31* | *7.63* | |
| *Vuong's Z-statistic* | *2.31* | *1.63* | *3.14* | *2.05* | *-0.95* | *1.14* | |
| **Sector 2** | 23.29 | | 40.06 | | 44.01 | | 28.86 |
| *The difference* | *16.77** | *3.95* | *20.72** | *5.57* | *11.2** | *15.15** | |
| *Vuong's Z-statistic* | *5.92* | *1.7* | *6.99* | *1.01* | *3.53* | *3.55* | |
| **Sector 3** | 60.01 | | 65.96 | | 71.36 | | 63.58 |
| *The difference* | *5.95** | *5.4** | *11.35** | *3.57* | *2.38*** | *7.78** | |
| *Vuong's Z-statistic* | *3.68* | *3.46* | *4.7* | *1.44* | *2.19* | *4.72* | |
| **Sector 4** | 59.83 | | 69.52 | | 74.46 | | 69.31 |
| *The difference* | *9.69** | *4.94** | *14.63** | *9.48** | *0.21* | *5.15** | |
| *Vuong's Z-statistic* | *8.62* | *5.99* | *9.46* | *7.66* | *0.14* | *6.07* | |
| **Sector 5** | 47.02 | | 56.56 | | 60 | | 54.88 |
| *The difference* | *9.54** | *3.44** | *12.98** | *7.86** | *1.68** | *5.12** | |
| *Vuong's Z-statistic* | *7.62* | *4.88* | *9.53* | *4.79* | *3.1* | *5.56* | |
| **Sector 6** | 53.12 | | 53.66 | | 61.46 | | 51.6 |
| *The difference* | *0.54* | *7.8* | *8.34* | *-1.52* | *2.06* | *9.86* | |
| *Vuong's Z-statistic* | *-0.78* | *1.11* | *0.82* | *-0.55* | *0.38* | *1.01* | |
| **Sector 7** | 42.96 | | 48.24 | | 49.45 | | 48.05 |
| *The difference* | *5.28** | *1.21*** | *6.49* | *5.09** | *0.19*** | *1.4** | |
| *Vuong's Z-statistic* | *3.45* | *-2.11* | *1.41* | *3.33* | *-2.07* | *-2.96* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## 6.3 The Effect of the Length of the Operating Cash Cycle.

The results of Dechow et al. (1998) reveal that the predictive ability of earnings for future cash flows depends on the firms' operating cycle. The forecast errors produced by using current operating cash flows to forecast one-year-ahead cash flows are positively correlated with the length of the operating cycle. This is because the difference between one-year-ahead cash flows and current earnings is accruals, which are reflected in the length of the operating cycle.

In order to examine whether the length of the operating cash cycle influences the incremental predictive ability of cash flows and accruals, the whole sample (following Dechow et al. and BCN) is partitioned into quartiles based on the length of the operating cash cycle. Then models 1 to 4 are estimated at a sub-sample level. Following Dechow (1994) the operating cash cycle (*OC*) is calculated using the following equation[2]:

$$OC = \left( \frac{(AR_t + AR_{t-1})/2}{Sales/360} \right) + \left( \frac{(Inv_t + Inv_{t-1})/2}{Cost\ \ of\ \ goods\ \ sold/360} \right)$$

The first component in the above equation represents the debtors' ratios in days. The second component represents the stock ratio in days. These variables are taken from Datastream. The Datastream codes are 727 and 725 for the debtors' ratio and the stock ratio, respectively.

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[2] This method is different from the one used in both Dechow et al.. (1998) and BCN. Dechow et al. calculated the length of OC using the following equation $\alpha + (1-\pi)\gamma_1 - \beta(1-\pi)$ where $\alpha=(AR_t + AR_{t-1})/2sales_t$. $\beta=(AP_t+AP_{t-1})/2Sales$ $(1-\pi)$. $\Pi=E_t/Sales_t$, and $\gamma_t$ is target inventory as a fraction of forecasted cost of sales. Fore more details see Dechow et al. (p. 138).

The results of the analysis are reported in Table 6.3. Panel A provides the coefficients of the variables and its related t-value when $OCF_{t+1}$ is the dependent variable. As can be seen, the results are very close to those reported in Table 5.2. In each of the four quartiles, the signs of the coefficients of *E, OCF, AR, INV*, and *AGGACC* are positive and significant. The coefficient of *DEP* is negative in 3 groups out of 4, but not significant. Finally, the coefficient of *OTHER* has a positive sign in all the groups but not always significant.

In regard to the ability of the models in explaining future cash flows, Panel B presents the adjusted $R^2$ obtained from regressing models 1 to 4 at the portfolio level. In addition, the difference in the explanatory power of the models in explaining future cash flows and its related Vuong's z-statistic are reported. Consistent with the prior results in section 5.3.1, Vuong's test reveals that cash flows and the main components of accruals (Model 3) are a better predictor for future cash flows than model 1, model 2, or model 4. Cash flows and aggregate accruals (Model 2) are better than earnings alone (model 1) and cash flows alone (model 4) in predicting future cash flows. Finally, cash flows alone (Model 4) are better than earnings alone (model 1) in predicting future cash flows. These conclusions, in general, remain unchanged when $OCF_{t+2}$ and $OCF_{t+3}$ are used as the dependent variables. The above results reveal that the conclusions drawn at the whole sample level are not affected by the length of the operating cash cycle.

Dechow (1994) found that the association of cash flows with stock returns is negatively correlated with the length of the operating cycle. Following this line, Dechow et al. predict that the predictive ability of earnings relative to cash flows increases as the length of the operating cycle increases. In Panel B it can be noticed that the differences between the adjusted $R^2$ from model 4 and model 1 decrease as

OC increases. In group 1 it is 8.2%, falling to 2.12% in group 4. These results indicate that the superiority of cash flows over earnings in predicting future cash flows is negatively correlated with the length of the operating cash cycle. This also can be seen when comparing the adjusted $R^2$ of model 3 with models 1 and 4, separately. While the difference in adjusted $R^2$ between model 3 and model 1 is stable across all the groups, there is an increase in the difference between models 3 and 4 moving from group 1 to 4. This is mainly because of the decrease in the explanatory power of model 4.

For more investigation of this issue, the approach used in Dechow (1994) is adopted. This approach involves two steps. First, the explanatory power (adjusted $R^2$) is calculated for modes 1 and 4 by running industry specific regressions (reported in Table 6.1, Panel B). Second, the explanatory power relating to each industry specific regression is correlated with the mean operating cash cycle. Panel C presents descriptive statistics for the length of the operating cash cycle. As can be seen there is clear variation in the average length of the operating cash cycle across industries. The mean (median) of *OC* is ranges from 0.014 (0.001) to 0.251 (0.078). Panel D presents the Spearman correlation coefficients. Consistent with Dechow, it can be seen that there is a negative correlation of -0.214 between the $R^2$ from the cash flows regression and the length of operating cash cycle. This indicates that the predictive ability of cash flows decreases as the length of the operating cash cycle increase. However, the correlation coefficient is insignificant at any reasonable probability level. In contrast the correlation coefficient between the $R^2$ from the earnings regressions and the length of the operating cash cycle is positive but insignificant (0.25). This result also reveals that differences in the length of the operating cash cycle across industries do not

explain the variation in the value relevance of cash flows and accruals across industries.

Overall, the results in this section suggest that the role of accruals in explaining the variation in future cash flows decreases as the length of the operating cash cycle increases. There is also a decrease in the superiority of cash flows over earnings as the length of the operating cash cycle increases.

## Table 6.2
## Summary results for regressions of future cash flows on earnings, cash flows and accruals, by quartiles formed based on the length of the operating cash cycle
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

**Panel A: Summarizes the Coefficients of estimating models 1 to 4**

| Group1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.69* | 1.57* | | | | | | | | 75.3 | 4.26 |
| | (5.34) | (14.11) | | | | | | | | | |
| **Model 2** | 0.17* | | 1.27* | 0.59* | | | | | | 86.33 | 3.66 |
| | (2.74) | | (21.81) | (5.22) | | | | | | | |
| **Model 3** | 0.04 | | 1.12* | | -0.97* | 0.87* | 1.09* | -0.12 | 0.31 | 88.2 | 3.51 |
| | (0.72) | | (15.74) | | (-5.29) | (6.04) | (5.06) | (-0.62) | (1.92) | | |
| **Model 4** | 0.11 | | 0.98* | | | | | | | 83.5 | 3.85 |
| | (1.36) | | (27.22) | | | | | | | | |

## Table 6.2, Panel A, Continued

| Group2 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.42* | 1.72* | | | | | | | | 69.9 | 4.57 |
| | (4.93) | (20.46) | | | | | | | | | |
| **Model 2** | 0.2* | | 1.2* | 0.49* | | | | | | 80.2 | 4.15 |
| | (2.83) | | (14.4) | (3.96) | | | | | | | |
| **Model 3** | 0.11 | | 1.13* | | -0.91* | 0.79* | 0.71* | -0.17 | 0.44** | 81.9 | 4.06 |
| | (1.51) | | (13.93) | | (-6.05) | (5.68) | (5.03) | (-1.1) | (2.49) | | |
| **Model 4** | 0.26* | | 0.93* | | | | | | | 78.9 | 4.21 |
| | (3.85) | | (26.59) | | | | | | | | |
| **Group 3** | | | | | | | | | | | |
| **Model 1** | 0.86* | 1.45* | | | | | | | | 67.3 | 5.05 |
| | (8.87) | (20.14) | | | | | | | | | |
| **Model 2** | 0.42* | | 1.16* | 0.54* | | | | | | 76.6 | 4.72 |
| | (4.35) | | (17.7) | (5.67) | | | | | | | |
| **Model 3** | 0.18 | | 0.97* | | -0.76* | 0.76* | 0.53* | -0.01 | 0.16 | 79.4 | 4.59 |
| | (1.91) | | (12.51) | | (-6.1) | (7.13) | (3.66) | (-0.1) | (1.01) | | |
| **Model 4** | 0.42* | | 0.89* | | | | | | | 74.3 | 4.82 |
| | (4.22) | | (20.97) | | | | | | | | |
| **Group 4** | | | | | | | | | | | |
| **Model 1** | 1.09* | 1.27* | | | | | | | | 71.2 | 5.55 |
| | (10.96) | (25.93) | | | | | | | | | |
| **Model 2** | 0.69* | | 1.09* | 0.61* | | | | | | 76.9 | 5.32 |
| | (7.69) | | (30.23) | (10.01) | | | | | | | |
| **Model 3** | 0.09 | | 0.95* | | -0.67* | 0.77* | 0.56* | 0.05 | 0.39** | 79.4 | 5.21 |
| | (0.9) | | (15.3) | | (-6.53) | (7.25) | (5.32) | (0.36) | (2.08) | | |
| **Model 4** | 0.58* | | 0.81* | | | | | | | 73.1 | 5.48 |
| | (4.76) | | (19.17) | | | | | | | | |

*Significant at level 0.01.
**Significant at level 0.05.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## Table 6.2-Continued

**Panel B: Summarizes the adjusted $R^2$ obtained from analysing model 1 to 4 for one-year, two-year and three-year ahead cash flows at quartiles level based on the length of the operating cash cycle**

| **One-year ahead** | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** |
|---|---|---|---|---|---|---|---|
| **Group 1** | 75.3 | | 86.33 | | 88.2 | | 83.5 |
| | M2 vs.. M1 | M3 vs.. M2 | M3 vs.. M1 | M4 vs.. M1 | M2 vs.. M4 | M3 vs.. M4 | |
| *The difference* | *11.03** | *1.87** | *12.9** | *8.2** | *2.83** | *4.7** | |
| *Vuong's Z-statistic* | *8.1* | *4.45* | *9.86* | *4.89* | *4.29* | *6.5* | |
| **Group 2** | 69.9 | | 80.2 | | 81.9 | | 78.9 |
| *The difference* | *10.3** | *1.7** | *12** | *9** | *1.3** | *3** | |
| *Vuong's Z-statistic* | *8.56* | *4.39* | *9.51* | *6.34* | *3.98* | *6.11* | |
| **Group 3** | 67.3 | | 76.6 | | 79.4 | | 74.3 |
| *The difference* | *9.3** | *2.8** | *12.1** | *7** | *2.3** | *5.1** | |
| *Vuong's Z-statistic* | *9.47* | *5.36* | *11* | *5.39* | *5.66* | *9.14* | |
| **Group 4** | 71.2 | | 76.9 | | 79.4 | | 73.1 |
| *The difference* | *5.7** | *2.5** | *8.2** | *1.9** | *3.8** | *6.3** | |
| *Vuong's Z-statistic* | *9.76* | *6.53* | *13* | *2.12* | *9.22* | *11.58* | |
| **Two-year ahead** | | | | | | | |
| **Group 1** | 70 | | 78.37 | | 82.11 | | 75.22 |
| *The difference* | *8.37** | *3.74** | *12.11** | *5.22* | *3.15*** | *6.89** | |
| *Vuong's Z-statistic* | *4.69* | *3.54* | *7.37* | *1.49* | *1.99* | *2.85* | |
| **Group 2** | 62.64 | | 71.84 | | 73.82 | | 69.93 |
| *The difference* | *9.2** | *1.98** | *11.18** | *7.29** | *1.91** | *3.89** | |
| *Vuong's Z-statistic* | *5.92* | *3.98* | *6.07* | *3.91* | *4.28* | *6.6* | |
| **Group 3** | 61.96 | | 67.73 | | 71.29 | | 63.58 |
| *The difference* | *5.77** | *3.56** | *9.33** | *1.62* | *4.15** | *7.71** | |
| *Vuong's Z-statistic* | *6.78* | *5.28* | *9.57* | *1.14* | *6.09* | *7.16* | |
| **Group 4** | 49.67 | | 56.46 | | 62.4 | | 52.58 |
| *The difference* | *6.79** | *5.94** | *12.73** | *2.91*** | *3.88** | *9.82** | |
| *Vuong's Z-statistic* | *8.35* | *7.31* | *11.56* | *2.17* | *5.66* | *9.09* | |

## Table 6.2, Panel B, Continued

| Three-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 67.7 | | 76.6 | | 77.5 | | 76.4 |
| | M2 vs.. M1 | M3 vs.. M2 | M3 vs.. M1 | M4 vs.. M1 | M2 vs.. M4 | M3 vs.. M4 | |
| *The difference* | *8.9** | *0.9* | *9.8** | *8.7** | *0.2* | *1.1* | |
| *Vuong's Z-statistic* | *7.13* | *1.4* | *7.12* | *6.22* | *0.42* | *1.55* | |
| **Group 2** | 54.8 | | 63.71 | | 65.38 | | 61.66 |
| *The difference* | *8.91** | *1.67*** | *10.58** | *6.86** | *2.05** | *3.72** | |
| *Vuong's Z-statistic* | *4.68* | *2.1* | *4.71* | *3.05* | *3.47* | *4.34* | |
| **Group 3** | 51.39 | | 59.78 | | 61.61 | | 57.69 |
| *The difference* | *8.39** | *1.83*** | *10.22** | *6.3** | *2.09** | *3.92** | |
| *Vuong's Z-statistic* | *3.3* | *2.13* | *7.39* | *3.3* | *2.98* | *3.16* | |
| **Group 4** | 40 | | 47 | | 53.97 | | 44 |
| *The difference* | *7** | *6.97** | *13.97** | *4** | *3** | *9.97** | |
| *Vuong's Z-statistic* | *7.24* | *6.41* | *9.14* | *2.58* | *3.67* | *7.92* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

# Table 6.2-Continued

## Panel C: Summarizes the Descriptive Statistics on operating cash cycle at industry level

| Sector | NOB | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|---|
| 1 | 182 | 0.059 | 0.009 | 0.215 | 0 | 2.020 |
| 2 | 832 | 0.072 | 0.027 | 0.140 | 0 | 1.916 |
| 3 | 1137 | 0.122 | 0.033 | 0.625 | 0 | 15.047 |
| 4 | 1377 | 0.235 | 0.035 | 1.513 | 0 | 48 |
| 5 | 2931 | 0.105 | 0.023 | 0.333 | 0 | 6.055 |
| 6 | 174 | 0.014 | 0.001 | 0.033 | 0 | 0.21 |
| 7 | 558 | 0.251 | 0.078 | 1.613 | 0 | 35.82 |

## Panel D: Spearman correlation between adjusted $R^2$ from 7 industry-specific regressions of one-year-ahead cash flows on cash flows and on earnings with the average industry operating cash cycle

| | Operating Cycle |
|---|---|
| $R^2$ from operating cash flow regressions (*Probability*) | -0.214 (*0.65*) |
| $R^2$ from earnings regressions (*probability*) | 0.25 (*0.59*) |

## 6.4 The Effect of Extreme Earnings

The price-based UK study by Garrod et al. (2000) found that long-term accruals were valued differently in extreme earnings cases, i.e. when the contextual variable was negative or highly positive. However, short term accruals were rarely valued differently. They concluded:

> *The isolation of accruals from cash flows only takes on a valuation significance in conditions which are unusual and unlikely to persist (negative, very low or very high values of earnings, operating cash flow or accruals). (Garrod et al., 2000, p.15).*

Thus, decomposing earnings into accruals and cash flows had no significant impact for mid-range profit companies, but for loss-making and high profit companies it had information content. They arrived at this conclusion after analyzing different sub-samples of companies: they created five groupings. The first group contained all companies with negative earnings; the second contained the lowest positive earnings quartile and so on, while the fifth group contained the highest earnings quartile. To investigate whether a similar effect may be observed from a direct analysis of future cash flow data — rather than price-based proxies — the same approach is adopted in this study. Companies reporting negative earnings are placed into a group of their own. The majority of companies report positive earnings numbers and these are divided into four groups on the basis of quartile calculations for positive earnings levels. Thus, we have five groups, from the lowest earnings levels (negative earnings group) to the highest quartile for the positive earnings sample.

Models 1, 2, 3 and 4 are estimated using OLS and a summary of the results are

presented in Table 6.3. Panel A summarizes the coefficients for the models when $OCF_{t+1}$ is the dependent variable. Consistent with the prior OLS results conducted on the whole sample of firms, the coefficients of *E, OCF, AGGACC, AR*, *INV* and *OTHER* are positive for all the sub-samples. The coefficient of *AP* is negative for all the groups. In groups 1 and 5 –where earnings values are extreme- the coefficients of *E, OCF, AGGACC, AP, AR, INV* and *OTHER* are significant at the 0.05 level. The component of long-term accruals (*DEP*) is only significant at a 0.05 level in group 1. A summary of the adjusted $R^2$ values is given in Panel B. This Panel also reports the Vuong test statistics which are used to examine the relative explanatory power of the models. The results relate to one-year, two-year and three-year ahead cash flows ($OCF_{t+1,}$, $OCF_{t+2}$, and $OCF_{t+3}$).

The first point to note is that within each of the five sub-samples, there is evidence of the gains to the disaggregation of earnings data. Model 1 generates the lowest adjusted $R^2$ values. When earnings are disaggregated into cash flows and aggregate accruals, the adjusted $R^2$ values increase and this increase is statistically significant in all cases as indicated by the Vuong statistics. The results for model 3 show that the further disaggregation of earnings into cash flows and individual accrual components leads again to significant improvements in explanatory power. Regarding the ability of cash flows alone, the results reveal that model 4 is significantly better than model 1 in predicting future cash flows in each of the five groups. These results confirm the findings of the earlier OLS analysis, conducted on the whole sample of firms.

The results in Panel B also provide an insight into the role of accruals for extreme earnings performers. In their study, Garrod, et al. (2000) find that accruals data are of greatest value for companies with extreme levels of earnings-per-share. In

Panel B it can be seen that models 2 and 3 — which contain aggregate and disaggregated accruals components, respectively — generate their greatest adjusted $R^2$ values for extreme earnings performers (i.e. Groups 1 and 5). This could be interpreted as supporting the conclusion of Garrod, et al. However, this pattern in the adjusted $R^2$ can also be found in Models 1 and 4.

An alternative approach to evaluate the role of accruals is to see how the adjusted $R^2$ value changes from model 1 to model 2, i.e. when earnings are broken down into cash flows and aggregate accruals. Across the five groups, there does not appear to be any obvious trend. Moving from the lowest to the highest earnings levels, the absolute changes in the adjusted $R^2$ values are: 11.8%, 14.18%, 15.52%, 19.9% and 7.7%. Indeed, it could be argued that these results indicate that accruals data are less important for the extreme performers. A similar pattern is found when comparing model 1 with model 3, i.e. when earnings are broken down into cash flows and accruals components. The same pattern can also be noticed when predicting two-year and three-year ahead. The results reveal that the superiority of cash flows over earnings is less clear for the extreme performers. These results appear inconsistent with the conclusions of Garrod et al. (2000). This inconsistency may be due to the different dependent variables used in the two studies. In Garrod, et al. the share price proxied for future cash flows while in this study actual future operating cash flow is the dependent variable.

If it is assumed that extreme earnings performance is more likely to be reflect a larger temporary component (Garrod, et al., 2000, p.15) these results provide indirect evidence on the affect of earnings permanence on the value relevance of earnings components. Charitou, et al. (2001), using UK data, reported that as earnings become more transitory the value relevance of earnings decreased, which is

inconsistent with the above results. In addition, the literature on earnings management suggests that manipulation of earnings is most likely when earnings levels are extreme, and a consequence of such manipulation may be a reduction in the predictive ability of accruals (e.g. McNichols and Wilson, 1988; Yoon and Miller, 2002).

## Table 6.3
## Summary results for regressions of future cash flows on earnings, cash flows and accruals, by groups formed based on the level of earnings
### (Sample of 7191 Firm-Year Observations, 1991-2000)

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*

*Variables are defined as for Table 5.1.*

**Panel A: Summarizes the Coefficients for models 1 to 4**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.6* | 0.72* | | | | | | | | 34 | 4.75 |
| | (4.75) | (7.02) | | | | | | | | | |
| **Model 2** | 0.37* | | 0.81* | 0.38* | | | | | | 45.8 | 4.55 |
| | (2.92) | | (7.87) | (3.48) | | | | | | | |
| **Model 3** | 0.09* | | 0.86* | | -0.84* | 0.65* | 0.69* | 0.47* | 0.27* | 54.8 | 4.37 |
| | (1.03) | | (9.61) | | (-5.57) | (4.37) | (5.92) | (2.61) | (1.95) | | |
| **Model 4** | -0.06 | | 0.62* | | | | | | | 40 | 4.65 |
| | (-0.93) | | (7.81) | | | | | | | | |
| **Group 2** | | | | | | | | | | | |
| **Model 1** | 0.29* | 1.38* | | | | | | | | 2.7 | 2.77 |
| | (5.34) | (5.97) | | | | | | | | | |
| **Model 2** | 0.21* | | 1* | 0.55** | | | | | | 17 | 2.62 |
| | (4.27) | | (4.7) | (2.15) | | | | | | | |
| **Model 3** | -0.01 | | 0.71* | | -0.86* | 0.94* | 0.65* | 0.69* | 0.25 | 38.3 | 2.32 |
| | (-0.35) | | (3.63) | | (-3.64) | (4.29) | (2.84) | (2.7) | (0.91) | | |
| **Model 4** | 0.32* | | 0.47* | | | | | | | 16.6 | 2.62 |
| | (6.8) | | (5.24) | | | | | | | | |

## Table 6.3, Panel A, Continued

| Group 3 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.26 | 1.75* | | | | | | | | 3 | 3.65 |
| | (1.45) | (6.8) | | | | | | | | | |
| **Model 2** | 0.17 | | 1.38* | 0.89* | | | | | | 18.5 | 3.47 |
| | (1.02) | | (5.5) | (3) | | | | | | | |
| **Model 3** | -0.41 | | 0.92* | | -0.65 | 0.91* | 0.58 | 0.38 | 0.38 | 34.2 | 3.26 |
| | (-0.00) | | (3.2) | | (-1.17) | (2.78) | (1.77) | (0.91) | (0.83) | | |
| **Model 4** | 0.74* | | 0.51* | | | | | | | 17.8 | 3.48 |
| | (5.5) | | (5.04) | | | | | | | | |
| **Group 4** | | | | | | | | | | | |
| **Model 1** | 0.03 | 1.84* | | | | | | | | 7.6 | 4.23 |
| | (0.11) | (10.45) | | | | | | | | | |
| **Model 2** | 0.22 | | 1.27* | 0.73* | | | | | | 27.5 | 3.99 |
| | (1.04) | | (8.35) | (4) | | | | | | | |
| **Model 3** | 0.09 | | 1.04* | | -0.91* | 0.87* | 0.57* | -0.17 | 0.29 | 33.5 | 3.9 |
| | (0.46) | | (6.52) | | (-4.52) | (4.13) | (3.22) | (-0.64) | (1.45) | | |
| **Model 4** | 1.16* | | 0.58* | | | | | | | 26.5 | 4 |
| | (7.23) | | (9.48) | | | | | | | | |
| **Group 5** | | | | | | | | | | | |
| **Model 1** | 1* | 1.5* | | | | | | | | 67.7 | 6.1 |
| | (3.38) | (23.36) | | | | | | | | | |
| **Model 2** | 0.84* | | 1.16* | 0.61* | | | | | | 75.4 | 5.79 |
| | (4.6) | | (27.55) | (8.71) | | | | | | | |
| **Model 3** | 0.29 | | 1.04* | | -0.71* | 0.78* | 0.56* | -0.13 | 0.4** | 77.4 | 5.71 |
| | (1.42) | | (20.41) | | (-8.2) | (10) | (4.38) | (-1.6) | (2.3) | | |
| **Model 4** | 1.48* | | 0.84* | | | | | | | 72.7 | 5.89 |
| | (5.95) | | (26.6) | | | | | | | | |

Group 1 contains the observations that have negative earnings value (1288 observations). Then the rest of observations are assigned equally into groups 2, 3, 4and 5.
*Significant at level 0.01.
**Significant at level 0.05.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## Table 6.3-Continued

**Panel B: Summarize the adjusted $R^2$% obtained from analysing model 1 to 4 for one-year, two-year and three-year ahead cash flows and the results of Vuong's test, at sub-samples level based on the level of earnings**

| One-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 34 | | 45.8 | | 54.8 | | 40 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *11.8** | *9** | *20.8** | *6*** | *5.8** | *14.8** | |
| *Vuong's Z-statistic* | *6.8* | *6.28* | *10.41* | *2.09* | *3.34* | *6.05* | |
| **Group 2** | 2.77 | | 17 | | 38.3 | | 16.6 |
| *The difference* | *14.23** | *21.3** | *35.53** | *13.83** | *0.4* | *21.7** | |
| *Vuong's Z-statistic* | *4.27* | *7.15* | *7.28* | *4.14* | *0.02* | *7.28* | |
| **Group 3** | 3 | | 18.5 | | 34.2 | | 17.8 |
| *The difference* | *15.5** | *15.7** | *31.2** | *14.8** | *0.7* | *16.4** | |
| *Vuong's Z-statistic* | *4.22* | *4.74* | *7.61* | *3.98* | *1.35* | *4.92* | |
| **Group 4** | 7.8 | | 27.5 | | 33.5 | | 26.5 |
| *The difference* | *19.7** | *6** | *25.7** | *18.7** | *1** | *7** | |
| *Vuong's Z-statistic* | *7.31* | *5.25* | *10.4* | *6.67* | *2.66* | *5.44* | |
| **Group 5** | 67.7 | | 75.4 | | 77.4 | | 72.7 |
| *The difference* | *7.7** | *2** | *9.7** | *5** | *2.7** | *4.7** | |
| *Vuong's Z-statistic* | *11.91* | *6.15* | *13.16* | *5.83* | *8.98* | *9.98* | |
| **Two-year ahead** | | | | | | | |
| **Group 1** | 14.65 | | 28.69 | | 36.24 | | 28.31 |
| *The difference* | *14.04** | *7.55** | *21.59** | *13.66** | *0.38* | *7.93** | |
| *Vuong's Z-statistic* | *6.95* | *3.97* | *7.31* | *6.33* | *-0.11* | *3.82* | |
| **Group 2** | 2 | | 15.56 | | 28.58 | | 15.44 |
| *The difference* | *13.56** | *13.02** | *26.58** | *13.44** | *0.12* | *13.14** | |
| *Vuong's Z-statistic* | *4* | *5.58* | *6.26* | *4* | *-1.99* | *5.59* | |
| **Group 3** | 3.5 | | 13.9 | | 23.38 | | 12.62 |
| *The difference* | *10.4** | *9.48** | *19.88** | *9.12** | *1.28*** | *10.76** | |
| *Vuong's Z-statistic* | *4* | *3.89* | *6.72* | *3.4* | *2.43* | *4.12* | |
| **Group 4** | 6.3 | | 19.88 | | 25.59 | | 18.83 |
| *The difference* | *13.58** | *5.71** | *19.29** | *12.53** | *1.05*** | *6.76** | |
| *Vuong's Z-statistic* | *6.77* | *3.86* | *8.33* | *5.99* | *2.22* | *4.38* | |
| **Group 5** | 50.2 | | 56.16 | | 60.47 | | 50.78 |
| *The difference* | *5.96** | *4.31** | *10.27** | *0.58* | *5.38** | *9.69** | |
| *Vuong's Z-statistic* | *6.9* | *5.89* | *8.9* | *0.33* | *5.95* | *7.99* | |

## Table 6.3, Panel B, Continued

| Three-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 5.89 | | 17.72 | | 24.19 | | 17.82 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *11.83** | *6.47*** | *18.3** | *11.93** | *-0.1** | *6.37* | |
| *Vuong's Z-statistic* | *4.52* | *2.23* | *4.97* | *4.53* | *-10.38* | *1.87* | |
| **Group 2** | 1.4 | | 18.25 | | 23.61 | | 18.32 |
| *The difference* | *16.85** | *5.36* | *22.21** | *16.92** | *-0.07** | *5.29* | |
| *Vuong's Z-statistic* | *3.52* | *1.72* | *3.39* | *3.63* | *-20.99* | *1.47* | |
| **Group 3** | 3.1 | | 12.25 | | 25.76 | | 11.24 |
| *The difference* | *9.15** | *13.51** | *22.66** | *8.14** | *1.01* | *14.52** | |
| *Vuong's Z-statistic* | *4.04* | *5.38* | *6.72* | *3.61* | *1.56* | *5.62* | |
| **Group 4** | 6.03 | | 14.74 | | 20.96 | | 13.1 |
| *The difference* | *8.71** | *6.22** | *14.93** | *7.07** | *1.64*** | *7.86** | |
| *Vuong's Z-statistic* | *4.21* | *2.99* | *4.83* | *3.08* | *2.43* | *3.94* | |
| **Group 5** | 42.35 | | 49.6 | | 51.11 | | 46.3 |
| *The difference* | *7.25** | *1.51* | *8.76** | *3.95*** | *3.3** | *4.81** | |
| *Vuong's Z-statistic* | *6.56* | *0.88* | *6.23* | *2.55* | *4.87* | *4.56* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## 6.5 The Effect of Extreme Cash Flows

Again, referring to the study of Garrod et al. (2000), one of their conclusions is that disaggregating earnings into cash flows and accruals is most useful when the value of operating cash flows is negative or highly positive. Following the same methods used in Garrod et al., companies reporting negative operating cash flows are placed into a group of their own. Then the companies that report positive operating cash flow numbers are divided into four groups on the basis of quartiles. Thus, five groups are formed, from the lowest cash flows levels (group1) to the highest quartile for the positive cash flows sample (group 5).

Table 6.4, Panel A presents the results of analysing models 1 to 4 at the sub-samples level. As can be seen, the sign of the coefficients of all the variables remain unchanged. In group 1, where cash flows' values are negative, all the coefficients of the variables except *DEP* and *OTHER* are significant at the 0.05 level. In group 5, where cash flows' values are too positive, all the coefficients of the variables are significant at the 0.05 level. It can be seen, in general, that the value of the coefficients of earnings and accruals are higher when the value of cash flows are extreme than when the cash flow values are in the mid-range groups. This may give an early indication of the role for accruals when cash flows are transitory i.e. negative and very highly positive..

Turning now to the explanatory power of models 1 to 4, Panel B summarizes the adjusted $R^2$s associated with the models when explaining one-year, two-year and three-year ahead cash flows. In addition, Vuong's Z-statistic are provided. As can be seen the main inferences drawn from the whole sample remain unchanged. Cash flows and the main components of accruals are a better predictor for future cash

flows. Aggregate accruals and cash flows have the second highest explanatory power. Contrary to results drawn from the whole sample, current earnings alone turn out to be better than current operating cash flows alone in predicting future cash flows in most groups. For instance, when $OCF_{t+1}$ and $OCF_{t+2}$ are the dependent variables, Vuong test reveals that *E* alone (model 1) is significantly better than *OCF* alone (model 4) in explaining the variation in future cash flows in groups 1 and 4. In contrast, operating cash flow alone is better than earnings alone only in group 5, where operating cash flow is very high.

The results in Panel B also provide an insight on the role of accruals in predicting future cash flows. The reported differences between the relevant models and the related Vuong's z-statistic are used to evaluate the role of accruals. For instance, across the five groups, the differences in adjusted $R^2$s (Vuong's z-statistics) between model 1 and model 2 are 0.3 (1.03), 2.2 (4.53), 2.3 (4.71), 3.1 (5.35) and 8.1 (12.83). A similar pattern can be seen in the differences between model 1 and model 3. Consistent with the results reported in section 6.3, these results indicate that the gains to decomposing earnings into accruals and cash flows are less important for the extreme performers. Overall, contrary to the results of Garrod et al., the results in this section reveal that the value relevance of decomposing earnings into its components reduces when the value of cash flows is negative or highly positive.

The notable result in this section is that, in all groups except in group 5, the predictive ability of earnings alone in predicting future cash flows is more than for cash flows alone. The prior price-based studies (e.g. Ali (1994) and Ali and Pope (1995)) which used the value of cash flows as a contextual variable indicate that cash flows have incremental information content beyond that already existing in earnings only when the absolute changes in cash flows are low. If it is assumed that negative

cash flows and very high positive cash flows contain a large temporary component (Garrod et al. (2000), p.15), the results in this section appear to be inconsistent with the results of Ali (1994) and Ali and Pope (1995).

It can be argued here that the level of cash flows may not indicate that cash flow is permanent or transitory, as Garrod et al. have suggested. Instead, partitioning the whole sample according to the level of cash flows may reflect the level of earnings management[3]. This proposition is supported by Yoon and Miller (2002)). They found that mangers managed earnings when the values of cash flows are extreme. Yoon and Miller suggest that one of the indicators of earnings management is a negative correlation between the value of cash flows and the value of aggregate accruals. More specifically, they found that when cash flow is negative the mean of total accruals is positive and then decrease as the value of cash flows increases. In order to examine if the same pattern exists in the data of this study, Panel C provides the mean and the median of aggregate accruals for each group. Consistent with Yoon and Millar, the mean of aggregate accruals is positive when cash flow values are negative, and then decrease as the value of cash flows increase. The same pattern can be seen when predicting two-year and three-year ahead cash flows. These results may provide indirect evidence on the existence of earnings' management in UK data. Earnings management either improves the ability of earnings in predicting future cash flows or impairs it (Dechow 1994). Based on this, it can be argued that the failure of cash flows alone in explaining the variation in future cash flows more than earnings alone in groups 1, 2, 3, and 4 is caused by earnings' management. At the same time, the superiority of cash flows over earnings in explaining future cash flows in group 5

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[3] This argument is based on the results of prior studies. McNichols and Wilson (1988) found that partitioning the whole sample according to the level of cash flows equivalents to partitioning it according to the level of total accruals. Dechow 1994 links the level of the existence of earnings management with the level of accruals.

may also be caused by earnings management. The discussion in the next section will provide an answer for this puzzle.

## Table 6.4
## Summary results for regressions of future cash flows on earnings, cash flows and accruals, by groups formed based on the level of operating cash flows
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

**Panel A: Summarizes the Coefficients of estimating models 1 to 4**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.13 | 0.78* | | | | | | | | 43.1 | 4.78 |
| | (1.41) | (9.65) | | | | | | | | | |
| **Model 2** | 0.27* | | 0.83* | 0.67* | | | | | | 43.4 | 4.77 |
| | (2.88) | | (9.62) | (6.85) | | | | | | | |
| **Model 3** | -0.05 | | 0.88* | | -0.74* | 0.69* | 0.54* | 0.55 | 0.29 | 50.8 | 4.64 |
| | (-0.48) | | (9.1) | | (-4.1) | (6.39) | (3) | (1.89) | (1.20) | | |
| **Model 4** | 0.36* | | 0.63* | | | | | | | 26.7 | 5.03 |
| | (2.67) | | (5.89) | | | | | | | | |
| **Group 2** | | | | | | | | | | | |
| **Model 1** | 0.5* | 0.23** | | | | | | | | 3 | 2.89 |
| | (15.04) | (2.36) | | | | | | | | | |
| **Model 2** | 0.23* | | 0.91* | 0.2** | | | | | | 5.2 | 2.87 |
| | (4.67) | | (7.65) | (1.99) | | | | | | | |
| **Model 3** | 0.05 | | 0.65* | | -0.43* | 0.4** | 0.22 | 0.76* | 0.04 | 15.6 | 2.76 |
| | (1.1) | | (5.35) | | (-2.61) | (2.35) | (1.33) | (2.93) | (0.029) | | |
| **Model 4** | 0.21* | | 0.84* | | | | | | | 3.1 | 2.89 |
| | (4.34) | | (7.24) | | | | | | | | |

## Table 6.4, Panel A, Continued

| Group 3 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 1.02* | 0.48* | | | | | | | | 6.3 | 3.51 |
| | (8.92) | (2.72) | | | | | | | | | |
| **Model 2** | 0.08 | | 1.24* | 0.44** | | | | | | 8.6 | 3.48 |
| | (0.5) | | (8.04) | (2.49) | | | | | | | |
| **Model 3** | -0.04 | | 0.93* | | -0.69* | 0.49** | 0.47* | 0.4 | -0.05 | 19.6 | 3.36 |
| | (-0.35) | | (4.5) | | (-3.12) | (2.56) | (2.61) | (1.1) | (-0.16) | | |
| **Model 4** | 0.15 | | 0.97* | | | | | | | 3.3 | 3.54 |
| | (0.99) | | (8.24) | | | | | | | | |
| **Group 4** | | | | | | | | | | | |
| **Model 1** | 1.53* | 0.86* | | | | | | | | 16.6 | 4.1 |
| | (10.64) | (7.78) | | | | | | | | | |
| **Model 2** | -0.11 | | 1.45* | 0.74* | | | | | | 19.7 | 4.06 |
| | (-0.48) | | (12.96) | (6.37) | | | | | | | |
| **Model 3** | -0.26 | | 1.08* | | -0.64* | 0.9* | 0.62* | 0.28 | 0.32 | 29.9 | 3.93 |
| | (-1.21) | | (9.59) | | (-4.44) | (7.39) | (4.23) | (1.53) | (1.8) | | |
| **Model 4** | -0.16 | | 1.12* | | | | | | | 8.9 | 4.19 |
| | (-0.65) | | (11.1) | | | | | | | | |
| **Group 5** | | | | | | | | | | | |
| **Model 1** | 2.02* | 1.42* | | | | | | | | 68.6 | 5.99 |
| | (10.7) | (33.2) | | | | | | | | | |
| **Model 2** | 0.52* | | 1.16* | 0.57* | | | | | | 76.7 | 5.69 |
| | (2.67) | | (30.3) | (9.24) | | | | | | | |
| **Model 3** | 0.18 | | 1.06* | | -0.78* | 0.81* | 0.64* | -0.15** | 0.45* | 78.8 | 5.61 |
| | (1.02) | | (21.9) | | (-10.2) | (9.08) | (4.03) | (-2) | (2.92) | | |
| **Model 4** | 0.39 | | 0.89* | | | | | | | 73.9 | 5.81 |
| | (1.65) | | (30.2) | | | | | | | | |

Group 1 contains the observations that have negative cash flows value (1158 observations). Then the rest of observations are assigned equally into groups 2, 3, 4 and 5.
*Significant at level 0.01.
**Significant at level 0.05.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (white, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## Table 6.4, Continued

**Panel B: Summarize the adjusted $R^2$% obtained from analysing model 1 to 4 for one-year, two-year and three-year ahead cash flows and the results of Vuong's test, at sub-samples level based on the level of operating cash flows**

| One-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 43.1 | | 43.4 | | 50.8 | | 26.7 |
| | *M2 vs. M1* | *M3 vs. M2* | *M3 vs. M1* | *M4 vs. M1* | *M2 vs. M4* | *M3 vs. M4* | |
| *The difference* | *0.3* | *7.4** | *7.7** | *-16.4** | *16.7** | *24.1** | |
| *Vuong's Z-statistic* | *1.03* | *4.9* | *4.98* | *-5.97* | *6.94* | *8.68* | |
| **Group 2** | 3 | | 5.2 | | 15.6 | | 3.1 |
| *The difference* | *2.2** | *10.4** | *12.6** | *0.1* | *2.1* | *12.5** | |
| *Vuong's Z-statistic* | *4.53* | *5.06* | *6.19* | *0.062* | *1.59* | *4.32* | |
| **Group 3** | 6.3 | | 8.6 | | 19.6 | | 3.3 |
| *The difference* | *2.3** | *11** | *13.3** | *-3* | *5.3*** | *16.3** | |
| *Vuong's Z-statistic* | *4.71* | *3.2* | *3.84* | *-1.32* | *2.32* | *4.18* | |
| **Group 4** | 16.6 | | 19.7 | | 29.9 | | 8.9 |
| *The difference* | *3.1** | *10.2** | *13.3** | *-7.7** | *10.8** | *21** | |
| *Vuong's Z-statistic* | *5.35* | *4.29* | *5.81* | *-4.18* | *6.96* | *6.74* | |
| **Group 5** | 68.6 | | 76.7 | | 78.8 | | 73.9 |
| *The difference* | *8.1** | *2.1** | *10.2** | *5.3** | *2.8** | *4.9** | |
| *Vuong's Z-statistic* | *12.83* | *5.95* | *12.98* | *6.36* | *9.46* | *9.88* | |
| **Two-year ahead** | | | | | | | |
| **Group 1** | 28.13 | | 28.65 | | 43.69 | | 8.3 |
| *The difference* | *0.52* | *15.04** | *15.56** | *-19.83** | *20.35** | *35.39** | |
| *Vuong's Z-statistic* | *0.09* | *6.51* | *5.78* | *-5.74* | *5* | *6.94* | |
| **Group 2** | 5.59 | | 6.27 | | 11.03 | | 1.54 |
| *The difference* | *0.68* | *4.76*** | *5.44* | *-4.05** | *4.73** | *9.49** | |
| *Vuong's Z-statistic* | *0.73* | *1.99* | *1.86* | *-2.65* | *3.24* | *3.94* | |
| **Group 3** | 3.58 | | 7.02 | | 17.29 | | 4.62 |
| *The difference* | *3.44** | *10.27** | *13.71** | *1.04* | *2.4* | *12.67** | |
| *Vuong's Z-statistic* | *5.24* | *3.39* | *4.67* | *0.52* | *1.06* | *4.37* | |
| **Group 4** | 14.4 | | 17.18 | | 22.5 | | 7.57 |
| *The difference* | *2.78** | *5.32** | *8.1** | *-6.83** | *9.61** | *14.93** | |
| *Vuong's Z-statistic* | *4.76* | *2.98* | *4.55* | *-3.77* | *6.08* | *6.31* | |
| **Group 5** | 49.78 | | 58.12 | | 61.93 | | 53.94 |
| *The difference* | *8.34** | *3.81** | *12.15** | *4.16** | *4.18** | *7.99** | |
| *Vuong's Z-statistic* | *9.09* | *5.76* | *10.72* | *3.12* | *6.98* | *8.99* | |

## Table 6.4, Panel B, Continued

| Three-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 13.79 | | 13.68 | | 25.29 | | 6.6 |
| | *M2 vs. M1* | *M3 vs. M2* | *M3 vs. M1* | *M4 vs. M1* | *M2 vs. M4* | *M3 vs. M4* | |
| *The difference* | *-0.11** | *11.61** | *11.5** | *-7.19** | *7.08** | *18.69** | |
| *Vuong's Z-statistic* | *-11.98* | *2.97* | *2.75* | *-3.18* | *2.88* | *3.44* | |
| **Group 2** | 4.42 | | 5.1 | | 15.14 | | 1.62 |
| *The difference* | *0.68* | *10.04** | *10.72** | *-2.8*** | *3.48** | *13.52** | |
| *Vuong's Z-statistic* | *0.42* | *4.31* | *4.39* | *-2.38* | *2.66* | *5.55* | |
| **Group 3** | 4.47 | | 7.34 | | 19.08 | | 4.2 |
| *The difference* | *2.87** | *11.74** | *14.61** | *-0.27* | *3.14* | *14.88** | |
| *Vuong's Z-statistic* | *4.4* | *4.61* | *5.67* | *-0.15* | *1.72* | *6.29* | |
| **Group 4** | 11.28 | | 13.9 | | 18 | | 6.7 |
| *The difference* | *2.62** | *4.1*** | *6.72** | *-4.58*** | *7.2** | *11.3** | |
| Vuong's Z-statistic | 3.72 | 2.12 | 3.97 | -2.51 | 3.72 | 4.83 | |
| **Group 5** | 40.11 | | 48.5 | | 50.4 | | 45 |
| *The difference* | *8.39** | *1.9* | *10.29** | *4.89** | *3.5** | *5.4** | |
| *Vuong's Z-statistic* | *7.55* | *1.61* | *7.55* | *3.15* | *4.74* | *4.73* | |

Group 1 contains the observations that have negative cash flows value (1158, 906, and 703 observations for one-year, two-year and three-ahead, respectively). Then the rest of observations are assigned equally into groups 2, 3, 4, and 5.

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

# Table 6.4, Continued

**Panel C: presents the mean and the median of Aggregate accruals for the groups formed according to the level of operating cash flows**

| | one -year ahead | | Two-year ahead | | three-year ahead | |
|---|---|---|---|---|---|---|
| | Mean | Median | Mean | Median | Mean | Median |
| **Group 1** | 0.59 | 0.12 | 0.58 | 0.14 | 0.55 | 0.15 |
| **Group 2** | -0.21 | -0.18 | -0.21 | -0.17 | -0.19 | -0.17 |
| **Group 3** | -0.58 | -0.58 | -0.58 | -0.57 | -0.59 | -0.57 |
| **Group 4** | -1.21 | -1.19 | -1.17 | -1.14 | -1.11 | -1.11 |
| **Group 5** | -4.51 | -3.16 | -4.05 | -2.98 | -3.84 | -2.91 |

Group 1 contains the observations that have negative cash flows value (1158, 906, and 703 observations for one-year , two-year and three-ahead , respectively). Then the rest of observations are assigned equally into groups 2, 3, 4, and 5.

## 6.6 The Effect of the Magnitude of Aggregate Accruals

Accruals are subject to managerial discretion because of the flexibility accorded under the Generally Accepted Accounting Principles (GAAP). Accruals also represent the difference between *OCF* and *E*. So any superiority for earnings over cash flows is caused by accruals. Accruals mitigate timing and mismatching problems inherent in measuring cash flows over short intervals (Dechow et al. (1998) and Dechow, 1994). In addition, managers could use their control over accruals recognition to signal private information, which enhances earnings' informativeness (quality) (Watts and Zimmerman, 1986). At the same time, any superiority for cash flows over earnings is caused by accruals. Managers, for different reasons[4] (e.g. maximizing incentive compensation) may use accruals to manage earnings opportunistically, thereby destroying the quality of the reported earnings (Watts and Zimmerman, 1986; Mulford and Comiskey, 2002).

Therefore, the predictive ability of earnings depends on how managerial discretion is used. It may be argued here that earnings quality depends on the quality of accruals. Dechow and Dichev (2001) found that the quality of accruals is negatively correlated with the magnitude of total aggregate accruals. This is because the noise error in the estimation of accruals increases. This implies that a large magnitude for accruals may be associated with reduced predictive ability of earnings. This provides a possible explanation as to why in section 6.5, cash flows outperform earnings in explaining the variation in future cash flows for group 5. Referring back to Table 6.4 Panel C, it can be seen that the mean of aggregate accruals in group 5 is substantially larger than in other groups.

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[4] Fore more information about earnings management and its incentives and consequences the reader is referred to Smith (1996) and Mulford and Comiskey (2002).

To provide more comprehensive and direct evidence on the effect of the magnitude of total accruals on the value relevance of earnings' components, all the observations are grouped into quintiles based on the absolute value of aggregate accruals *(absacc)*. Group 1 contains firm observations for which the magnitude of *absacc* is very small, while group 5 contains firm observations for which the magnitude of *absacc* is very large. Models 1 to 4 are estimated for each group.

Table 6.5 summarizes the results of estimating the models for each group. Panel A presents the coefficients of the variables when $OCF_{t+1}$ is the dependent variable. The results in Panel A, in general, show that the coefficients of all the variables have the expected signs. Across all groups, the coefficients of *E, OCF, AGGACC, AR,* and *INV* are positive and significant at 0.05 level. The coefficient of *AP* is significantly negative. However, the coefficient of *DEP* is positive in 3 groups out of 5 but is not significant in any groups.

Panel B in the same Table provides the adjusted $R^2$ for models 1 to 4 for each group. In addition, the difference in adjusted $R^2$ between the models and the related Vuong's z-statistics are given. The Table shows that the tenor of the results is very close to that for Table 5.2. Cash flows and the main components of accruals are the best predictor for future cash flows. This result remains unchanged for longer horizons. Operating cash flows and aggregate accruals are better than earnings alone in predicting future cash flows for groups 4 and 5 where *absacc* is large. Operating cash flow alone is better than earnings alone only for group 5 where *absacc* is large. These results remain unchanged when predicting two year and three-year ahead.

Regarding the role of accruals, the results in Panel B indicate that the superiority of both model 2 and model 3 over model 1 increases with the magnitude of aggregate accruals. Since the results are similar across all the horizons, the here

discussion will focus on the results related to one-year ahead. The differences (Vuong's z-statistic) between model 2 and model 1 are -0.01 (-46.32), 0.13 (-0.67), 0.48 (1.58), 2.25 (5.3) and 8.47 (13.89) in groups 1 to 5, respectively. It can be seen that Vuong's z-statistic reveals that model 2 is better than model 1 only when *absacc* is large (i.e. groups 4 and 5). Overall, the results indicate that the importance of decomposing aggregate earnings into its components is positively associated with the magnitude of total accruals.

In regard to the predictive ability of cash flows alone and earnings alone, the differences (Vuong's z-statistic) between model 4 and model 1 in groups 1 to 5 , respectively, are -0.73 (-5.45), -1.19 (-3.09), -2.63 (-3.26), -1 (-1.15), and 4.77 (5.49). As can be seen there is no clear trend in the differences; however, the results tend to favour earnings. These results are consistent with Dechow (1994). These results also suggest that UK mangers use accruals adjustments to signal private information to the market, which eventually improves the quality of earnings. Contrary to Dechow, when *absacc* is large in magnitude (groups 4 and 5) earnings are no longer better than cash flows in predicting future cash flows. Interestingly, cash flow alone is significantly better than earnings alone in predicting future cash flows when *absacc* is very large in magnitude. This result might be explained in the light of the results of Dechow and Dichev (2001) in that the quality of accruals (earnings) is negatively correlated with the magnitude of accruals. This result also indicates that large accounting accruals reduce the quality of earnings as UK mangers might use it to opportunistically manipulate reported earnings.

To sum up, the first conclusion to be drawn here is that decomposing earnings into operating cash flows and aggregate accruals provides incremental information content beyond earnings when the quality of earnings— as measured by the *absacc* is

low. The second is that operating cash flow alone is better than earnings alone in predicting future cash flows when the quality of earnings is low. These conclusions are consistent with Green[5] (1999). Finally, the main conclusion drawn from the whole sample (i.e. that cash flows and the main components of accruals are the best predictor for future cash flows) remains unchanged.

[5] Green measured the quality of earnings as the relationship between profitability and cash generating ability.

## Table 6.5
## Summary results for regressions of future cash flows on earnings, cash flows and accruals, by groups formed based on the magnitude of aggregate accruals
**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Where j= 1, 2, or 3.*
*Variables are defined as for Table 5.1.*

**Panel A: Summarizes the Coefficients of estimating models 1 to 4**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.231* | 1.28* | | | | | | | | 63.79 | 3.07 |
| | (6.889) | (15.99) | | | | | | | | | |
| **Model 2** | 0.233* | | 1.18* | 1.24* | | | | | | 63.78 | 3.07 |
| | (6.31) | | (16) | (4.95) | | | | | | | |
| **Model 3** | 0.031 | | 0.94* | | -1.15* | 1.38* | 0.85* | -0.21 | 0.441 | 68.19 | 2.94 |
| | (0.632) | | (11.69) | | (-5.06) | (4.77) | (3.28) | (-0.563) | (1.435) | | |
| **Model 4** | 0.18* | | 1.18* | | | | | | | 63.06 | 3.09 |
| | (5.088) | | (15.72) | | | | | | | | |
| **Group 2** | | | | | | | | | | | |
| **Model 1** | 0.458* | 1.04* | | | | | | | | 55.23 | 3.62 |
| | (8.331) | (10.98) | | | | | | | | | |
| **Model 2** | 0.395* | | 1.04* | 0.78* | | | | | | 55.36 | 3.61 |
| | (5.163) | | (10.91) | (4.45) | | | | | | | |
| **Model 3** | 0.018 | | 0.89* | | -0.75* | 0.73* | 0.43* | 0.39 | 0.11 | 59.76 | 3.51 |
| | (0.158) | | (9.02) | | (-3.24) | (3.73) | (2.12) | (0.82) | (0.36) | | |
| **Model 4** | 0.233* | | 1.00* | | | | | | | 54.04 | 3.64 |
| | (3.27) | | (11.05) | | | | | | | | |

## Table 6.5, Panel A, Continued

| Group 3 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.73* | 1.08* | | | | | | | | 52.71 | 3.77 |
| | (8.25) | (11.44) | | | | | | | | | |
| **Model 2** | 0.55* | | 1.08* | 0.79* | | | | | | 53.19 | 3.76 |
| | (5.56) | | (11.45) | (5.02) | | | | | | | |
| **Model 3** | 0.03 | | 0.89* | | -0.66* | 0.62* | 0.79* | 0.27 | 0.15 | 59.31 | 3.62 |
| | (0.303) | | (9.17) | | (-3.05) | (4.09) | (5.15) | (1.054) | (0.578) | | |
| **Model 4** | 0.21 | | 0.99* | | | | | | | 50.08 | 3.82 |
| | (1.848) | | (13.07) | | | | | | | | |
| **Group 4** | | | | | | | | | | | |
| **Model 1** | 1.13* | 1.11* | | | | | | | | 56.56 | 4.42 |
| | (14.51) | (19.59) | | | | | | | | | |
| **Model 2** | 0.82* | | 1.09* | 0.63* | | | | | | 58.81 | 4.37 |
| | (6.57) | | (18.68) | (5.92) | | | | | | | |
| **Model 3** | 0.14 | | 0.89* | | -0.52* | 0.67* | 0.44* | 0.38 | 0.14 | 64.3 | 4.23 |
| | (0.8) | | (11.48) | | (-3.51) | (4.52) | (3.33) | (1.42) | (0.81) | | |
| **Model 4** | 0.39* | | 0.96* | | | | | | | 55.56 | 4.44 |
| | (3.01) | | (20.42) | | | | | | | | |
| **Group 5** | | | | | | | | | | | |
| **Model 1** | 2.67* | 1.35* | | | | | | | | 68.42 | 6.18 |
| | (16.90) | (38.82) | | | | | | | | | |
| **Model 2** | 1.11* | | 1.13* | 0.59* | | | | | | 76.89 | 5.87 |
| | (6.62) | | (37.53) | (11.29) | | | | | | | |
| **Model 3** | 0.42* | | 1.01* | | -0.75* | 0.77* | 0.59* | -0.07 | 0.39* | 79.29 | 5.76 |
| | (2.31) | | (22.71) | | (-9.99) | (10.54) | (5.21) | (-0.844) | (2.8) | | |
| **Model 4** | 0.82* | | 0.84* | | | | | | | 73.19 | 6.02 |
| | (3.36) | | (27.39) | | | | | | | | |

*Significant at level 0.01.
**Significant at level 0.05.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

## Table 6.5-Continued

**Panel B: Summarize the adjusted $R^2$% obtained from analysing model 1 to 4 for one-year, two-year and three-year ahead cash flows and the results of Vuong's test at sub-samples level based on the magnitude of aggregate accruals**

| **One-year ahead** | **Model 1** | | **Model 2** | | **Model 3** | | **Model 4** |
|---|---|---|---|---|---|---|---|
| **Group 1** | 63.79 | | 63.78 | | 68.19 | | 63.06 |
| | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *-0.01** | *4.41** | *4.4** | *-0.73** | *0.72** | *5.13** | |
| *Vuong's Z-statistic* | *-46.32* | *3.69* | *3.51* | *-5.45* | *3.51* | *4.07* | |
| **Group 2** | 55.23 | | 55.36 | | 59.76 | | 54.04 |
| *The difference* | *0.13* | *4.4** | *4.53** | *-1.19** | *1.32** | *5.72** | |
| *Vuong's Z-statistic* | *-0.67* | *3.46* | *3.43* | *-3.09* | *3.66* | *4.74* | |
| **Group 3** | 52.71 | | 53.19 | | 59.31 | | 50.08 |
| *The difference* | *0.48* | *6.12** | *6.6** | *-2.63** | *3.11** | *9.23** | |
| *Vuong's Z-statistic* | *1.58* | *3.91* | *4.58* | *-3.26* | *4.29* | *6.75* | |
| **Group 4** | 56.56 | | 58.81 | | 64.3 | | 55.56 |
| *The difference* | *2.25** | *5.49** | *7.74** | *-1* | *3.25** | *8.74** | |
| *Vuong's Z-statistic* | *5.3* | *4.58* | *6.31* | *-1.15* | *5.85* | *6.67* | |
| **Group 5** | 68.42 | | 76.89 | | 79.29 | | 73.19 |
| *The difference* | *8.47** | *2.4** | *10.87** | *4.77** | *3.7** | *6.1** | |
| *Vuong's Z-statistic* | *13.89* | *7.08* | *15.6* | *5.49* | *9.85* | *11.53* | |
| **Two-year ahead** | | | | | | | |
| **Group 1** | 47.21 | | 47.19 | | 54.79 | | 46.97 |
| *The difference* | *-0.02** | *7.6** | *7.58** | *-0.24* | *0.22* | *7.82** | |
| *Vuong's Z-statistic* | *-6.78* | *4.34* | *4.19* | *-1.34* | *-0.31* | *4.2* | |
| **Group 2** | 36.95 | | 37.12 | | 46.13 | | 36.43 |
| *The difference* | *0.17* | *9.01** | *9.18** | *-0.52* | *0.69* | *9.7** | |
| *Vuong's Z-statistic* | *-0.99* | *3.72* | *3.75* | *-1.17* | *1.19* | *3.63* | |
| **Group 3** | 44.26 | | 45 | | 49.9 | | 43 |
| *The difference* | *0.74* | *4.9** | *5.64** | *-1.26* | *2** | *6.9** | |
| *Vuong's Z-statistic* | *1.84* | *2.97* | *3.47* | *-1.7* | *3.56* | *3.99* | |
| **Group 4** | 47.3 | | 48.92 | | 58.15 | | 46 |
| *The difference* | *1.62** | *9.23** | *10.85** | *-1.3* | *2.92** | *12.15** | |
| *Vuong's Z-statistic* | *3.28* | *5.46* | *6.81* | *-1.27* | *4.02* | *6.13* | |
| **Group 5** | 52.98 | | 60.4 | | 64.78 | | 54.55 |
| *The difference* | *7.42** | *4.38** | *11.8** | *1.57* | *5.85** | *10.23** | |
| *Vuong's Z-statistic* | *9.23* | *6.95* | *11.6* | *1.07* | *7.16* | *9.23* | |

## Table 6.5, Panel B, Continued

| Three-year ahead | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 32.87 | | 32.84 | | 42.9 | | 32.76 |
| | M2 vs.. M1 | M3 vs.. M2 | M3 vs.. M1 | M4 vs.. M1 | M2 vs.. M4 | M3 vs.. M4 | |
| *The difference* | *-0.03** | *10.06** | *10.03** | *-0.11* | *0.08** | *10.14** | |
| *Vuong's Z-statistic* | *-5.95* | *5.27* | *5.07* | *-0.57* | *-2.61* | *5* | |
| **Group 2** | 35.74 | | 35.96 | | 40.92 | | 35.11 |
| *The difference* | *0.22* | *4.96** | *5.18** | *-0.63* | *0.85* | *5.81** | |
| *Vuong's Z-statistic* | *-1* | *2.99* | *2.89* | *-1.26* | *1.3* | *3.28* | |
| **Group 3** | 42.28 | | 42 | | 49.7 | | 38.54 |
| *The difference* | *-0.28** | *7.7** | *7.42** | *-3.74** | *3.46** | *11.16** | |
| *Vuong's Z-statistic* | *-3.67* | *4.15* | *3.99* | *-4.11* | *4.05* | *5.26* | |
| **Group 4** | 32 | | 34.7 | | 40 | | 33 |
| *The difference* | *2.7** | *5.3** | *8** | *1* | *1.7** | *7** | |
| *Vuong's Z-statistic* | *3.89* | *4.21* | *5.82* | *1.05* | *2.35* | *4.85* | |
| **Group 5** | 43.2 | | 51.49 | | 54.76 | | 47.95 |
| *The difference* | *8.29** | *3.27** | *11.56** | *4.75** | *3.54** | *6.81** | |
| *Vuong's Z-statistic* | *8.19* | *3.86* | *8.96* | *3.16* | *4.86* | *6.09* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## 6.7 Summary and Conclusion

The overall results obtained in this chapter confirm the main prior findings presented in chapter 5. That is to say that a combination of current accruals data and current cash flow data have more ability in explaining the variations in future cash flows than either current aggregate earnings alone or current cash flows alone. However, the results show that all the contextual variables examined in this chapter have an impact on the gains to decomposing earnings into cash flows and aggregate accruals. They also affect the gains to decomposing earnings into cash flows, depreciation and changes in accounts payable, receivable, and inventory.

An implication of the results in this chapter is that users of accounts (especially creditors) can identify criteria to distinguish between companies where they should place greater emphasis on cash flow data rather than earnings as a predictor for future cash flows. For example, the results show that the decomposition of earnings into cash flows and accruals is more useful and more value relevant when: (i) the length of the operating cycle is short; (ii) the performance level is not extreme; and (iii) the magnitude of total accruals is high. The results also reveal that earnings outperform cash flows in explaining the variation in future cash flows when the magnitude of total accruals is low.

# Chapter 7

# The Effect of Financial Distress on the Explanatory Power of Earnings' Components

## 7.1 Introduction to Financial Distress

As can be noted from chapter 2, accounting setters across the world state that cash flow data is expected to help accounting users in assessing the financial position for a firm. It is also expected to be better than accruals income in assessing liquidity and solvency because, unlike reported income it is relatively free from allocation and manipulation problems (White et al, 1998). There is a weight of evidence to indicate that managers manage earnings in one way or another. In chapter 6, it is noted that earnings management can reduce the quality of earnings which, as a result, damages the ability of earnings in explaining the variation in future cash flows.

One of the popular motivations for managers to manage earnings is to avoid violation of debt covenants. There are varieties of financial covenants that are affected by the amount of net income reported (Mulford and Comiskey, 2002, p.79). It can be argued here that the management incentive to manipulate earnings in order to avoid negative consequences associated with the violation of a financial covenant in a credit agreement will increase when the financial position of the company is poor. As a consequence, it can be expected that earnings will be a poor predictor for future cash flows. In the meantime, cash flows and accruals are expected to play greater roles in explaining the variation in future cash flows.

This chapter aims to provide empirical evidence on the effect of financial distress on the value relevance of aggregate earnings, cash flows and accruals. While there are many American studies which examine this issue (though not using the approach employed in this study) no such UK studies exist on this topic.

### 7.1.1. A Note on Bankruptcy Models

One of the objectives of financial statements is to help investors to assess the ability of firms to survive. So it is not a surprise that most bankruptcy models use financial ratios in predicting financial failure. The pioneering work in this field was Beaver (1966). Out of 30 ratios he chose the following six ratios for his six prediction models: (1) cash flows/total debt, (2) net income/total assets, (3) total debt/total assets, (4) working capital / total assets, (5) current ratios, (6) no credit interval.

One of the problems with these models is the use of only one ratio, which may not be enough to fully explain financial distress. Moreover, it is possible that some ratios will reveal the importance of other ratios if they are used together (Rees, 1995, pp.298-302).

To overcome the deficiencies of univeriate models, multivariate models were developed combining more than one ratio to predict financial distress. The models in this category might be classified into those models that use the statistical techniques of discriminant analysis and those models that use logit or probit techniques.

Altman (1968) is an example of those studies that used discriminant analysis to develop a prediction model. Altman in his first study developed a so-called Z - model. The model produces a Z-score which discriminates between failed and non-failed firms. Altman's Z-model is expressed in the following equation:

$$Z\text{-}score = .012\,X_1 + .014\,X_2 + .033\,X_3 + 0.006\,X_4 + .0999\,X_5$$

Where $X_1$, $X_2$, $X_3$, $X_4$, *and* $X_5$ are working capital/total assets, retained earnings/total assets, earnings before interest and taxes / total assets, market value equity /book value of total liabilities, and sales/total assets, respectively.

The boundaries for Altman's Z-score are 2.99 and 1.81. Companies that have a Z-score above 3 are classified as non-bankrupt companies while companies with a Z-score less than 1.81 are classified as potential failures. The area between these two levels is called the grey or ignorance zone. To simplify the process of classification of companies into failed and nonfailed, Altman calculated the midpoint of the interval to be the cut off point. This implied that firms with a Z-score below 2.675 will fall in the bankrupt sector while firms with a Z-score above this point will fall in nonbankrupt sector (Altman, 1983, pp. 99-125).

The popular example in the UK is Taffler's Z- model although he did not publish the weights of the variables used in his prediction model. Based on manufacturing companies he used the following equation to classify companies into failed and non-failed companies.

$$Z\text{-}score = C_0 + C_1\,profitability + C_2\,working\ capital + C_3\,financial\ risk + C_4\,Liquidity$$

He stated that the profitability metric, which is defined as profit before tax/average current liabilities makes a 53% contribution to the model; 13% comes from working capital, which is defined as current assets/total liabilities; 18% comes from financial risk, which is defined as current liabilities/total assets; and 15% comes from the "liquidity" measure (no credit interval) which defines the number of days a company

can finance its operations from its immediate assets if it can no longer generate revenue.

Another technique used in prediction models is the conditional probability model. This development in prediction techniques is due, in part, to Ohlson (1980) who used probit analysis to produce his prediction model. The main difference between his model and the Z-score models is that his model does not try to find a cut off point to classify companies into bankrupt and nonbankrupt companies. Instead the model assigns each firm a probability of bankruptcy.

Keasey and McGuiness (1990), based on UK data, used logit techniques to develop a model for industrial companies. They developed five models to predict bankruptcy 1 to 5 years ahead. They used different ratios in their models but the most significant ratios were profitability and efficiency ratios. The following equation was used to predict the probability of bankruptcy prior one year:

$$pro_{i,t} = \left[1 + e\left(-p_{i,t}\right)\right]^{-1}$$

Where:

$$P = 0.0881 + 0.0316\ Capital\ Gearing - 0.271\ Credit\ Turnover - 0.3227\ Pre\text{-}tax\ profit\ margin$$

The above model is the model that will be used in this chapter to measure the probability that a firm will experience financial default within one year.

The remainder of this chapter is organized as follows. Section 7.2 discusses the empirical evidence on the usefulness of cash flow in predicting financial distress. Section 7.3 provides definitions of the variables used in the study and discusses the method of measuring the variables. Section 7.4 provides a discussion for the descriptive statistics. Sections 7.5 and 7.6 are devoted to a discussion of the empirical results. Finally, section 7.7 summarizes the chapter.

## 7.2 Evidence on the Importance of Cash flow in Predicting Financial Distress

Section 7.2.1 aims to review prior studies that explored the role of cash flows in signalling financial distress. Specifically it looks at those studies that used cash flow ratios in bankruptcy prediction models. Section 7.2.2 reviews the studies that directly investigated the effect of financial distress on the value relevance of cash flows.

### 7.2.1 The Importance of Cash Flow in Bankruptcy Models

Beaver (1966) used a univariate approach to examine the usefulness of ratio analysis in predicting bankruptcy. He compared the ability of 30 different ratios in predicting bankruptcy. Eventually he concluded that the cash flows to total debt ratio is the best univariate predictor.

More recent studies used multivariate approaches to examine the usefulness of cash flow ratios in predicting bankruptcy. Gentry et al. (1985a) found that cash flows (defined as fund flow) and working capital changes separately did not improve the ability of bankruptcy models. In another study (1985b) they combined other financial ratios with cash flow ratios in one model. They pointed out that this model was better than either the cash flow ratios or the financial ratios model in predicting bankruptcy. Aziz and Lawson (1989) reported that adding cash flow ratios to Altman's model did not improve the performance of the model, which implied that cash flow ratios were not useful in predicting bankruptcy or, at least, they did not add anything.

Ward and Foster (2001) used logit analysis to examine the information content of cash flows in predicting financial distress. Using US data for the period 1991-1993 they aimed to examine the usefulness of aggregating and disaggregating cash flow ratios in signalling financial distress. They performed two main regressions. The first regression contained seven accruals ratios (net income / total assets, sales/ current assets, current assets/ current liabilities, owners' equity / total liabilities, current assets / total assets, cash plus marketable securities / total assets, and firm size measure by log of total assets) and three net aggregate cash flows (operating cash flows/ total assets, financing cash flows/ total liabilities, investing cash flows/ total liabilities). The second regression contained the seven accruals ratios and the components of the three net aggregate cash flows (cash collection on sales/total assets, other cash flows payments / total assets, income taxes paid/ total assets, interest paid/ total assets, cash transaction in stock/ total liabilities, cash transaction in debt/ total liabilities, cash dividends/ total liabilities, cash transaction in investments / total liabilities, cash transaction in long-term assets/ total liabilities).

They concluded that operating cash flow is the only useful grossed cash flow variable in predicting future financial distress. They also found that several components of cash flow variables are useful in signalling future financial distress, particularly taxes and interest paid.

Neophytou, et al. (2000), for the first time in the UK, examined the usefulness of operating cash flows in predicting financial distress. Using UK data over the period 1988-1997 they developed a model for predicting bankruptcy. They employed two techniques in developing this model: logit analysis and neural networks. Eventually they concluded that the model that included profitability, operating cash flows and

financial leverage variables as independent variables is the best one in classifying companies into failed and nonfailed companies.

To sum up, the weight of evidence indicates that using operating cash flows in prediction models improves the ability of these models in classifying companies into bankrupt and non-bankrupt companies.

### 7.2.2 The Ability of Cash Flow Data in Predicting Financial Distress

While the above studies examined the incremental information content of cash flows by measuring its ability to improve accruals-based models in predicting bankruptcy, other studies examined the relation between cash flow and firms' solvency.

Wertheim and Robinson (1993) (W &R, hereafter) used the ability of earnings, cash flow, and working capital from operations in explaining the change in liquidity. Based on US data for the period 1975-1989, they developed the following model:

$$\Delta Liquidity_t = \alpha + \beta X_t + e_t$$

Where the dependent variable was the change in liquidity, which equalled either the change in the current ratio, defined as total current assets/total current liabilities, or the change in the quick ratio, defined as (cash and cash equivalent + total current receivables)/total current liabilities. In the model above, $X$ represents: (1) the change in income before extra ordinary items *(IBEI);* (2) the change in operating cash flows *(OCF)*, or (3) the change in working capital from operations *(WCFO).*

The above model aimed to measure the ability of each variable alone in explaining the variation in *ΔLiquidity*. In addition, they developed three multivariate

models to examine the incremental information content for the variables beyond each other, as follows:

$$\Delta liquidity_t = \alpha + \beta_1 X_t + \beta_2 Y_t + e_t$$

In the fourth and the fifth models, $Y$ represents *WCFO* and *OCF* respectively, while $X$ represents *IBEI* in both models. In the sixth model $X$ represents *WCFO* and $Y$ represents *OCF*.

The results of the study were mixed and conditional on the definition of liquidity. When it was measured as the change in the current ratio, IBEI and WCFO were the only variables that had information content in explaining the variation in the dependent variable. They also had incremental information content beyond each other. OCF revealed neither information content nor incremental information content beyond the other two variables. On the other hand all the variables of the study revealed information content and incremental information content beyond each other when the change in the quick ratio was used as the proxy for the change in liquidity. The authors argued that this conflict in the results was due to the difference in the two measures of *ΔLiquidity*. In the first measurement (change in current ratio) all current assets are the source of cash to meet firm's obligations, therefore, IBEI and WCFO are better than OCF in providing information about this measurement. On the other hand, the quick ratio assumes that current assets excluding inventory are the main source to meet firm's obligations so OCF is expected to provide more information. However, this explanation might be valid for the period of their study as Lancaster et al. (1998) reported. They extended the W&R study by extending the period of the study to be from 1977-1994, and using the change in cash conversion cycle as another proxy for change in liquidity. The cash conversion cycle in current period was defined as:

$$Inv/(COGS/365)+TCR/(Sale/365)-AP/(COGS/365)$$

Where *Inv* is total current inventories, *TCR* is total current receivables, *COGS* is cost of goods sold, and *AP* is accounts payable. They argued that the proxies used in W&R were static measures of a firm's liquidity and they did not measure the ongoing ability of a firm to go from cash back to cash. Therefore, employing dynamic measures could provide different results.

They used the same method and models used in W&R. Contrary to W&R's results, all the variables of the study had information and incremental information content beyond each other when the current ratio was the dependent variable. The results also were not consistent with W&R's results when the change in the quick ratio was the dependent variable. OCF had neither information nor incremental information content beyond IBEI and WCFO. These inconsistencies in the results may be due to differences in the time periods of the two studies. Finally, when the change in the cash conversion cycle was the dependent variable OCF and WCFO had information and incremental information content beyond each other but IBEI had neither information nor incremental information content beyond them.

While the above two studies used liquidity measures as dependent variables to evaluate the usefulness of cash flow in assessing liquidity, other studies used measures of a firm's financial position as a contextual variable.

Lang and McNichols (1990) examined the effect of financial distress on the relation between unexpected cash flows and market adjusted returns. They used Standard and Poor's bond rating as the proxy for a firm's level of risk. They concluded that the relation between the operating cash flows and stock return is not conditional on a firm's financial condition. Frankel (1992) found that for those

companies that have bond ratings below BBB, usually defined as unhealthy companies, there is weak relation between stock return and cash flows.

Hanna (1995), using another proxy for financial distress, concluded that the information content of cash flows is conditional on the firm's financial condition. She used the Ohlosn (1980) bankruptcy model to measure risk. She partitioned the sample into five groups according to their probability in facing default risk one-year ahead. The first group contained the lowest-probability firms while the fifth group contained the highest. She found that for the overall sample there is no significant relation between unexpected cash flows and the cumulated abnormal return (CAR). The coefficient of operating cash flows was not significant At the subgroups level, the coefficient of operating cash flows for the first group was not significant while it was for the second, third and fourth groups. Moreover it increased as the level of default risk increased. For the fifth group, which contained the highest default-risk firms the coefficient was not significant. She argued that the firms in this group are in a very bad financial condition, so investors most likely looked towards alternative sources of data

## 7.3 Variables Measurement and Definitions

As the aim of this section is to examine the effect of financial distress on the relation between future cash flows and earnings' components, the models developed in chapter 4 will be used. These models will be reproduced here but for more details about its theoretical background the reader is referred to section 4.3.

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \qquad \text{[Model 1]}$$

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \qquad \text{[Model 2]}$$

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3]}$$

$$OCF_{i,t+j} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+j} \quad \text{[Model 4]}$$

The definitions of the variables used in the above models are the same as those used in section 4.5. These variables are defined as follows, with Datastream codes in parentheses.

*OCF*= Operating cash flows which equals net cash inflow/outflow minus cash from non-operating activities, (1015 = 1009 – 1014).

*E*= earnings, defined as after tax profit adjusted for items that do not relate to the normal trading activities of the company, (175).

*AP*= accounts payable that show the increase or decrease in creditors during the year, (417).

*INV*: change in stock, (445).

*AR*= change in accounts receivable, (448).

*DEP*= depreciation on tangible assets, (402).

*Aggacc*= total accrual, which is calculated manually based on the following equation:

$$Aggacc = E - OCF$$

*OTHER*= represent other accruals. Following Barth et al (2001) it is defined as follows:

$$OTHER = E - (OCF + \Delta AR + \Delta INV - \Delta AP - \Delta DEP)$$

The other variable used in this chapter is the probability of financial distress. To measure this variable Keasey and McGuiness's (1990) model is used for the following reasons:

1. The bankruptcy models developed based on US data may be problematic when used to predict financial failure for UK companies due to differences between the two countries in financial reporting and insolvency codes. (Neophytou et al., 2000).
2. Models developed from UK financial data include Taffler (1983) and Masson and Harris (1979). The former does not publish the variables' weights of the variables and so it can not be used here. The latter was mainly designed for use in the construction industry so may be inappropriate for our study's sample.
3. Keasey and McGuiness's (1990) was developed for a broad section of UK firms and will be used here. The model estimates the probability that a firm will experience financial distress within 1 year ahead and is used here to divide the sample into groups according to the level of financial risk.

The probability (pro.) that firm will experience financial distress within one year is:

$$pro_{i,t} = \left[1 + e\left(-p_{i,t}\right)\right]^{-1}$$

Where $p_{j,t} = 0.0881 + 0.0316\,CG - 0.271\,CT - 0.3227\,PPM$

The variables *CG*, *CT* and *PPM* were obtained form Datastream. The definitions of these variables are (Datastream's codes are in parentheses):

CG= Capital gearing% which equals preference capital plus total debt divided by total capital employed plus short term borrowings minus total intangibles. (731)

CT= Creditors turnover which equals net trading expenses divided by total creditors.

(728)

PPM= Profit pre-tax margin% which equal pre-tax profit divide by total sales.

(716)

To examine the effect of financial distress on the value relevance of earnings' components, partitions of the data are used as opposed to including the probability of bankruptcy as an independent variables in the models. This makes sense as the results in chapter 6 show that the relation between future cash flows and current earning, cash flows, and accruals can vary with firm characteristics. In other words, cash flow might not be better than earnings in predicting future cash flows unless the current period's level of the contextual variable (financial distress in this case) is beyond some threshhold. Therefore, the primary sample is divided into five groups (quintiles) according to the level of estimated financial distress

1. Group 1: contains the firms that have probability less than .00748.
2. Group 2: is devoted for the firms have probability between .00748 and .0416.
3. Group 3: represents the firms that have probability between .0416 and .137423.
4. Group 4: contains the firms that have probability between .137423and .5008438.
5. Group 5: contains the firms that have probability more than .5008438.

## 7.4 Descriptive Statistics

Summary statistics for the sub-samples are represented in Table 7.1. As can be seen, there are significant differences among the groups regarding the magnitude of operating cash flows and earnings. As we move from the first to the fifth group the magnitude of both earnings and cash flows decreases. Actually, it can be noticed that companies in the fifth group are mainly loss-making companies as the mean of *E* and *OCF* is negative, (-0.9 and -0.07, respectively). The decrease in the reported cash flows and earnings from group 1 to 5 appears to validate the decision to partition the whole sample according to their financial position.

# Table 7.1

## Descriptive statistics for the variables in each groups formed based on the level of default risk

**(Sample of 7191 Firm-Year Observations, 1991-2000)**

| | *Group* | *OCF** | *E* | *AP* | *AR* | *INV* | *DEP* | *AGGACC* | *OTHER* | *PRO* | *N=* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Mean | 4.008 | 2.57 | 0.25 | 0.41 | 0.19 | 0.76 | -1.44 | -1.03 | 0.002 | 1438 |
| | Median | 2.3 | 1.5 | 0.07 | 0.11 | 0.01 | 0.43 | -0.77 | -0.56 | 0.001 | |
| | SD | 6.8 | 4.4 | 1.5 | 1.4 | 1.14 | 1.12 | 2.9 | 1.9 | 0.002 | |
| | Min. | -7 | -15 | -7 | -8 | -20 | 0 | -50 | -43 | 0 | |
| | Max. | 159 | 109 | 32 | 22 | 7 | 13 | 12 | 16 | 0.007 | |
| 2 | Mean | 3.4 | 2.02 | 0.4 | 0.55 | 0.26 | 0.91 | -1.41 | -0.92 | 0.021 | 1438 |
| | Median | 2.04 | 1.21 | 0.10 | 0.14 | 0.03 | 0.52 | -0.81 | -0.56 | 0.019 | |
| | SD | 4.89 | 2.82 | 1.69 | 2.1 | 1.1 | 1.3 | 2.73 | 1.7 | 0.009 | |
| | Min. | -10 | -17 | -6 | -19 | -4 | 0 | -31 | -23 | 0.007 | |
| | Max. | 57 | 26 | 41 | 40 | 13 | 17 | 10 | 16 | 0.04 | |
| 3 | Mean | 2.97 | 1.53 | 0.36 | 0.45 | 0.31 | 1.1 | -1.44 | -0.78 | 0.082 | 1439 |
| | Median | 1.64 | 0.87 | 0.09 | 0.11 | 0.05 | 0.52 | -0.73 | -0.42 | 0.08 | |
| | SD | 5.49 | 2.45 | 2.02 | 2.19 | 1.88 | 2.1 | 3.69 | 1.8 | 0.027 | |
| | Min. | -14 | -3 | -21 | -14 | -9 | 0 | -53 | -49 | 0.04 | |
| | Max. | 90 | 40 | 29 | 37 | 51 | 34 | 26 | 8 | 0.14 | |
| 4 | Mean | 2.15 | 0.88 | 0.35 | 0.43 | 0.16 | 0.89 | -1.27 | -0.62 | 0.27 | 1438 |
| | Median | 0.98 | 0.38 | 0.09 | 0.1 | 0.01 | 0.42 | -0.56 | -0.25 | 0.245 | |
| | SD | 4.52 | 2.41 | 2.51 | 2.21 | 1.5 | 1.65 | 3.1 | 1.5 | 0.099 | |
| | Min. | -29 | -39 | -31 | -16 | -10 | 0 | -33 | -20 | 0.14 | |
| | Max. | 68 | 35 | 27 | 23 | 20 | 16 | 13 | 5 | 0.50 | |
| 5 | Mean | -0.07 | -0.9 | 0.24 | 0.24 | -0.1 | 0.49 | -0.81 | -0.25 | 0.87 | 1438 |
| | Median | -0.04 | -0.3 | 0.02 | 0.02 | 0 | 0.23 | -0.31 | -0.04 | 0.97 | |
| | SD | 3.57 | 2.45 | 2.18 | 2.18 | 1.37 | 0.95 | 2.5 | 1.5 | 0.16 | |
| | Min. | -27 | -18 | -13 | -13 | -20 | 0 | -25 | -21 | 0.50 | |
| | Max. | 43 | 23 | 34 | 30 | 14 | 17 | 18 | 12 | 1 | |

## Table 7.1 Continued

Variables definition:

*OCF*= Operating cash flows which equals net cash inflow/outflow minus cash from non-operating activities, (1015 = 1009 – 1014).

*E*= earnings, defined as after tax profit adjusted for items that do not relate to the normal trading activities of the company, (175).

*AP*= accounts payable that show the increase or decrease in creditors during the year,(417).

*INV*: change in stock, (445).

*AR*= change in accounts receivable, (448).

*DEP*= depreciation on tangible assets, (402).

*Aggacc*= total accrual, which is calculated manually based on the following equation:

$$Aggacc = E - OCF$$

*OTHER*= represent other accruals. Following Barth et al (2001) it is defined as follows:

$$OTHER = E - (OCF + AR + INV - AP - DEP)$$

Pro.is the probability that firm will experience financial distress within one year. This is measured by Keasey and McGuiness (1992)

$$pro_{i,t} = [1 + e(-p_{i,t})]^{-1}$$

Where $p_{j,t} = 0.0881 + 0.0316\,CG - 0.271\,CT - 0.3227\,PPM$

Group 1: contains the firms that have probability less than .00748.

Group 2: is devoted for the firms have probability between .00748 and .0416.

Group 3: represents the firms that have probability between .0416 and .137423.

Group 4: contains the firms that have probability between .137423and .5008438.

Group 5: contains the firms that have probability more than .5008438.

## 7.5 The Effect of Financial Distress

Table 7.2 summarizes the results of estimating the study's models for the sub-samples. Panel A presents the coefficient of the variables and its related robust t-values. The results are consistent with previous results conducted at the whole sample level. The coefficients of *E, OCF, AGGACC, AR,* and *INV* are positive and significant at the 0.05 level. The slope of *AP* is negative and significant, also. The coefficient of *DEP* and *OTHER* are not always significant. The coefficient of *DEP* is only significant in the fifth group and the coefficient of *OTHER* is only significant in the third group. One point to note here is that the value of the coefficient is smallest in the fifth group where the firms have high probability of bankruptcy. This is reflected in the ability of the models in explaining future cash flows in this group as can be seen in Panel B.

The adjusted $R^2$s, the differences between them, and the results of Vuong' test are all presented in Panel B. The results at sub-samples level enhance the original conclusion drawn at the whole sample level in that operating cash flow and the main components of accruals are the best predictor of future cash flows. Also they confirm the conclusion that operating cash flows and aggregate accruals together are better than either earnings alone or cash flows alone in predicting future cash flows. However, the results at the portfolio level indicate that the importance of decomposing earnings to its components is positively correlated with a firms' financial position. Contrary to the original conclusion drawn at the whole sample level, cash flows alone are not *always* a better predictor for future cash flows than earnings alone.

Regarding the effect of financial distress on the value relevance of earnings'

components, the first point to note is that the ability of models in explaining the variation in future cash flows is negatively correlated with the probability of bankruptcy. For instance, the $R^2$s of model 1 (earnings alone) in groups one to five are: 85.4%, 69.3%, 66.6%, 56.1%, and 39%. It can be argued here that the probability of bankruptcy affects the level of uncertainty about future cash flows so using only current information to predict future cash flows may not be enough to predict future cash flows and so other information may be used. However, the main concern here is the value relevance of decomposing earnings.

The difference in adjusted $R^2$ between model 1 and model 2 is used to capture the gains from decomposing earnings into aggregate accruals and cash flows. As can be seen in Panel B, the absolute differences (and its related Vuong's Z-statistics) between model 2 and model 1 in each group are: 2.3% (6.5), 8.4% (7.29), 9% (7.27), 12.7% (8.14) and 13.9% (7.14). There are two points here. First, the results of the Vuong tests reveal that model 2 is significantly better than model 1 in explaining the variation in one-year-ahead cash flows in all the five groups. Second, the gap between the two models increases moving from the lowest to the highest probability of bankruptcy group, which implies that the importance decomposing earnings into aggregate accruals and cash flows increases for firms that have a high probability of risk. A similar pattern is found when comparing model 1 with model 3, i.e. when earnings are broken down into cash flows and accruals components.

The results in Panel B also provide an indirect examination for *FRS1's* claim that cash flow data help in assessing the liquidity of a firm. In group 1 where the probability of bankruptcy is low, cash flows alone do not outperform earnings alone in predicting future cash flows. The adjusted $R^2$ of models 1 and 4 are 85.4% and 86.5%, respectively. Vuong's z-statistic is 0.99 which is not significant at any

reasonable probability level. As the probability of bankruptcy increases, the superiority of cash flows over earnings in explaining the variation in one-year-ahead cash flows increases. For instance the adjusted $R^2$s for models 1 and 4 in group 5 are 39% and 50.2%, respectively. The results also show that accruals have incremental information content beyond that already existing in cash flows. These results together provide indirect support for *FRS1's* claim that cash flow data are important in predicting a firm's liquidity.

The above results can not directly be compared with any prior US and UK studies as there are no prior studies with the same methodology[1]. However, bearing in mind the differences in the methodology between Hanna (1995)[2] and this study, the above reported conclusions are very close to those reported in Hanna in that the incremental information content of cash flows increases with the probability of bankruptcy.

The results may also be linked to the study of Black (1998) who examined the effect of the life-cycle stage on the value relevance of cash flows and earnings. Black divided a firm's life into six stages: start-up, growth, growth-mature, mature, mature-decline, and decline stage. He pointed out that one factor which distinguishes between these stages is the value of earnings and cash flows. In growth and mature-decline stages, companies report lower earnings levels than in growth-mature and mature stages. In the start-up and decline stages companies have negative earnings and cash flows. Based on this, it could be argued here that the fifth group in this study contains companies in start-up and decline stages. Actually more investigation for this group reveals that some of these companies are already 'dead' companies. Using the same

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[1] To my knowledge there is no prior predictive study which uses a direct bankruptcy probability measure as the contextual factor either in the US or UK.

[2] Though Hanna (1995) examined the effect of financial distress on the value relevance of cash flows, she did not examine its effect on the value relevance of accruals.

logic, it also can be argued that companies in group 1 may be in the mature stage. Black also reports that operating cash flows are better than earnings in start-up, growth, mature/decline and decline stages. On the other hand, earnings are better than cash flows in growth/mature and mature stages. The reported results in this chapter are consistent with Black's results.

The results may also be linked to those studies that examined the effect of earnings permanence on the value relevance of earnings and cash flows. The financial condition of a firm can determine whether its reported earnings are permanent or not. Risky firms may face uncertainty about their ability to continue their normal operations, which makes their reported earnings more transitory. This might explain why decomposing earnings into operating cash flows and accruals is more useful for risky firms than other firms. In this context, the results are consistent with the results of Cheng et al (1996) who found that the value relevance of cash flows increased as earnings become more transitory. However, Charitou et al (2001) using UK price data did not report any improvement in the incremental information content of operating cash flows when earnings became more transitory. Finally, the results provide indirect support for using cash flow ratios in predicting bankruptcy.

To sum up, the results reveal that the importance of decomposing earnings into accruals and cash flows is positively associated with the level of default risk. Furthermore, cash flows and earnings have the same ability in explaining the variation in one-year-ahead cash flows when the probability of bankruptcy is very low.

## Table 7.2

**Summary results for regressions of future cash flows on earnings, cash flows, and accruals, by groups formed based on the level of the probability of default risk**

**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Variables are defined as for Table 7.1.*

**Panel A: Presents the coefficients of the variables**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.33** | 1.47* | | | | | | | | 85.4 | 4.79 |
| | (2.3) | (24) | | | | | | | | | |
| **Model 2** | 0.24** | | 1.21* | 0.69* | | | | | | 87.7 | 4.63 |
| | (2.02) | | (18.8) | (5.1) | | | | | | | |
| **Model 3** | -0.04 | | 0.99* | | -0.54* | 0.64* | 0.79* | 0.16 | 0.24 | 89 | 4.51 |
| | (-0.5) | | (17.3) | | (-3.5) | (5) | (5) | (0.84) | (1.63) | | |
| **Model 4** | 0.32* | | 0.95* | | | | | | | 86.05 | 4.75 |
| | (4.53) | | (44.51) | | | | | | | | |
| Group 2 | | | | | | | | | | | |
| **Model 1** | 0.36** | 1.55* | | | | | | | | 69.3 | 4.97 |
| | (2.07) | (16.3) | | | | | | | | | |
| **Model 2** | 0.14 | | 1.19* | 0.53* | | | | | | 77.7 | 4.65 |
| | (1.32) | | (16.8) | (4.75) | | | | | | | |
| **Model 3** | -0.03 | | 1* | | -0.72* | 0.55* | 0.68* | 0.011 | 0.15 | 79.5 | 4.57 |
| | (-0.32) | | (12.5) | | (-5.27) | (4.6) | (5.9) | (0.05) | (1.21) | | |
| **Model 4** | 0.29* | | 0.93* | | | | | | | 75.91 | 4.73 |
| | (2.79) | | (24.87) | | | | | | | | |

# Table 7.2, Panel A, Continued

| Group 3 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 0.45* | 1.68* | | | | | | | | 66.6 | 4.98 |
| | (3.56) | (16.2) | | | | | | | | | |
| **Model 2** | 1.32 | | 1.24* | 0.73* | | | | | | 75.6 | 4.68 |
| | (0.41) | | (16.8) | (4.75) | | | | | | | |
| **Model 3** | 0.26* | | 0.96* | | -0.81* | 0.84* | 0.49* | 0.08 | 0.51** | 80 | 4.47 |
| | (2.7) | | (9.3) | | (-4.1) | (5.8) | (2.7) | (0.45) | (2.1) | | |
| **Model 4** | 0.72* | | 0.78* | | | | | | | 71.8 | 4.82 |
| | (6.83) | | (21.2) | | | | | | | | |
| **Group 4** | | | | | | | | | | | |
| **Model 1** | 0.91* | 1.43* | | | | | | | | 56.1 | 5.07 |
| | (9.13) | (14.6) | | | | | | | | | |
| **Model 2** | 0.42* | | 1.19* | 0.63* | | | | | | 68.8 | 4.73 |
| | (3.79) | | (12.4) | (6.11) | | | | | | | |
| **Model 3** | 0.13 | | 0.96* | | -0.71* | 0.87* | 0.52* | -0.01 | 0.34 | 72.8 | 4.59 |
| | (1.5) | | (5.8) | | (-3.97) | (5.1) | (2.97) | (-0.1) | (1.16) | | |
| **Model 4** | 0.42* | | 0.82* | | | | | | | 64.2 | 4.87 |
| | (3.63) | | (14.9) | | | | | | | | |
| **Group 5** | | | | | | | | | | | |
| **Model 1** | 0.97* | 0.9* | | | | | | | | 39 | 4.87 |
| | (9.5) | (10) | | | | | | | | | |
| **Model 2** | 0.52* | | 0.87* | 0.34* | | | | | | 52.9 | 4.61 |
| | (5.89) | | (12.3) | (3.8) | | | | | | | |
| **Model 3** | 0.15** | | 0.85* | | -0.7* | 0.66* | 0.66* | 0.35** | 0.17 | 60.8 | 4.43 |
| | (2.1) | | (14.5) | | (-5.6) | (5.7) | (5.11) | (2.17) | (1.19) | | |
| **Model 4** | 0.23* | | 0.7* | | | | | | | 50.2 | 4.67 |
| | (3.43) | | (13.1) | | | | | | | | |

*Significant at level 0.01.
**Significant at level 0.05.
Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

# Table 7.2-Continued

## Panel B: Summarizes the Adjusted $R^2$% of performing models 1 to 4, and the results of Vuong's test by the level of the probability of bankruptcy

| | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 85.4 | | 87.7 | | 89 | | 86.05 |
| One-year ahead | M2 vs. M1 | M3 vs. M2 | M3 vs. M1 | M4 vs. M1 | M2 vs. M4 | M3 vs. M4 | |
| *The difference* | *2.3** | *1.3** | *3.6** | *0.65* | *1.65** | *2.95** | |
| *Vuong's Z-statistic* | *6.5* | *4.94* | *8.4* | *0.99* | *4.95* | *6.84* | |
| **Group 2** | 69.3 | | 77.7 | | 79.5 | | 75.91 |
| *The difference* | *8.4** | *1.8** | *10.2** | *6.61** | *1.79** | *3.59** | |
| *Vuong's Z-statistic* | *7.29* | *4.39* | *8.1* | *4.92* | *4.45* | *7.52* | |
| **Group 3** | 66.6 | | 75.6 | | 80 | | 71.8 |
| *The difference* | *9** | *4.4** | *13.4** | *5.2** | *3.8** | *8.2** | |
| *Vuong's Z-statistic* | *7.72* | *7.11* | *11.92* | *3.26* | *5.48* | *9.25* | |
| **Group 4** | 56.1 | | 68.8 | | 72.8 | | 64.2 |
| *The difference* | *12.7** | *4** | *16.7** | *8.1** | *4.6** | *8.6** | |
| *Vuong's Z-statistic* | *8.14* | *4.87* | *10.42* | *04-Mar* | *4.4* | *7.64* | |
| **Group 5** | 39 | | 52.9 | | 60.8 | | 50.2 |
| *The difference* | *13.9** | *7.9** | *21.8** | *11.2** | *2.7** | *10.6** | |
| *Vuong's Z-statistic* | *7.14* | *5.82* | *10.84* | *4.64* | *3.74* | *6.62* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## 7.6 Other Financial Distress Measures

The analysis so far has used the probability of bankruptcy, measured by Keasey and McGuiness's (1990) model, as a proxy for financial distress. As noted in section 7.2.2 W&R and Lancaster et al. (1998) used liquidity measures as dependent variables to evaluate the usefulness of cash flows and earnings. As the main concern in this chapter is to determine the effect of a firms' financial position on the ability of earnings components to explain future cash flows, partitions of the entire sample according to the level of liquidity are used, as opposed to including it as a dependent variable.

Short-term creditors and long-term lenders are concerned with a firm's ability to pay its short-debts when they become due. This ability is commonly measured by a different combination of available financial data. There is no single measure which can adequately reflect all aspect of company liquidity. However, widely used ratios for measuring a firm's liquidity include the current and quick ratio (W&R, 1993)[3]. The current ratio indicates the ability of current assets (i.e. those expected to generate cash within one year) to pay off the current liabilities (i.e. obligations due to mature within one year). The quick ratio indicates the ability of cash, cash equivalents, and receivables to pay off the current liabilities.

In this study, following W&R, the current and quick ratio will be used as measures for liquidity (i.e. financial position). One of the limitations of these ratios is that there is no intuitive meaning to a quick ratio of 2 (White et. al., 1998, p.160). This value may be considered very high for some companies and low for others. As the value of

[3] In addition, these two ratios are classified as short-term liquidity measures by the studies that (i) used factor or other grouping procedures to categorize ratios, (ii) examined the prediction of corporate bankruptcy. W&R, 1993, p.67

these ratios does not have the same meaning across different companies, partitioning the sample into 5 portfolios may not adequately measure the effect of current financial position on the value relevance of earnings' components. However, to avoid this problem, the main analysis here is based on dividing the whole sample into two groups. The first one contains companies that have current (quick) ratio below the median, and can be considered unhealthy companies. The second one contains companies that have current (quick) ratios above the median, and be considered healthy companies. Then models 1 to 4 are re-estimated for each group.

Table 7.3 provides descriptive statistics for the two measures at the whole sample level. The mean current (quick) ratio is 1.8 (1.33), with standard deviations 2.52 (2.45). The values of the current (quick) ratio range from 0.02 (0.02) to 81.42 (81.23). As can be noticed, there is variation in the value of these measures across companies. Finally, the median of the current and quick ratios are 1.35 and 0.92, respectively.

Table 7.4 summarizes the results of analyzing models 1 to 4 for the two groups formed according to the level of the current ratio. Panel A presents the t-values of the coefficients of the variables. As can be seen, in general, all the variables have the same sign as reported in the earlier section. Panel B, presents the adjusted $R^2$ values. There is a difference in the ability of the models in explaining future cash flows between the two groups. The first point to note is that the importance of decomposing aggregate earnings into cash flows and accruals is greater for group 1, where the level of the current ratio is below the median, than in group 2, where the level of current ratio is above the median. This result confirms the prior conclusion that when companies have a poor financial position, reporting cash flows becomes more important. This can also be seen when

comparing model 1 (earnings alone) with model 4 (cash flows alone). When the financial position is poor, as measured by the current ratio, the results of the Vuong test show that current cash flow is better than earnings alone in predicting future cash flows. On the other hand, when the financial position is healthy, the Vuong z-statistic is 0.78 which is insignificant at any reasonable probability level. This means that cash flows and earnings alone have similar ability in explaining the variation in future cash flows. The same results are obtained when replacing the current ratio with the quick ratio, as can be seen in Table 7.5.

Finally, untabulated results reveal that when dividing the entire sample into five equal groups the same above inferences were obtained. For instance, cash flow alone is significantly better than earnings alone in explaining the variation in future cash flows in the first three groups (i.e. companies have low current ratios values) while in the fourth and fifth groups (i.e. companies have high current ratios values) cash flows and earnings have the same ability in explaining the variation in future cash flows. The adjusted $R^2$s associated with model 1 (model 4) in the five groups, respectively, are: 80.5% (89.8%), 70.7% (74.1%), 57.9 %( 61.8%), 60.5% (61.1%), and 69.6% (69%). Vuong's Z-statistic for each difference between model 4 and model 1 in the five groups are 12.6, 2.9, 2.16, 0.36, and -0.34, respectively.

# Table 7.3

## Descriptive statistics for current and quick ratio
### (Sample of 7191 Firm-Year Observations, 1991-2000)

| | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| Current ratio | 1.800 | 1.350 | 2.520 | 0.020 | 81.420 |
| Quick ratio | 1.330 | 0.920 | 2.450 | 0.020 | 81.230 |

Where:
Current ratio= current assets/current liabilities. (Datastream code is 741).

Quick ratio=Current assets excluding inventory/Current liabilities (Datastream code is 742)

## Table 7.4
## Summary results for regressions of future cash flows on earnings, cash flows, and accruals, by groups formed based on the level of current ratio
### (Sample of 7191 Firm-Year Observations, 1991-2000)

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Variables are defined as for Table 7.1*

**Panel A: Presents the coefficients of the variables**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 1.13* | 1.52* | | | | | | | | 74.90 | 5.09 |
| | (14.51) | (26.43) | | | | | | | | | |
| **Model 2** | 0.56* | | 1.17* | 0.56* | | | | | | 83.40 | 4.68 |
| | (8.96) | | (28.28) | (8.97) | | | | | | | |
| **Model 3** | 0.28* | | 1.05* | | -0.73* | 0.8* | 0.65* | -0.1 | 0.36* | 85.30 | 4.56 |
| | (5.31) | | (28.5) | | (-10.12) | (10.8) | (7.4) | (-1.34) | (4.05) | | |
| **Model 4** | 0.46* | | 0.89* | | | | | | | 81.10 | 4.8 |
| | (6.98) | | (37.57) | | | | | | | | |
| **Group 2** | | | | | | | | | | | |
| **Model 1** | 0.7* | 1.19* | | | | | | | | 63 | 4.79 |
| | (12.17) | (28.86) | | | | | | | | | |
| **Model 2** | 0.45* | | 1.08* | 0.62* | | | | | | 68.40 | 4.64 |
| | (7.88) | | (27.32) | (8.51) | | | | | | | |
| **Model 3** | 0.09 | | 0.87* | | -0.81* | 0.74* | 0.56* | 0.23 | 0.31 | 72.60 | 4.5 |
| | (1.16) | | (15.7) | | (-7.16) | (7.57) | (3.91) | (1.71) | (1.59) | | |
| **Model 4** | 0.44* | | 0.81* | | | | | | | 63.80 | 4.78 |
| | (6.74) | | (27.8) | | | | | | | | |

The whole sample (7191 observations) is divided into two groups. Group 1 contains the companies that have current ratio values below the median. Group 2 contains the companies that their current ratios values above the median.

*Significant at level 0.01. **Significant at level 0.05.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (White, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

# Table 7.4-Continued

## Panel B: Summarizes adjusted $R^2$ obtained from analyzing models 1 to 4, and the results of Vuong's test at groups formed according to the level of financial distress measured by current ratio

| | Model 1 | Model 2 | Model 3 | Model 4 |
|---|---|---|---|---|
| **Group 1** | 74.9 | 83.4 | 85.3 | 81.1 |
| | **M2 vs. M1** | **M3 vs. M2** | **M3 vs. M1** | **M4 vs. M1** | **M2 vs. M4** | **M3 vs. M4** |
| *The difference* | *8.5** | *1.9** | *10.4** | *6.2** | *2.3** | *4.2** |
| *Vuong's Z-statistic* | *15.3* | *8.72* | *17.82* | *8.99* | *9.68* | *12.35* |
| **Group 2** | 63 | 68.4 | 72.6 | 63.8 |
| *The difference* | *5.4** | *4.2** | *9.6** | *0.8* | *4.6** | *8.8** |
| *Vuong's Z-statistic* | *8.89* | *7.37* | *11.31* | *0.78* | *8.22* | *11.42* |

*Significant at level 0.01.
**Significant at level 0.05.
*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## Table 7.5

## Summary results for regressions of future cash flows on earnings, cash flows, and accruals, by groups formed based on the level of quick ratio

**(Sample of 7191 Firm-Year Observations, 1991-2000)**

$$OCF_{i,t+1} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+1} \quad \text{[Model 1]}$$

$$OCF_{i,t+1} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+1} \quad \text{[Model 2]}$$

$$OCF_{i,t+1} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 OTHER_{i,t} + u_{i,t+1} \quad \text{[Model 3]}$$

$$OCF_{i,t+1} = \delta_0 + \delta_1 OCF_{i,t} + \mu_{i,t+1} \quad \text{[Model 4]}$$

*Variables are defined as for Table 7.1.*

**Panel A: Presents the coefficients of the variables**

| Group 1 | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | OTHER(±) | Adj.$R^2$% | AIC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Model 1** | 1.05* | 1.52* | | | | | | | | 72.70 | 4.99 |
| | (12.24) | (21.12) | | | | | | | | | |
| **Model 2** | 0.49* | | 1.18* | 0.52* | | | | | | 83.30 | 4.51 |
| | (7.32) | | (21.84) | (7.34) | | | | | | | |
| **Model 3** | 0.24* | | 1.02* | | -0.7* | 0.72* | 0.67* | -0.02 | 0.28* | 85.50 | 4.36 |
| | (4.19) | | (27.5) | | (-9.3) | (8.4) | (8.98) | (-0.28) | (3.49) | | |
| **Model 4** | 0.42* | | 0.91* | | | | | | | 81.10 | 4.63 |
| | (7.24) | | (40.13) | | | | | | | | |
| **Group 2** | | | | | | | | | | | |
| **Model 1** | 0.73* | 1.27* | | | | | | | | 68 | 4.95 |
| | (11.74) | (30.61) | | | | | | | | | |
| **Model 2** | 0.46* | | 1.11* | 0.65* | | | | | | 72.90 | 4.79 |
| | (8.64) | | (30.39) | (9.58) | | | | | | | |
| **Model 3** | 0.11 | | 0.95* | | -0.71* | 0.77* | 0.47** | 0.03 | 0.38* | 75.50 | 4.69 |
| | (1.76) | | (16.5) | | (-7.7) | (9.79) | (2.24) | (0.17) | (2.73) | | |
| **Model 4** | 0.44* | | 0.82* | | | | | | | 68.70 | 4.93 |
| | (6.49) | | (29.3) | | | | | | | | |

The whole sample (7191 observations) is divided into two groups. Group 1 contains the companies that have quick ratio values below the median. Group 2 contains the companies that their quick ratios values above the median.

*Significant at level 0.01. **Significant at level 0.05.

Figures in parentheses denote t-statistics based on the heteroskedasticity-consistenet covariance matrix (white, 1980). A t-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.

# Table 7.5-Continued

**Panel B: Summarizes adjusted $R^2$ obtained from analyzing models 1 to 4, and the results of Vuong's test at groups formed according to the level of financial position measured by quick ratio**

| | Model 1 | | Model 2 | | Model 3 | | Model 4 |
|---|---|---|---|---|---|---|---|
| **Group 1** | 72.7 | | 83.3 | | 85.5 | | 81.1 |
| | **M2 vs. M1** | **M3 vs. M2** | **M3 vs. M1** | **M4 vs. M1** | **M2 vs. M4** | **M3 vs. M4** | |
| *The difference* | *10.6* | *2.2* | *12.8* | *8.4* | *2.2* | *4.4* | |
| *Vuong's Z-statistic* | *16.52* | *8.71* | *19.93* | *10.64* | *9.36* | *12.3* | |
| **Group 2** | 68 | | 72.9 | | 75.5 | | 68.7 |
| *The difference* | *4.9* | *2.6* | *7.5* | *0.7* | *4.2* | *6.8* | |
| *Vuong's Z-statistic* | *9.49* | *6.64* | *11.7* | *0.81* | *8.79* | *11.63* | |

*Significant at level 0.01.

**Significant at level 0.05.

*Vuong's Z-statistic refers to Z-statistics from the likehold ratio test proposed by Vuong (1989). A Z-statistic of 2.58 (1.96) implies a significance level of 0.01 (0.05) using a two-tailed test.*

## 7.7 Summary and Conclusion

Using UK data over the period 1991-2000, this chapter aimed to measure the effect of a firms' financial position on the ability of aggregate earnings, cash flows, and accruals in explaining one-year-ahead operating cash flows. The whole sample is divided into quintiles according to the probability of bankruptcy. This probability is measured by using the Keasey and McGuinness (1992) the bankruptcy model.

The results obtained in this chapter confirm prior results obtained in chapter 6 that the relation between future cash flows and current earnings, cash flows, and accruals differs across firm characteristics. Evidence is provided which indicates that earnings' components, in particular cash flows, play a greater role in explaining the variation in future cash flows as the level of financial distress increases. This evidence is not sensitive to the measure of financial position. Alternative measures for financial position i.e. current and quick ratios, were used and the results remained unchanged.

A significant implication of the findings reported in this chapter is that accounting users — and especially creditors — should analyse the financial position for a firm when they want to assess future cash flows. The results also imply that investors should focus on cash flows rather than earnings, for companies that suffer from financial distress. Furthermore, the results obtained in this chapter provide indirect support for FRS1's claim that cash flows are vital data for assessing a firm's liquidity. The results may also provide useful information for academic researchers in developing superior bankruptcy models.

# Chapter 8

# Summary and Conclusions

This chapter summarizes the results of this study and the potential opportunities for further research. Section 1 provides a summary of the work done in this study. Section 2 summarizes the main empirical results and conclusions drawn from this study. Section 3 describes the implications and the limitations of this study. Section 4 concludes this chapter by providing some suggestions for the future research.

## 8.1 Summary

In the late 1980s and early 1990s many accounting bodies across the world adopted cash flow statements as replacements for traditional statements of changes in financial position and in 1991 the UK's Accounting Standards Board (ASB) published *Financial Reporting Standard 1* (FRS1, 1991, revised in 1996).

This study was designed to investigate the usefulness of accounting data in explaining future corporate cash flows. Through a number of different analyses, this study provides evidence on the explanatory power of current accounting data — earnings, cash flows and accruals — with respect to future cash flows. The data relates to UK companies for the period 1991-2000, and only used cash flow data disclosed in line with the UK accounting standard FRS1. This is achieved through the development of an empirical framework utilised in a recent paper by Barth et al. (2001).

Four main hypotheses were developed and tested to achieve the aims of this study. The first hypothesis expected that, in terms of the explanatory power, a combination of cash flows and aggregate accruals would dominate either earnings or cash flows alone. The second hypothesis predicted that decomposing aggregate accruals into their components -depreciation, other accruals and changes in accounts payable, receivable, inventory- would improve the ability of the model in explaining the variation in future cash flows. The third hypothesis predicted that cash flow data would provide more information that could be used to assess a firm's future cash flows than earnings. The fourth hypothesis predicted that, in terms of the explanatory power, a combination of cash flow and the disaggregated components of accruals would dominate earnings alone, cash flows alone or a combination of cash flows and aggregate accruals. The results of testing this hypothesis were expected to provide evidence on the validity of FRS1 assertion. In order to test these hypotheses, four regression models were developed and estimated.

In chapter 5 of this study, pooled cross sectional regressions were used for measuring the predictive ability of earnings, cash flows and accruals. These models were then extended to deal with fixed effects and time trends in the levels of cash flows. Furthermore, first differences were employed in the four models of the study (instead of levels) to provide more comprehensive results. Employing fixed effects and first difference analysis aimed to control any firm-specific factors that might affect the incremental information content of the variables.

A detailed examination of the firm-specific factors was then undertaken in the next two chapters. The effects of the following factors were examined: industry membership, the length of the operating cash cycle, the level of earnings, cash flows, and aggregate accruals, and the firm's financial position. Partitions of the data were

used in this study instead of including the level of these factors as an independent variable in an OLS regression, to allow for the possibility that the valuation effects of earnings, cash flows, and accruals are nonlinear.

## 8.2 Main Findings of the Study

1. There is evidence on the gains from decomposing earnings into cash flows and aggregate accruals. This evidence is based on two observations. First, the coefficients of both aggregate accruals and cash flows are significant at the 0.05 level. Second, the ability of cash flows and aggregate accruals in explaining the variation in future cash flows is higher than it is for aggregate earnings.

2. There is strong evidence to support FRS1's assertion that cash flow data in conjunction with income statement data (depreciation), and balance sheet data (accounts payable, accounts receivable, and inventory) should be used together in predicting future cash flows. This is concluded from the following observations. First, all these variables have significant coefficients at a 0.05 level. Second, this combination appears to explain the variation in future cash flows better than earnings alone, cash flows alone, or even aggregate accruals and cash flows together.

3. Operating cash flows alone show more ability than earnings alone in explaining the variation in future cash flows.

4. Although controlling for firm-specific factors through employment of a fixed effects model did not alter the above two main findings, the importance of decomposing earnings into cash flows and accruals reduced. Controlling for firm-specific factors affects the superiority of cash flows over earnings. Interestingly, aggregate earnings reveal more ability than cash flows in explaining the variation in future cash flows.

5. The value relevance of decomposing earnings into its components varies across industries. One of the reasons for this variation is the differences among industries in the length of the operating cash cycle. The evidence revealed that the role of accruals in explaining the variation in future cash flows decreases with the increase in the length of the operating cash cycle. It also revealed that the incremental information content for cash flows beyond earnings decreases as the length of the operating cash cycle increases.

6. The importance of decomposing aggregate earnings into cash flows and accruals reduced when the level of firm's performance was extreme. This is concluded from the following observations. First, the superiority of accruals and cash flows data together over aggregate earnings decreased when the value of earnings was negative or very highly positive. Second, the superiority of cash flows alone over aggregate earnings was the lowest when the value of earnings was extreme.

7. The value relevance of accruals and cash flows was positively correlated with the magnitude of cash flows. The incremental information content of accruals

beyond that already existing in aggregate earnings increased with the increase in the level of cash flows. The superiority of cash flows alone over earnings was existed only when the value of cash flows is highly positive.

8. The quality of earnings, as measured by the magnitude of aggregate accruals, affected the ability of both cash flows and accruals in explaining the variation in *future cash flows*. Aggregate earnings had more ability than cash flows in explaining the variation in future cash flows when the quality of earnings was high. On the other hand, cash flows alone performed better than earnings alone when the quality of earnings was low. The ability of accruals also increased as the quality of earnings decreased. Therefore, the quality of earnings affects the value relevance of decomposing aggregate earnings into its components.

9. The superiority of cash flows and accruals over aggregate earnings appears to be conditional on the level of financial distress. The ability of accruals in explaining the variation in future cash flows increased as the level of the financial distress increased. Cash flows alone outperformed aggregate earnings in explaining the variation in future cash flows when the level of financial distress was relatively high. Thus, the value relevance of separating cash flows from aggregate earnings increases with the increase in the probability of default risk.

## 8.3 Contributions and Limitations

With regard to explaining future cash flows, the general conclusion of this study is that neither current earnings nor current cash flows are sufficient variables. A combination of current cash flows and current accruals data should be used together in predicting future cash flows. This conclusion is not conditional on any firm characteristics.

Regarding the value relevance of cash flows versus earnings alone, the general conclusion is that current cash flow data is not always better than earnings in explaining the variation in future cash flows. At the same time, earnings are not always better than current cash flows in explaining the variation in future cash flows. To be more specific, the value relevance of cash flows and earnings are too conditional to favour one over the other.

These two conclusions, which are based on actual cash flow data rather than stock returns, might bridge the gap in the UK evidence on the usefulness of cash flows and accruals. These conclusions could also provide scholars with a guide to develop a bankruptcy model.

The above two general conclusions could have implications for practitioners in particular lenders. These conclusions may affect their analysis of financial statements. In assessing future cash flows, financial statements complement each other and provide different information about future cash flows. However, to those who look at financial statements as competing statements, the results give them a guide to distinguish between companies where they should place greater emphasis on cash flow data rather than earnings as a predictor for future cash flows.

The major disadvantage of this study design, however, is that it looks at the ability of accounting data to explain cash flows at a single future point (i.e. one, two or three-years-ahead) rather than the whole series of future cash flows. Since the actual series of all future cash flows is unobservable, this aspect is untestable.

## 8.4 Suggestions for Future Research

The results in this study provide indirect evidence on the relative importance of earnings and cash flows over different life-cycle stages. While there is direct US evidence on this issue, there is no such UK evidence. This issue may be interesting to consider in more details. This study, using a large sample, examined different issues and factors that may affect the superiority of earnings over their components. However, further analysis using specific sub-samples (e.g. bankrupt, small firms, etc.) may provide more detail about the effect of firm's characteristics. The differences in the relative importance of earnings versus their components in different phases of the economy are also avenues for future research.

Avenues for future research may include time series modelling of cash flows and their association with past observations of other accounting series. This study is primarily concerned with the power of current accounting data (earnings, operating cash flows, and accruals) to explain variation in future cash flows. At some point in the future there will be a sufficient time series of FRS1 data to generate forecasts for UK corporate cash flows: in this current study, I do not generate explicit forecasts of future cash flows but try to explain variation in them. For example the use of Box-Jenkins models [commonly used in earnings forecasting (e.g. Foster 1977)] requires a long time series of data.

Another issue related to the time series of FRS1 cash flow data is the potential use of discounted cash flows valuation models. For this study, current data restrictions mean that there was only the opportunity to examine relatively short horizons for future cash flows. As a result the conclusions of this study are of greatest significance for short term creditors. However, once a longer series of observations is available, it will be possible to employ them in corporate valuation models where values are a function of discounted future cash flows. For practical purposes it is often not required to have predictions for future cash flows at very long horizons. Thus, in another ten years or so, there may be sufficient data to examine the findings of this study within a longer-term framework of equal significance to shareholders as well as creditors.

The results in this study provide evidence on the usefulness of accruals in improving the ability of cash flows in predicting future cash flows. The results also provide indirect evidence on the use of earnings management to signal private information, which as a result improve the ability of earnings in explaining future cash flows. One way to extend these results is to examine whether the discretionary or the non-discretionary part is the one that has information content. This may be done by using an accrual models (e.g. Jones' model) to break accruals into discretionary and non-discretionary. This method will also provide direct evidence on whether UK managers use earnings management to signal private information about the future performance. The existing US evidence in this regard indicates that discretionary accruals are priced by the market. The evidence also indicates that US managers use discretionary accruals to communicate information regarding future profitability. (See Subramanyam, 1996).

# APPENDICES

**Appendix A 1:**

**Summarize the results of Barth et al. (2001)**

$$OCF_{i,t+j} = \alpha_0 + \alpha_1 E_{i,t} + u_{i,t+j} \quad \text{[Model 1]}$$

$$OCF_{i,t+j} = \beta_0 + \beta_1 OCF_{i,t} + \beta_2 AGGACC_{i,t} + u_{i,t+j} \quad \text{[Model 2]}$$

$$OCF_{i,t+j} = \gamma_0 + \gamma_1 OCF_{i,t} + \gamma_2 AP_{i,t} + \gamma_3 INV_{i,t} + \gamma_4 AR_{i,t} + \gamma_5 DEP_{i,t} + \gamma_6 AMORT_{i,t} + \gamma_7 OTHER_{i,t} + u_{i,t+j} \quad \text{[Model 3]}$$

**The results of regressing one-year ahead cash flows on accruals and cash flows**

| | Intercept(±) | E(+) | OCF(+) | AGGACC(±) | AP(-) | AR(+) | INV(+) | DEP(+) | AMORT(+) | OTHER(±) | Adj.$R^2$% | NOB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Model 1 | 0.07 | 0.42 | | | | | | | | | 15 | 10164 |
| | 81.16 | 42.98 | | | | | | | | | | |
| Mode 2 | 0.04 | | 0.60 | 0.22 | | | | | | | 27 | 10164 |
| | 45.31 | | 59.48 | 21.19 | | | | | | | | |
| Model 3 | 0.01 | | 0.59 | | -0.56 | 0.42 | 0.35 | 0.42 | 0.47 | 0.15 | 35 | 10164 |
| | 7.89 | | 61.34 | | -28.58 | 28.10 | 21.75 | 16.39 | 11.05 | 10.54 | | |

## Appendix A 2:

**Summarize the results of Barth et al. (2001)**

**The adjusted $R^2$% of regressing one-year, two-year, three-year ahead cash flows on accrual and cash flows**

| | One-year ahead OCF | Two-year ahead OCF | Three-year ahead OCF |
|---|---|---|---|
| Earnings only | 15 | 13 | 8 |
| Cash flows only | 24 | 19 | 17 |
| Cash flows and aggregate accruals | 27 | 22 | 18 |
| Cash flows and the components of accruals | 35 | 27 | 22 |

## Appendix A 3:

## List of Sample Companies

| No. | TYPE | NAME |
|---|---|---|
| 1 | 134982 | MCBRIDE |
| 2 | 135083 | PROTEC |
| 3 | 135084 | JJB SPORTS |
| 4 | 135085 | HYDRO INTL. |
| 5 | 135090 | TELEWEST COMMS. |
| 6 | 135093 | CLYDEPORT |
| 7 | 135109 | K3 BUS.TECH.GP. |
| 8 | 135116 | BRIT.SKY BCAST. |
| 9 | 135127 | ADVANCED MED.SLTN.GP. |
| 10 | 135128 | DEE VALLEY GROUP |
| 11 | 135129 | DEE VLY.WT.NV. |
| 12 | 135130 | MICE GROUP |
| 13 | 135132 | ATLANTIC TELECOM SUSP - 05/10/01 |
| 14 | 135134 | PROTEOME |
| 15 | 135138 | TOAD UK |
| 16 | 135142 | TRINITY CARE |
| 17 | 135176 | PHOTOBITION SUSP - SUSP 29/10/01 |
| 18 | 135177 | XKO GROUP |
| 19 | 135178 | GET GROUP |
| 20 | 135203 | DATRONTECH SUSP - SUSP 06/11/00 |
| 21 | 135205 | BEALE |
| 22 | 135206 | EXPRO INTL. |
| 23 | 135209 | AMCO CORPORATION |
| 24 | 135212 | PRECOAT INTL. |
| 25 | 135215 | BIOCOMPATIBLES |
| 26 | 135216 | JUST GROUP SUSP - SUSP 01/11/01 |
| 27 | 135217 | CORAL PRODUCTS |
| 28 | 135227 | COBURG GROUP |
| 29 | 135229 | FIRST GROUP |
| 30 | 135233 | ANTONOV |
| 31 | 135236 | SILK INDUSTRIES |
| 32 | 135246 | SR PHARMA |
| 33 | 135254 | FORMSCAN |
| 34 | 135255 | LORIEN |
| 35 | 135258 | OLD ENG.INNS DEAD - DEAD 07/11/01 |
| 36 | 135264 | CHARACTER GROUP |
| 37 | 135271 | OASIS STORES DEAD - 25/09/01 |
| 38 | 135362 | UNIVERSE GROUP |
| 39 | 135368 | VOSS NET SUSP - SUSP 26/10/01 |
| 40 | 135380 | UNIVERSAL SALVAGE |
| 41 | 135503 | NORTHGATE INFO.SLTN. |
| 42 | 135506 | WELLINGTON HDG. |
| 43 | 135508 | WASTE RECYCLING |
| 44 | 135509 | SMARTLOGIK GROUP |
| 45 | 135511 | DOMNICK HUNTER |
| 46 | 135515 | NOVARA DEAD - 27/06/01 |
| 47 | 135516 | AVAILEON SUSP - SUSP 29/09/00 |
| 48 | 135522 | TRAFFICMASTER |
| 49 | 135523 | ROBERT WSM.DRS. |
| 50 | 135527 | TECTEON |
| 51 | 135539 | BRANCOTE HOLDINGS |
| 52 | 135540 | KELLER |
| 53 | 135547 | SUPERSCAPE |
| 54 | 135549 | SOUTHAMPTON LEISURE HDG. |
| 55 | 135561 | HAMLEYS |
| 56 | 135564 | DRS DATA |
| 57 | 135565 | GO-AHEAD GROUP |
| 58 | 135585 | PALADIN RESOURCES |
| 59 | 135716 | AUTOMOTIVE PRECN. |
| 60 | 135730 | LDN.CLUBS INTL. |
| 61 | 135744 | AMEY |
| 62 | 135750 | BLOOMSBURY PBL. |
| 63 | 135860 | COMMUNISIS |
| 64 | 135861 | LAWRENCE |
| 65 | 135866 | UCM GROUP |
| 66 | 135867 | CROWN SPORTS |
| 67 | 135869 | IMAGINATION TECHNOLOGIES |
| 68 | 135872 | SPRINGHEALTH LEISURE |
| 69 | 135889 | INTERX |
| 70 | 135970 | PUBS 'N' BARS |
| 71 | 136515 | MAGNUM PWR.SLTN. |
| 72 | 136517 | OSMETECH |
| 73 | 136531 | JAZZ FM |
| 74 | 136631 | COMPEL GP. |
| 75 | 136751 | GAMES WORKSHOP |
| 76 | 136858 | AFRICAN GOLD |
| 77 | 136902 | CIVILIAN CONTENT |
| 78 | 136904 | FILTRONIC |
| 79 | 136985 | CHURCHILL CHINA |
| 80 | 137127 | TRANSCOMM |
| 81 | 137487 | ASK CENTRAL |
| 82 | 137537 | SYSTEMS INTL.GROUP |
| 83 | 137538 | CELTIC |
| 84 | 137539 | UNIVENT |
| 85 | 137543 | BALTIMORE TECHNOLOGIES |
| 86 | 137545 | KS BIOMEDIX HOLDINGS |
| 87 | 137553 | CHORION |
| 88 | 137668 | ENTERPRISE INNS |
| 89 | 138223 | CALLUNA DEAD - DEAD 28/09/01 |
| 90 | 138535 | RM |
| 91 | 139275 | ZOTEFOAMS |
| 92 | 139769 | MECONIC DEAD - 23/08/01 |
| 93 | 139996 | BTG |
| 94 | 139998 | JKX OIL & GAS |
| 95 | 142283 | GPE.CHEZ GERARD |
| 96 | 275608 | EASYSCREEN |
| 97 | 275734 | REDSTONE |
| 98 | 276190 | MONOTUB INDUSTRIES |
| 99 | 278054 | HARRIER GROUP |
| 100 | 278216 | THUS |
| 101 | 278612 | DOMINO'S PIZZA |
| 102 | 278620 | SYSTEMS UNION |
| 103 | 278697 | PEACOCK GROUP |
| 104 | 278833 | SDL |
| 105 | 278945 | TRANSENSE TECHS. |
| 106 | 282045 | MELROSE RESOURCES |
| 107 | 285000 | SCIPHER |
| 108 | 287585 | TOPNOTCH HEALTH CLUBS |
| 109 | 301854 | LINX PRINT.TECH. |
| 110 | 301861 | WETHERSPOON (JD) |
| 111 | 301917 | NATIONAL EXPRESS |
| 112 | 301966 | PAN ANDEAN RESOURCES |
| 113 | 307411 | NWF |
| 114 | 312657 | ALLDERS |
| 115 | 312697 | ABACUS GROUP |
| 116 | 312698 | DFS FURNITURE CO. |
| 117 | 312742 | ROXBORO GROUP |
| 118 | 312760 | AZLAN GROUP |
| 119 | 312763 | BIOTRACE INTL. |
| 120 | 312840 | LITHO SUPPLIES |
| 121 | 312852 | ROYAL DOULTON |
| 122 | 312860 | GLOW COMMUNICATIONS |
| 123 | 312883 | TELSPEC |
| 124 | 319336 | QSP GROUP SUSP - SUSP 24/09/01 |

| No. | TYPE | NAME |
|---|---|---|
| 125 | 319410 | STAGECOACH GROUP |
| 126 | 319608 | ASTRAZENECA |
| 127 | 319711 | CAPITAL BARS |
| 128 | 319712 | RPC GROUP |
| 129 | 319717 | DREW SCIENTIFIC |
| 130 | 319730 | TELME GROUP |
| 131 | 319733 | INVERESK |
| 132 | 319743 | VIRIDIAN GROUP |
| 133 | 319752 | CARPETRIGHT |
| 134 | 319802 | DEVRO |
| 135 | 319868 | THERATASE |
| 136 | 319875 | BUSINESS POST GP. |
| 137 | 319938 | CELSIS INTL. |
| 138 | 323271 | GTL RESOURCES |
| 139 | 323584 | VHE HOLDINGS |
| 140 | 323592 | AXIS-SHIELD |
| 141 | 359942 | DUNHAM BUSH (EUROPE) |
| 142 | 361085 | ALPHA AIRPORTS |
| 143 | 361100 | SLIMMA |
| 144 | 361101 | IDS GROUP |
| 145 | 361224 | TRIFAST |
| 146 | 361232 | CLINICAL CMPTG. |
| 147 | 361289 | HANOVER INTL. |
| 148 | 361361 | WINCHESTER ENTERTAINMENT |
| 149 | 361388 | RADSTONE TECH. |
| 150 | 361468 | CEDAR GROUP |
| 151 | 362534 | PRESTON NTH.END |
| 152 | 362536 | METRODOME GROUP |
| 153 | 506163 | MERSEY DOCKS |
| 154 | 506293 | TEPNEL LIFE SCI. |
| 155 | 506921 | ENTERPRISE |
| 156 | 507342 | BRISTOL WATER |
| 157 | 507343 | BRISTOL WT.NV. |
| 158 | 507414 | HOMESTYLE GROUP |
| 159 | 507481 | HUGHES (TJ) |
| 160 | 507482 | REGENT INNS |
| 161 | 507494 | VEGA GROUP |
| 162 | 507523 | ANGLIAN GROUP DEAD - DEAD 08/06/01 |
| 163 | 507526 | BRITISH BIOTECH |
| 164 | 507530 | MFI FURNITURE |
| 165 | 507551 | XENOVA GP. |
| 166 | 507886 | HOUSE OF FRASER |
| 167 | 507916 | REDROW |
| 168 | 670163 | HOST EUROPE |
| 169 | 671004 | RANGE COOKER COMPANY |
| 170 | 671158 | BOUSTED |
| 171 | 671159 | SCS UPHOLSTERY |
| 172 | 671160 | AUTOLOGIC |
| 173 | 671226 | BOVIS HOMES GROUP |
| 174 | 671267 | TERENCE CHAPMAN GROUP |
| 175 | 671338 | MARCHPOLE HOLDINGS |
| 176 | 671363 | ENERGIS |
| 177 | 671375 | SYTNER |
| 178 | 671388 | GOOCH AND HOUSEGO |
| 179 | 671391 | HACAS GROUP |
| 180 | 671467 | KINGSTON COMMUNICATIONS |
| 181 | 671537 | OPTOPLAST |
| 182 | 671549 | BOND INTL.SOFTWARE |
| 183 | 671586 | LONGMEAD GROUP |
| 184 | 671754 | DEBENHAMS |
| 185 | 671755 | FALKLAND ISLANDS HDG. |
| 186 | 676024 | MONSOON |
| 187 | 676377 | FISH |
| 188 | 676492 | SAFESTORE |
| 189 | 676493 | ELDRIDGE POPE |
| 190 | 676522 | LONRHO AFRICA |
| 191 | 676563 | GUARDIAN IT |
| 192 | 676579 | PENNANT INTL GROUP |
| 193 | 676684 | HARTFORD GROUP |
| 194 | 676708 | PEEL HOTELS |
| 195 | 676775 | EXPRESS DAIRIES |
| 196 | 679040 | VI GROUP |
| 197 | 679103 | OXFORD GLYCOSCIENCES |
| 198 | 679154 | INFORMA GROUP |
| 199 | 679184 | OTTAKARS |
| 200 | 679282 | DESIRE PETROLEUM |
| 201 | 679447 | CONVERGENT COMMS. |
| 202 | 679666 | MATALAN |
| 203 | 679861 | AMBIENT |
| 204 | 679947 | COMPUTACENTER |
| 205 | 679949 | ICM COMPUTER |
| 206 | 681096 | QUANTICA |
| 207 | 681134 | JAMES R KNOWLES HDG. |
| 208 | 681135 | ITNET |
| 209 | 681165 | MULTI GROUP |
| 210 | 681307 | GOLDSHIELD GROUP |
| 211 | 681341 | NEW LOOK |
| 212 | 681398 | ATA GROUP |
| 213 | 681399 | SURFCONTROL |
| 214 | 681444 | MADISONS COFFEE |
| 215 | 681551 | TCT INTERNATIONAL |
| 216 | 681552 | ANGLO SIBERIAN OIL CO. |
| 217 | 681683 | ECSOFT GROUP |
| 218 | 681712 | ADVAL GROUP |
| 219 | 681730 | SELFRIDGES |
| 220 | 681815 | FUNDAMENTAL-EINVESTMENT |
| 221 | 681899 | SIRIUS FINL.SLTN. |
| 222 | 681958 | TOUCHSTONE GROUP |
| 223 | 681961 | TOROTRAK |
| 224 | 684990 | CARILLION |
| 225 | 685597 | EXCHANGE FS GROUP |
| 226 | 686012 | BALDWINS INDL.SERVICES |
| 227 | 686313 | EUROLINK MANAGED SVS. |
| 228 | 686445 | DOWNTEX |
| 229 | 686453 | PREMIER DIRECT GROUP |
| 230 | 686526 | MEDIA CONTENT |
| 231 | 686597 | FIRESTONE DIAMONDS |
| 232 | 686690 | CLIPPER VENTURES |
| 233 | 686732 | IFTE |
| 234 | 686800 | TOLENT |
| 235 | 686853 | METNOR GROUP |
| 236 | 686918 | NETB2B2 |
| 237 | 688329 | LTG TECHNOLOGIES |
| 238 | 688552 | TELECOM PLUS |
| 239 | 688583 | OLD MONK COMPANY |
| 240 | 688806 | HONEYCOMBE LEISURE |
| 241 | 688852 | MANPOWER SOFTWARE |
| 242 | 688875 | VIRTUAL INTERNET |
| 243 | 690266 | CONNAUGHT |
| 244 | 690387 | ARTISAN (UK) |
| 245 | 690410 | FINANCIAL OBJECTS |
| 246 | 690414 | BIOGLAN PHARMA |
| 247 | 690493 | WILLINGTON |
| 248 | 690652 | RDL GROUP |
| 249 | 690658 | HARTEST HOLDINGS |
| 250 | 695494 | SYNSTAR |
| 251 | 695614 | AXON GROUP |
| 252 | 695989 | MORSE |
| 253 | 697489 | AFFINITY INTERNET |
| 254 | 697849 | BELL GROUP |
| 255 | 698113 | PERTHSHIRE LEISURE |
| 256 | 698114 | ROBOTIC TECHNOLOGY SYS. |
| 257 | 698259 | GLOTEL |
| 258 | 698472 | REXONLINE |
| 259 | 698490 | NETBENEFIT |
| 260 | 698784 | STENOAK ASSD.SVS. |

| No. | TYPE | NAME | No. | TYPE | NAME |
|---|---|---|---|---|---|
| 261 | 698883 | FUTURE NETWORK | 324 | 874500 | PROTAGONA |
| 262 | 700190 | SFI GROUP | 325 | 874501 | INDE.ENERGY HDG. DEAD - 25/07/01 |
| 263 | 701270 | BOWNESS LEISURE | 326 | 874786 | FIBERNET GROUP |
| 264 | 728803 | EUROMONEY INSTL.INVESTOR | 327 | 875841 | MATRIX HEALTHCARE |
| 265 | 740722 | SOUTHERN VECTIS | 328 | 875854 | PACE MICRO TECHNOLOGY |
| 266 | 749140 | YATES GROUP | 329 | 875862 | JARVIS HOTELS |
| 267 | 757368 | TADPOLE TECHNOLOGY | 330 | 875868 | STAFFWARE |
| 268 | 776294 | INCEPTA | 331 | 875870 | SOLID STATE SUPPLIES |
| 269 | 776297 | EMERALD ENERGY | 332 | 875871 | VOCALIS |
| 270 | 865221 | NSB RETAIL SYSTEMS | 333 | 875879 | WHITTARD OF CHELSEA |
| 271 | 865235 | SHL GROUP | 334 | 876148 | 7 GROUP |
| 272 | 868658 | ALIZYME | 335 | 876181 | BELHAVEN BREWERY |
| 273 | 870000 | COFFEE REPUBLIC | 336 | 876247 | THEBIZ.COM |
| 274 | 870011 | INTL.GREETINGS | 337 | 876252 | BRITISH ENERGY |
| 275 | 870181 | NATIONAL GRID | 338 | 876253 | FAYREWOOD |
| 276 | 870189 | ACAMBIS | 339 | 876265 | HAT PIN |
| 277 | 870192 | WILMINGTON | 340 | 876296 | PLASMON |
| 278 | 870194 | GARDNER GP. | 341 | 882026 | DIGITAL ANIMATION |
| 279 | 870203 | JASMIN | 342 | 882039 | WATERMARK GROUP |
| 280 | 870205 | CMG | 343 | 882044 | ATKINS(WS) |
| 281 | 870211 | CLUBHAUS | 344 | 882047 | HIT ENTERTAINMENT |
| 282 | 870219 | FLOMERICS GROUP | 345 | 882048 | SOMERFIELD |
| 283 | 870223 | GEARHOUSE GROUP DEAD - 25/10/01 | 346 | 882050 | NETWORK TECHNOLOGY |
| 284 | 870364 | VICTREX | 347 | 882065 | DAIRY CREST |
| 285 | 870445 | NORTHERN PETROLEUM | 348 | 882089 | SCI ENTERTAINMENT GP. |
| 286 | 870449 | OXFORD BIOMEDICA | 349 | 882155 | AFA SYSTEMS |
| 287 | 870558 | JUMBO INTERNATIONAL | 350 | 882170 | PROFILE MEDIA |
| 288 | 870593 | SHIRE PHARMACEUTICALS | 351 | 882212 | ASTON VILLA |
| 289 | 870625 | EASYNET GROUP | 352 | 882224 | CONCURRENT TECHNOLOGIES |
| 290 | 870641 | STADIUM | 353 | 882240 | IMPERIAL TOBACCO GP. |
| 291 | 870717 | COLT TELECOM | 354 | 882245 | SOPHEON |
| 292 | 870771 | MACDONALD HOTELS | 355 | 882267 | DELTRON ELECTRONICS |
| 293 | 870783 | TRIAD GROUP | 356 | 882272 | WEEKS GROUP |
| 294 | 870785 | FULMAR | 357 | 882273 | AEA TECHNOLOGY |
| 295 | 870788 | NINTH FLOOR | 358 | 882274 | SHALIBANE DEAD - DEAD 01/10/01 |
| 296 | 870798 | SYSTEMS INTEG.RESEARCH | 359 | 882275 | ULTRA ELECTRONICS HDG. |
| 297 | 870805 | DICOM | 360 | 882276 | PNC TELECOM |
| 298 | 870806 | XANSA | 361 | 882286 | THISTLE HOTELS |
| 299 | 870809 | CHELSEA VILLAGE | 362 | 882289 | LAVENDON GROUP |
| 300 | 870815 | AVOCET MINING | 363 | 882297 | MEARS GROUP |
| 301 | 870866 | MILLENNIUM & COPTHORNE HOTELS | 364 | 882312 | FITNESS FIRST |
| 302 | 870867 | PHYTOPHARM | 365 | 882314 | VICTORY |
| 303 | 870873 | HARVEY NICHOLS | 366 | 882323 | JOHN DAVID SPORTS |
| 304 | 870888 | SIRA BUS.SERVICES | 367 | 882410 | DEEP SEA LEISURE |
| 305 | 870890 | VERNALIS GROUP | 368 | 882420 | MONDAS |
| 306 | 870895 | HERCULES PROPERTY ` | 369 | 882423 | GULLANE ENTM. |
| 307 | 870899 | MSB INTERNATIONAL | 370 | 882425 | AUXINET |
| 308 | 870910 | MAIDEN | 371 | 882453 | BEAUFORT INTERNATIONAL |
| 309 | 870916 | C A COUTTS | 372 | 882457 | MAJESTIC WINE |
| 310 | 870935 | FIELDENS | 373 | 882555 | MV SPORTS GROUP |
| 311 | 870942 | THOMAS POTTS | 374 | 882563 | ADVANCED POWER CMPN. |
| 312 | 870950 | REFLEC | 375 | 882651 | ACCESS PLUS |
| 313 | 870954 | LUMINAR | 376 | 882670 | FUTURE INTEG.TELEPHONY SUSP - SUSP 03/08/01 |
| 314 | 870956 | RAILTRACK GP. SUSP - SUSP 08/10/01 | 377 | 882671 | CHARTERHOUSE COMMS. |
| 315 | 870958 | EPIC GROUP | 378 | 882672 | SEMPLE COCHRANE |
| 316 | 870969 | MULBERRY GROUP | 379 | 882839 | AVEVA GROUP |
| 317 | 870988 | RICHMOND FOODS | 380 | 882966 | PARKWOOD HOLDINGS |
| 318 | 871620 | EUROPEAN TELECOM | 381 | 882976 | YEOMAN GP. |
| 319 | 871632 | PPL THERAPEUTICS | 382 | 888052 | HIGHAMS SYSTEMS SVS. GP. |
| 320 | 871642 | HYDRO DYNAMIC PRODUCTS | 383 | 888080 | AQUARIUS |
| 321 | 871674 | SECURICOR | 384 | 888085 | ON-LINE |
| 322 | 871675 | PRIMEENT | 385 | 888086 | NETCALL |
| 323 | 871729 | THEO FENNELL | 386 | 888093 | FOUNTAINS |

| No. | TYPE | NAME |
|---|---|---|
| 387 | 888114 | WEST BROMWICH ALBION |
| 388 | 888216 | JOHN LEWIS OF HUNGERFORD |
| 389 | 888271 | IMS GROUP |
| 390 | 888276 | CENTRICA |
| 391 | 888277 | KEYSTONE SLTN.GP. |
| 392 | 888291 | C&B PUBLISHING DEAD - DEAD 31/05/01 |
| 393 | 888330 | PSD GROUP |
| 394 | 888376 | IZODIA |
| 395 | 888420 | BIRMINGHAM CITY |
| 396 | 888438 | NORD ANGLIA EDUCATION |
| 397 | 888439 | CENES PHARMACEUTICALS |
| 398 | 888441 | AORTECH INTERNATIONAL |
| 399 | 888442 | ANGLO-WELSH GP. |
| 400 | 888445 | VFG |
| 401 | 888447 | HOWLE HOLDINGS |
| 402 | 888468 | SCREEN |
| 403 | 888469 | CHARLTON ATHLETIC |
| 404 | 888478 | TRANSACSYS |
| 405 | 888492 | DOBBIES GARDEN CENTRES |
| 406 | 888518 | LONDON BRIDGE SOFTWARE |
| 407 | 888525 | DIAGONAL |
| 408 | 888545 | KBC ADVANCED TECHS. |
| 409 | 888550 | AVIS EUROPE |
| 410 | 888553 | HEAL'S DEAD - DELIST 29/10/01 |
| 411 | 888572 | CAMBRIDGE ANTIBODY TECH. |
| 412 | 888573 | DONATANTONIO |
| 413 | 888577 | WHITEHEAD MANN GP. |
| 414 | 888590 | LEICESTER CITY |
| 415 | 888591 | NEWCASTLE UTD. |
| 416 | 888624 | HARVEY NASH GROUP |
| 417 | 888652 | NOTTINGHAM FOREST |
| 418 | 888689 | ENVESTA |
| 419 | 888699 | UNITED OVERSEAS GROUP DEAD - DEAD 28/09/01 |
| 420 | 888700 | NMT GROUP |
| 421 | 888732 | SIBIR ENERGY |
| 422 | 888765 | EQUATOR GROUP |
| 423 | 888780 | SAMEDAYBOOKS.CO.UK |
| 424 | 888790 | PARTNERS HOLDINGS SUSP - SUSP 23/01/01 |
| 425 | 888812 | HEART OF MIDLOTHIAN |
| 426 | 888830 | COMINO GROUP |
| 427 | 888831 | LADY IN LEISURE GROUP SUSP - SUSP 10/09/01 |
| 428 | 888928 | PETRA DIAMONDS |
| 429 | 892012 | LONGBRIDGE INTERNATIONAL |
| 430 | 892158 | GLADSTONE |
| 431 | 892784 | IS SOLUTIONS |
| 432 | 892896 | COMPUTERLAND UK |
| 433 | 892907 | AGGREKO |
| 434 | 892921 | SCIENCE SYSTEMS |
| 435 | 892927 | LATCHWAYS |
| 436 | 896457 | XAAR |
| 437 | 896466 | ULTRAFRAME |
| 438 | 896489 | PROVALIS |
| 439 | 896598 | INTELLIPLUS GROUP |
| 440 | 896638 | HOLMES PLACE |
| 441 | 897170 | NEWMARK TECHNOLOGY GP. |
| 442 | 897311 | SOCO INTERNATIONAL |
| 443 | 897326 | TOPPS TILES |
| 444 | 897328 | GALLAHER GROUP |
| 445 | 897412 | ROYALBLUE |
| 446 | 897450 | SBS GROUP |
| 447 | 897584 | POWDERJECT PHARMS. |
| 448 | 897585 | HIGHLAND TIMBER |
| 449 | 897822 | AIT GROUP |
| 450 | 897944 | GALEN HOLDINGS |
| 451 | 897975 | BAKERY SERVICES |
| 452 | 898071 | DELCAM |
| 453 | 898072 | CAMMELL LAIRD HOLDINGS SUSP - SUSP 11/04/01 |
| 454 | 898597 | NORTHERN RECRUITMENT |
| 455 | 898616 | GYRUS GROUP |
| 456 | 898643 | MINORPLANET SYSTEMS |
| 457 | 898686 | MAELOR |
| 458 | 898687 | CRC GROUP |
| 459 | 898792 | SEASCOPE SHIPPING HDG. |
| 460 | 899088 | TED BAKER |
| 461 | 899188 | BHP BILLITON |
| 462 | 899200 | KINGFISHER LEISURE DEAD - 07/09/01 |
| 463 | 899258 | FAIRPLACE CONSULTING |
| 464 | 899538 | LEARNING TECHNOLOGY |
| 465 | 899622 | GR HOLDINGS |
| 466 | 899865 | LEPCO |
| 467 | 899910 | LANDROUND |
| 468 | 900229 | ALPHAMERIC |
| 469 | 900232 | ALLIED DOMECQ |
| 470 | 900242 | SIX CONTINENTS |
| 471 | 900248 | DE VERE GROUP |
| 472 | 900250 | GREENE KING |
| 473 | 900251 | DIAGEO |
| 474 | 900261 | SCOT.& NEWCASTLE |
| 475 | 900271 | WHITBREAD |
| 476 | 900274 | WOLV.&.DUDLEY |
| 477 | 900283 | GLENMORANGIE 'A' |
| 478 | 900284 | GLENMORANGIE 'B' |
| 479 | 900286 | CADBURY SCHWEPPES |
| 480 | 900293 | BBA GROUP |
| 481 | 900294 | CAPE |
| 482 | 900304 | BLUE CIRCLE INDS. DEAD - DEAD 12/07/01 |
| 483 | 900307 | RMC GROUP |
| 484 | 900323 | COSTAIN |
| 485 | 900327 | GLEESON (MJ) |
| 486 | 900330 | SWAN HILL GP. |
| 487 | 900336 | MCALPINE(ALFRED) |
| 488 | 900339 | MOWLEM (JOHN) |
| 489 | 900345 | TAYLOR WOODROW |
| 490 | 900346 | INTERSERVE |
| 491 | 900350 | WIMPEY (GEORGE) |
| 492 | 900358 | BPB |
| 493 | 900382 | CAKEBREAD ROBEY DEAD - 19/09/01 |
| 494 | 900408 | MORGAN CRUCIBLE |
| 495 | 900433 | COOKSON GROUP |
| 496 | 900451 | BOC GROUP |
| 497 | 900455 | IMP.CHM.INDS. |
| 498 | 900461 | YORKS.GROUP |
| 499 | 900476 | CRODA INTL. |
| 500 | 900479 | GLAXOSMITHKLINE |
| 501 | 900484 | RECKITT BENCKISER |
| 502 | 900487 | SMITH & NEPHEW |
| 503 | 900493 | SPIRENT |
| 504 | 900494 | BALFOUR BEATTY |
| 505 | 900498 | MARCONI |
| 506 | 900509 | ELEKTRON |
| 507 | 900515 | ELECO |
| 508 | 900528 | VOLEX GROUP |

| No. | TYPE | NAME |
|---|---|---|
| 509 | 900534 | ATLANTIC CASPIAN |
| 510 | 900552 | BABCOCK INTL. |
| 511 | 900558 | MOLINS |
| 512 | 900559 | EMI GROUP |
| 513 | 900571 | BRIT.BSTOCK.AG. |
| 514 | 900574 | STERLING PBL.GP. |
| 515 | 900575 | FENNER |
| 516 | 900578 | BSS GROUP |
| 517 | 900580 | RENOLD |
| 518 | 900589 | 600 GROUP |
| 519 | 900600 | SENIOR |
| 520 | 900601 | SIMON GROUP |
| 521 | 900610 | ICELAND GROUP |
| 522 | 900612 | HAWTAL WHITING DEAD - DEAD 06/06/01 |
| 523 | 900616 | T & S STORES |
| 524 | 900619 | PRINCEDALE GROUP |
| 525 | 900631 | ASSD.BRIT.ENGR. |
| 526 | 900638 | STANLEY LEISURE |
| 527 | 900670 | ENTERTAINMENT RIGHTS |
| 528 | 900696 | CARBO |
| 529 | 900699 | WEIR GROUP |
| 530 | 900712 | FIRTH RIXSON |
| 531 | 900713 | LOCKER GROUP |
| 532 | 900735 | EXPAMET INTL. DEAD - 18/06/01 |
| 533 | 900737 | AGA FOODSERVICE |
| 534 | 900741 | SPIRAX-SARCO |
| 535 | 900743 | WAGON |
| 536 | 900750 | HAWTIN |
| 537 | 900754 | GKN |
| 538 | 900764 | WOLSELEY |
| 539 | 900767 | ENODIS |
| 540 | 900780 | ALEXANDRA |
| 541 | 900789 | UNILEVER (UK) |
| 542 | 900801 | NORTHERN FOODS |
| 543 | 900803 | TESCO |
| 544 | 900804 | UNIQ |
| 545 | 900819 | TATE & LYLE |
| 546 | 900825 | ASSD.BRIT.FOODS |
| 547 | 900828 | OSBORNE & LITTLE |
| 548 | 900832 | BUDGENS |
| 549 | 900872 | BIRSE GROUP |
| 550 | 900875 | ISOTRON |
| 551 | 900888 | BT GROUP |
| 552 | 900906 | DIXONS GP. |
| 553 | 900909 | WEMBLEY GP. |
| 554 | 900917 | PHOTO-ME INTL. |
| 555 | 900918 | RANK GROUP |
| 556 | 900925 | AVON RUBBER |
| 557 | 900930 | CHLORIDE GROUP |
| 558 | 900943 | SMITHS GROUP |
| 559 | 900952 | BRITAX INTERNATIONAL DEAD - DEAD 03/10/01 |
| 560 | 900953 | CAFFYNS |
| 561 | 900954 | DAVIS SER.GP. |
| 562 | 900959 | LEX SERVICE |
| 563 | 900995 | BP |
| 564 | 900997 | PREMIER OIL |
| 565 | 901016 | CHARTER |
| 566 | 901019 | SYGEN INTERNATIONAL |
| 567 | 901023 | ELEMENTIS |
| 568 | 901029 | INCHCAPE |
| 569 | 901053 | NOVAR |
| 570 | 901064 | API GROUP |
| 571 | 901065 | REXAM |
| 572 | 901067 | BUNZL |
| 573 | 901080 | REED INTL. |
| 574 | 901095 | 4IMPRINT GROUP |
| 575 | 901102 | TRINITY MIRROR |
| 576 | 901106 | UNITED BUSINESS MEDIA |
| 577 | 901107 | LAIRD GROUP |
| 578 | 901124 | JACOBS HOLDINGS |
| 579 | 901127 | PEN.&.ORNTL.DFD. |
| 580 | 901135 | BRANDON HIRE |
| 581 | 901143 | PARTRIDGE FINE |
| 582 | 901145 | MILLWALL HDG. |
| 583 | 901150 | DELTA |
| 584 | 901152 | JOHNSON MATTHEY |
| 585 | 901155 | MANGANESE BRONZE |
| 586 | 901156 | HUNTSWORTH |
| 587 | 901159 | VARDY (REG) |
| 588 | 901164 | HAYS |
| 589 | 901167 | JOHNSON SERVICE GROUP |
| 590 | 901181 | BENTALLS DEAD - DEAD 31/08/01 |
| 591 | 901192 | BOOTS |
| 592 | 901195 | ARCADIA GROUP |
| 593 | 901199 | GUS |
| 594 | 901203 | NEXT |
| 595 | 901207 | MARKS & SPENCER |
| 596 | 901208 | MENZIES (JOHN) |
| 597 | 901209 | MOSS BROS.GP. |
| 598 | 901215 | SMITH(WH) |
| 599 | 901224 | COURTS |
| 600 | 901250 | SCAPA GROUP |
| 601 | 901259 | LAING (JOHN) |
| 602 | 901271 | DAWSON INTL. |
| 603 | 901273 | FOSTER (JOHN) SUSP - SUSP 01/09/00 |
| 604 | 901278 | CHAPELTHORPE |
| 605 | 901287 | JAMES HALSTEAD |
| 606 | 901295 | BRIT.AMERICAN TOBACCO |
| 607 | 901332 | TDG |
| 608 | 901336 | BAIRD (WILLIAM) |
| 609 | 901343 | DE LA RUE |
| 610 | 901349 | GRAMPIAN HDG. |
| 611 | 901352 | LOW & BONAR |
| 612 | 901370 | DYSON GROUP |
| 613 | 901373 | EXEL |
| 614 | 901389 | HAYNES PUBLISHNG |
| 615 | 901399 | WESCOL GROUP |
| 616 | 901419 | BAE SYSTEMS |
| 617 | 901422 | METAL BULLETIN |
| 618 | 901430 | ROK PR.SOLUTIONS |
| 619 | 901433 | PIZZAEXPRESS |
| 620 | 901451 | INTELEK |
| 621 | 901453 | MACRO 4 |
| 622 | 901591 | TBI |
| 623 | 901604 | CARLTON COMMS. |
| 624 | 901633 | JOBS CO UK |
| 625 | 901634 | CABLE & WIRELESS |
| 626 | 901636 | FEEDBACK |
| 627 | 901704 | IMI |
| 628 | 901714 | RIO TINTO |
| 629 | 901722 | RELYON GROUP DEAD - 10/10/01 |
| 630 | 901744 | RUSSELL (ALEX.) DEAD - DEAD 21/06/01 |
| 631 | 901746 | POCHIN'S |
| 632 | 901765 | AMERSHAM |
| 633 | 901788 | AMEC |
| 634 | 901815 | BRAMMER |
| 635 | 901816 | BROOKE INDUSTRIAL HDG. |
| 636 | 901817 | AIM GROUP |

| No. | TYPE | NAME |
|---|---|---|
| 637 | 901822 | JACKS (WILLIAM) |
| 638 | 901830 | TT ELECTRONICS |
| 639 | 901846 | IREVOLUTION GP. |
| 640 | 901878 | DRUCK HOLDINGS |
| 641 | 901891 | ASSD.BRIT.PORTS |
| 642 | 901920 | HUNTERS LEISURE |
| 643 | 901921 | ENERGY TECHNIQUE |
| 644 | 901932 | HANSON |
| 645 | 901936 | MERANT |
| 646 | 901940 | LOGICA |
| 647 | 902024 | ELBIEF |
| 648 | 902089 | TELEMETRIX |
| 649 | 902232 | LONMIN |
| 650 | 902402 | SMG |
| 651 | 902407 | C D BRAMALL |
| 652 | 902417 | BAILEY (CH) |
| 653 | 902630 | BRITISH VITA |
| 654 | 902740 | PIFCO HDG. DEAD - DEAD 18/07/01 |
| 655 | 902791 | RICARDO |
| 656 | 903015 | WIGGINS GROUP |
| 657 | 903052 | BULLOUGH |
| 658 | 903054 | REA HOLDINGS |
| 659 | 903060 | LINTON PARK |
| 660 | 903357 | AGGREGATE INDUSTRIES |
| 661 | 903495 | BIOQUELL |
| 662 | 903500 | WESTBURY |
| 663 | 903605 | DCS GROUP |
| 664 | 904076 | BELLWAY |
| 665 | 904154 | BEN BAILEY |
| 666 | 904253 | TEMPUS GROUP |
| 667 | 904281 | AIR PARTNER |
| 668 | 904283 | DAILY MAIL & GEN. |
| 669 | 904285 | DEWHURST |
| 670 | 904286 | DEWHURST 'A' |
| 671 | 904302 | PENDRAGON |
| 672 | 904313 | COBHAM |
| 673 | 904321 | MEZZANINE GROUP |
| 674 | 904322 | MACLELLAN GROUP |
| 675 | 904327 | AWG |
| 676 | 904335 | RELIANCE SCTY. |
| 677 | 904367 | UNITED UTILITIES |
| 678 | 904373 | SEVERN TRENT |
| 679 | 904391 | PENNON GROUP |
| 680 | 904444 | INTELLIGENT ENVIRONMENT |
| 681 | 904486 | KELDA GROUP |
| 682 | 904550 | LEEDS UNITED |
| 683 | 904649 | SAGE GROUP |
| 684 | 904679 | EAST SURREY HDG. |
| 685 | 904689 | ASPINALLS ONLINE |
| 686 | 904690 | ELECTROCOMP. |
| 687 | 904692 | MEDISYS |
| 688 | 904693 | BETT BROS. |
| 689 | 904694 | BAGGERIDGE BRICK |
| 690 | 904716 | STYLO |
| 691 | 904740 | MID-STATES |
| 692 | 904750 | CHIME COMMS. |
| 693 | 904777 | KUNICK |
| 694 | 904923 | FAIRBRIAR GP. |
| 695 | 904970 | DIXON MOTORS |
| 696 | 904989 | QS GROUP |
| 697 | 904998 | SAFEWAY (UK) |
| 698 | 905104 | OCEAN WILSONS |
| 699 | 905110 | INVENSYS |
| 700 | 905308 | MOTHERCARE |
| 701 | 905310 | YULE CATTO |
| 702 | 905314 | ALEXON GROUP |
| 703 | 905329 | VICTORIA |
| 704 | 905396 | SIGNATURE REST. |
| 705 | 905498 | PREMIER FARNELL |
| 706 | 905501 | QUEENS MOAT HSE. |
| 707 | 905536 | AUSTIN REED GP. |
| 708 | 905545 | LOADES |
| 709 | 905553 | COHEN (A) |
| 710 | 905554 | COHEN (A) 'A' DEAD - DEAD 12/06/01 |
| 711 | 905576 | MORRISON(WM)SPMKTS. |
| 712 | 905581 | SIGNET GROUP |
| 713 | 905582 | LPA GROUP |
| 714 | 905583 | RICHARDS |
| 715 | 905686 | MONTPELLIER GP. |
| 716 | 905695 | 10 GROUP |
| 717 | 905700 | COATS |
| 718 | 905712 | FINDEL |
| 719 | 905728 | MENTMORE ABBEY |
| 720 | 905824 | BRAKE BROTHERS |
| 721 | 905827 | FORTNUM & MASON |
| 722 | 905833 | LATHAM(JAMES) |
| 723 | 905917 | WALKER GREENBANK |
| 724 | 905935 | BRUNEL HOLDINGS |
| 725 | 905952 | CARCLO |
| 726 | 906032 | HARDYS & HANSONS |
| 727 | 906045 | ASHTEAD GROUP |
| 728 | 906049 | SIRDAR |
| 729 | 906124 | PITTARD |
| 730 | 906137 | MAYBORN GROUP |
| 731 | 906275 | FRENCH |
| 732 | 906309 | BARRATT DEVELOPMENTS |
| 733 | 906315 | RANSOM (WM) |
| 734 | 906362 | WHATMAN |
| 735 | 906415 | HEYWOOD WILLIAMS |
| 736 | 906416 | AVESCO |
| 737 | 906468 | WILSON BOWDEN |
| 738 | 906469 | WYNDEHAM PRESS GP. |
| 739 | 906471 | CHRYSALIS GROUP |
| 740 | 906480 | RENTOKIL INITIAL |
| 741 | 907445 | HAY & ROBERTSON |
| 742 | 907481 | ULSTER T V |
| 743 | 907522 | RAGE SOFTWARE |
| 744 | 907547 | PATERSON ZOCH.'A' |
| 745 | 907765 | ITE GROUP |
| 746 | 910011 | BURTONWOOD BREW. |
| 747 | 910018 | YNG.&CO.BREW.'A' |
| 748 | 910019 | BAILEY (CH) 'B' |
| 749 | 910030 | CARLISLE HOLDINGS |
| 750 | 910036 | ALBION |
| 751 | 910043 | DOMINO PRINTING |
| 752 | 910062 | ARCOLECTRIC HDG. |
| 753 | 910072 | NXT |
| 754 | 910078 | SHERWOOD INTL. |
| 755 | 910119 | BODYCOTE INTL. |
| 756 | 910122 | BOOSEY & HAWKES |
| 757 | 910123 | BOOTH INDS.GP. |
| 758 | 910129 | BRAIME (TF & JH) |
| 759 | 910130 | BRAIME (TF &.JH) HDG.'A' |
| 760 | 910133 | PERSIMMON |
| 761 | 910136 | RADAMEC |
| 762 | 910137 | GAMING INTL. |
| 763 | 910146 | CAIRN ENERGY |
| 764 | 910180 | GEEST |
| 765 | 910192 | CLARKE (T) |
| 766 | 910215 | ASHLEY (LAURA) |
| 767 | 910222 | COOPER (FREDERICK) |
| 768 | 910229 | EUROPEAN COLOUR |

| No. | TYPE | NAME |
|---|---|---|
| 769 | 910238 | CREST NICHOLSON |
| 770 | 910240 | CROPPER (JAMES) |
| 771 | 910263 | DINKIE HEEL |
| 772 | 910264 | DIPLOMA |
| 773 | 910268 | PENNA CONSULTING |
| 774 | 910270 | DOWDING & MILLS |
| 775 | 910275 | CALDWELL INVS. |
| 776 | 910281 | HUNTINGDON LIFE SCIENCESGP. |
| 777 | 910283 | EMAP |
| 778 | 910347 | GIEVES & HAWKES |
| 779 | 910379 | HAMPSON INDS. |
| 780 | 910395 | HEADLAM GROUP |
| 781 | 910401 | SHEFFIELD UTD. |
| 782 | 910407 | MITIE GROUP |
| 783 | 910415 | JACQUES VERT |
| 784 | 910419 | FORTUNE OIL |
| 785 | 910436 | PGA TOUR.COURSES DEAD - 19/11/01 |
| 786 | 910437 | HILTON GROUP |
| 787 | 910439 | LAMONT HDG. |
| 788 | 910440 | BWA GROUP |
| 789 | 910450 | LEEDS GROUP |
| 790 | 910473 | ENNSTONE |
| 791 | 910500 | MARSHALLS |
| 792 | 910509 | MEGGITT |
| 793 | 910520 | KEWILL SYSTEMS |
| 794 | 910528 | MS INTERNATIONAL |
| 795 | 910532 | ELECTRONICS BTQ. |
| 796 | 910535 | YORKLYDE |
| 797 | 910540 | NORTHGATE |
| 798 | 910580 | PATERSON ZOCH. |
| 799 | 910589 | BOGOD GROUP |
| 800 | 910600 | HENLYS GROUP |
| 801 | 910614 | QUICKS GROUP |
| 802 | 910615 | RADIANT METAL |
| 803 | 910649 | ROTORK |
| 804 | 910663 | BRIT.POLYTHENE |
| 805 | 910672 | MAYFLOWER |
| 806 | 910676 | SHILOH |
| 807 | 910681 | SLINGSBY (HC) |
| 808 | 910685 | SMITH (DS) |
| 809 | 910700 | NFF DEAD - 31/07/01 |
| 810 | 910707 | TAYLOR NELSON SOFRES |
| 811 | 910716 | DAILY MAIL 'A' |
| 812 | 910750 | SHERWOOD GP. |
| 813 | 910777 | HEMSCOTT |
| 814 | 910784 | GAMING INSIGHT |
| 815 | 910821 | HALMA |
| 816 | 910907 | ANDREWS SYKES |
| 817 | 910908 | EUROTUNNEL UNITS |
| 818 | 910911 | INFAST GROUP |
| 819 | 910928 | CORPORATE SVS.GP. |
| 820 | 911053 | SANCTUARY GP. |
| 821 | 911054 | EUR.MOTOR HDG. |
| 822 | 911055 | JOURDAN |
| 823 | 911140 | BERADIN HOLDINGS DEAD - 11/07/01 |
| 824 | 911141 | BERTAM HOLDINGS |
| 825 | 911160 | XPERTISE GROUP |
| 826 | 911181 | LENDU HOLDINGS |
| 827 | 911199 | SINGAPORE PARA DEAD - 11/07/01 |
| 828 | 911201 | WATER HALL GROUP |
| 829 | 911205 | LIONHEART |
| 830 | 911218 | STIRLING GP. |
| 831 | 911220 | STODDARD |
| 832 | 911223 | PETERHOUSE GROUP |
| 833 | 911227 | DRUMMOND GROUP DEAD - DEAD 03/07/01 |
| 834 | 911250 | ERA GROUP DEAD - 29/08/01 |
| 835 | 911254 | TIME PRODUCTS DEAD - DEAD 17/08/01 |
| 836 | 911258 | TOMKINS |
| 837 | 911263 | TOYE |
| 838 | 911282 | ALVIS |
| 839 | 911286 | CONSTELLATION CORP. |
| 840 | 911305 | SPRINGWOOD |
| 841 | 911332 | WILSON(CONNOLLY) |
| 842 | 911345 | WORTHINGTON GP. |
| 843 | 911365 | NARBOROUGH PLTNS. |
| 844 | 911367 | PADANG SENANG DEAD - 11/07/01 |
| 845 | 911369 | GAUCHO GRILL |
| 846 | 911384 | FKI |
| 847 | 911389 | ELT.DATA PROC. |
| 848 | 911391 | FISHER (JAMES) |
| 849 | 911416 | CREIGHTONS |
| 850 | 911448 | FIRST CHOICE HOLS. |
| 851 | 911474 | MERCHANT RETAIL |
| 852 | 911488 | BG GROUP |
| 853 | 911518 | GASKELL |
| 854 | 911535 | JOHNSTON GROUP |
| 855 | 911540 | JARVIS |
| 856 | 911809 | EURODIS ELECTRON |
| 857 | 911860 | TARSUS GROUP |
| 858 | 911912 | SEET DEAD - DEAD 15/06/01 |
| 859 | 911921 | METALRAX GROUP |
| 860 | 911925 | LAMBERT HOWARTH |
| 861 | 911938 | TRANSTEC DEAD - 14/11/01 |
| 862 | 911941 | HUNTLEIGH TECH. |
| 863 | 911943 | ACTIONLEISURE SUSP - SUSP 10/10/01 |
| 864 | 911956 | BEATTIE (JAMES) |
| 865 | 911984 | ALLDAYS |
| 866 | 911994 | HOWARD HOLDINGS |
| 867 | 911998 | HILL & SMITH |
| 868 | 911999 | KALAMAZOO CMPTG. |
| 869 | 912000 | CITY CTR.REST. |
| 870 | 912862 | GREENWICH RES. |
| 871 | 914021 | PEARSON |
| 872 | 914023 | BARR (AG) |
| 873 | 914024 | CASTINGS |
| 874 | 914034 | QUARTO GROUP |
| 875 | 914038 | CRANSWICK |
| 876 | 914059 | PRESSAC |
| 877 | 914073 | CHEMRING |
| 878 | 914151 | ARRIVA |
| 879 | 914152 | AIRTOURS |
| 880 | 914153 | WIDNEY |
| 881 | 914159 | AIRFLOW STREAMLINES |
| 882 | 914161 | C H E |
| 883 | 914162 | ARMITAGE BROS. |
| 884 | 914176 | CHAMBERLIN &.HILL |
| 885 | 914182 | CRADLEY GP.HDG. |
| 886 | 914192 | MISYS |
| 887 | 914199 | GALLIFORD TRY |
| 888 | 914200 | GIBBS & DANDY |
| 889 | 914201 | GIBBS &.DANDY 'A' |
| 890 | 914203 | GOODWIN |
| 891 | 914210 | FLARE GROUP DEAD - 16/07/01 |
| 892 | 914231 | NTH.MIDL.CON. |
| 893 | 914236 | BURNDEN LEISURE |
| 894 | 914243 | MORGAN SINDALL |
| 895 | 914244 | SPRING GROUP |
| 896 | 914253 | THORPE (FW) |
| 897 | 914260 | UNITED INDS. |
| 898 | 914264 | WALKER (THOMAS) |
| 899 | 914270 | MEDICAL SOLUTIONS |
| 900 | 914278 | WOOD (ARTHUR) |
| 901 | 914283 | BILSTON &.BSEA.ENML. |
| 902 | 914285 | EUROPOWER |

| No. | TYPE | NAME |
|---|---|---|
| 903 | 914293 | BLICK |
| 904 | 914299 | ASCOT DEAD - 03/08/01 |
| 905 | 914315 | FCX INTERNATIONAL |
| 906 | 914327 | BROWN (N) GROUP |
| 907 | 914340 | WT FOODS |
| 908 | 914343 | MAISHA |
| 909 | 914346 | EMESS |
| 910 | 914349 | ALBERT FISHER |
| 911 | 914363 | BPP HDG. |
| 912 | 914367 | ARMOUR TRUST |
| 913 | 914380 | NICHOLS |
| 914 | 914395 | SPORTECH |
| 915 | 914404 | WILSHAW |
| 916 | 914421 | ROSS GROUP |
| 917 | 914427 | YOUNG(H)HDG. DEAD - DEAD 06/06/01 |
| 918 | 914430 | ALUMASC |
| 919 | 914432 | MACFARLANE GROUP |
| 920 | 914433 | AFRICAN LAKES |
| 921 | 914436 | BURNDENE INVS. |
| 922 | 914447 | BRITISH AIRWAYS |
| 923 | 914470 | SWAN (JOHN) &.SONS |
| 924 | 914553 | ROXSPUR |
| 925 | 914555 | PROTHERICS |
| 926 | 914579 | SSL INTERNATIONAL |
| 927 | 914596 | SOUNDTRACS |
| 928 | 917030 | COSALT |
| 929 | 917074 | INGENTA |
| 930 | 917076 | RENISHAW |
| 931 | 917099 | BOGOD GROUP 'A' |
| 932 | 917110 | MMT COMPUTING |
| 933 | 917130 | FERRARIS GROUP |
| 934 | 917135 | FORTRESS HOLDINGS |
| 935 | 917163 | PILKINGTON |
| 936 | 917184 | APPLIED OPTICAL TECHS. |
| 937 | 917509 | HUNTING |
| 938 | 917534 | ANITE GROUP |
| 939 | 917541 | HORNBY |
| 940 | 917557 | BLACKS LEISURE |
| 941 | 917570 | BROWN & JACKSON |
| 942 | 917574 | ABBOT GROUP |
| 943 | 917579 | FULLER SMITH 'A' |
| 944 | 917585 | SNACKHOUSE SUSP - SUSP 05/10/01 |
| 945 | 917597 | AEGIS GROUP |
| 946 | 926001 | BULMER (HP) |
| 947 | 926002 | SAINSBURY (J) |
| 948 | 926003 | HEAVITREE BREW. |
| 949 | 926005 | MICROGEN |
| 950 | 926011 | REED EXECUTIVE |
| 951 | 926029 | HEATH (SAMUEL) |
| 952 | 926037 | CHEPSTOW RACE. |
| 953 | 926048 | SPERATI (CA) |
| 954 | 926058 | MCLEOD RUSSEL |
| 955 | 926076 | STRATAGEM GROUP |
| 956 | 926114 | BESPAK |
| 957 | 926119 | WPP GROUP |
| 958 | 926121 | DAWSON HDG. |
| 959 | 926197 | FORMINSTER |
| 960 | 926255 | MANAGEMENT CNSL.GP. |
| 961 | 926288 | ANTOFAGASTA |
| 962 | 926296 | WYEVALE GDN.CENTRES |
| 963 | 926317 | MCCARTHY & STONE |
| 964 | 926346 | TEX HOLDINGS |
| 965 | 926348 | ABBEYCREST |
| 966 | 926384 | WHITE YOUNG GREEN |
| 967 | 926421 | GARTON ENGR. |
| 968 | 926509 | CARR'S MILLING |
| 969 | 926525 | BOOT (HENRY) |
| 970 | 926526 | HAY (NORMAN) |
| 971 | 926537 | CARE UK |
| 972 | 926584 | MARTIN INTL. |
| 973 | 926591 | YNG.&CO.BREW.NV. |
| 974 | 926600 | SYLTONE |
| 975 | 926665 | DEWHIRST GROUP |
| 976 | 926674 | FII GROUP |
| 977 | 926679 | FIRST TECHNOLOGY |
| 978 | 926690 | ARENA LEISURE |
| 979 | 926691 | DENSITRON |
| 980 | 926698 | NWIDE.ACCID.REPR.SVS. |
| 981 | 926701 | COUNTRYSIDE PROPS. |
| 982 | 926704 | UA GROUP |
| 983 | 926705 | BEAUFORD |
| 984 | 926712 | VITEC GROUP |
| 985 | 926751 | CORDIANT COMMS.GP. |
| 986 | 926773 | SILENTNIGHT HDG. |
| 987 | 928673 | HIGHBURY HOUSE COMMS. |
| 988 | 928738 | SCOT. & SOUTHERN ENERGY |
| 989 | 928741 | SCOTTISH POWER |
| 990 | 928744 | HOLIDAYBREAK |
| 991 | 928756 | ADAM & HARVEY GP. |
| 992 | 928779 | SAVE GROUP SUSP - SUSP 01/03/01 |
| 993 | 928781 | BURN STEW.DISTS. |
| 994 | 928782 | SOUTH STF.GP. |
| 995 | 928787 | FORTH PORTS |
| 996 | 928823 | BROCKHN.HDG. |
| 997 | 928827 | BROCKHN.HDG.NV.'A' |
| 998 | 928835 | ACTION DEAD - 15/11/01 |
| 999 | 928889 | ALLIANCE UNICHEM |
| 1000 | 928895 | EIDOS |
| 1001 | 928901 | INTERNATIONAL POWER |
| 1002 | 928903 | POWERGEN |
| 1003 | 931021 | VP |
| 1004 | 931093 | LOOKERS |
| 1005 | 931120 | MALLETT |
| 1006 | 931189 | DANKA BUS.SYS. |
| 1007 | 931202 | ST.IVES |
| 1008 | 931293 | BLACK ARROW GP. |
| 1009 | 931400 | ENSOR HOLDINGS |
| 1010 | 931450 | HEAVITREE 'A' L/V |
| 1011 | 931524 | GRANADA |
| 1012 | 931661 | MERRYDOWN |
| 1013 | 931669 | TRAVIS PERKINS |
| 1014 | 931825 | SALVESEN(CHRIS.) |
| 1015 | 940013 | OXFORD INSTS. |
| 1016 | 940015 | CLARKSON |
| 1017 | 940186 | ULTRASIS |
| 1018 | 940226 | PURA |
| 1019 | 940281 | KINGFISHER |
| 1020 | 940283 | TAYLOR & FRANCIS |
| 1021 | 940297 | RAMCO ENERGY |
| 1022 | 940372 | GRESHAM COMPUTING |
| 1023 | 940420 | REUTERS GP. |
| 1024 | 940458 | BNB RESOURCES |
| 1025 | 940514 | DANIELS (S) |
| 1026 | 940567 | GOWRINGS |
| 1027 | 940701 | RYLAND GP. |
| 1028 | 940763 | UMECO |
| 1029 | 940793 | ROLLS-ROYCE |
| 1030 | 940840 | TIBBETT &.BRITTEN |
| 1031 | 940860 | PORVAIR |
| 1032 | 940935 | SUTTON HARBOUR HDG. |
| 1033 | 940956 | WORLD SPORT GROUP |
| 1034 | 940985 | TOTTENHM.HOTSPUR |
| 1035 | 940986 | PLANIT HOLDINGS |
| 1036 | 943413 | TGI |

| No. | TYPE | NAME |
|---|---|---|
| 1037 | 943417 | TITON HOLDINGS |
| 1038 | 943512 | AUKETT ASSOCS. |
| 1039 | 943529 | PSION |
| 1040 | 943531 | GWR GROUP |
| 1041 | 943535 | MTL INSTS.GP. |
| 1042 | 943548 | INTERCARE GROUP |
| 1043 | 943550 | TOTAL SYSTEMS |
| 1044 | 943559 | VOSPER THNCFT. |
| 1045 | 943561 | HOLDERS TECH. |
| 1046 | 943562 | STANELCO |
| 1047 | 943605 | CLINTON CARDS |
| 1048 | 943607 | QA |
| 1049 | 943610 | JOHNSTON PRESS |
| 1050 | 943663 | SERCO GROUP |
| 1051 | 943670 | THORNTONS |
| 1052 | 943674 | PRIME PEOPLE |
| 1053 | 943688 | WATERMAN PTSHP. |
| 1054 | 943709 | PROWTING |
| 1055 | 943711 | ASW HOLDINGS |
| 1056 | 943740 | ANGLESEY MINING |
| 1057 | 943747 | SHAW (ARTHUR) |
| 1058 | 943803 | ACAL |
| 1059 | 943818 | EUROCOPY |
| 1060 | 943863 | CITY OF LONDON GROUP |
| 1061 | 943865 | ORBIS |
| 1062 | 943871 | SEVERFIELD-ROWEN |
| 1063 | 943872 | COLEFAX GROUP |
| 1064 | 943876 | LINCAT GROUP |
| 1065 | 943907 | CHRISTIE GROUP |
| 1066 | 943962 | WORLD TRADE SYSTEMS |
| 1067 | 943973 | DANA PETROLEUM |
| 1068 | 946023 | FAUPEL TRADING |
| 1069 | 946054 | SIG |
| 1070 | 952536 | JENNINGS BROTHERS |
| 1071 | 952540 | MANCHESTER UTD. |
| 1072 | 952560 | EDIN.OIL &.GAS |
| 1073 | 952571 | BELGRAVIUM TECH. |
| 1074 | 952780 | GREGGS |
| 1075 | 952895 | SCOTIA HOLDINGS SUSP - SUSP 24/01/01 |
| 1076 | 953096 | CELLTECH GROUP |
| 1077 | 953101 | SWALLOWFIELD |
| 1078 | 953107 | TELEVISION CORP. |
| 1079 | 953133 | VODAFONE GROUP |
| 1080 | 953144 | SWP GROUP |
| 1081 | 953154 | CHIEFTAIN GROUP |
| 1082 | 953170 | PORTMEIRION GROUP |
| 1083 | 953182 | DARBY GROUP |
| 1084 | 953191 | CORUS GROUP |
| 1085 | 953193 | AMSTRAD |
| 1086 | 953203 | SPECTRIS |
| 1087 | 953245 | DART GROUP |
| 1088 | 953273 | SURGICAL INNOVATIONS GP. |
| 1089 | 953431 | CASSIDY BROS. |
| 1090 | 953522 | SPORTSWORLD MEDIA GROUP |
| 1091 | 953527 | REDBUS INTERHOUSE |
| 1092 | 953531 | HARTSTONE GROUP |
| 1093 | 953535 | PARITY GROUP |
| 1094 | 953544 | SHELTON (MARTIN) |
| 1095 | 953553 | BAA |
| 1096 | 953568 | KLEENEZE |
| 1097 | 953577 | COOK (DC) HDG. DEAD - DEAD 20/07/01 |
| 1098 | 953595 | LYNX GP. |
| 1099 | 953598 | RPS GROUP |
| 1100 | 953602 | REECE SUSP - SUSP 01/11/01 |
| 1101 | 953604 | JOHN LUSTY GP. |
| 1102 | 953615 | CHEMEX INTL. |
| 1103 | 953627 | SEACON HOLDINGS DEAD - DEAD 01/10/01 |
| 1104 | 953640 | ALBA |
| 1105 | 953641 | WSP GROUP |
| 1106 | 953657 | ISA INTL. |
| 1107 | 953665 | AIRSPRUNG FURNITURE |
| 1108 | 953686 | SKYEPHARMA |
| 1109 | 953707 | HONEYSUCKLE GP. |
| 1110 | 953733 | PLTN.& GENERAL |
| 1111 | 953808 | TOREX GROUP |
| 1112 | 953810 | HR OWEN |
| 1113 | 953811 | RONSON |
| 1114 | 953815 | PILKINGTONS TILES GP. |
| 1115 | 953821 | AMBERLEY GP. |
| 1116 | 953822 | SCOOT.COM |
| 1117 | 953823 | PROBUS ESTATES |
| 1118 | 953830 | CAPITA GROUP |
| 1119 | 953834 | MID KENT HDG. DEAD - 03/07/01 |
| 1120 | 953842 | ML LABORATORIES |
| 1121 | 953844 | VTR |
| 1122 | 953851 | NESTOR HEALTHCARE |
| 1123 | 953866 | SPEEDY HIRE |
| 1124 | 953868 | TREATT |
| 1125 | 953870 | TRACE COMPS. |
| 1126 | 953877 | WENSUM CO. |
| 1127 | 953982 | TORDAY &.CARLISLE |
| 1128 | 960820 | ENIC |
| 1129 | 966249 | TEN ALPS COMMS. |
| 1130 | 974087 | FRENCH CONNECTN. |
| 1131 | 974117 | BERKELEY GROUP |
| 1132 | 974197 | TINSLEY (ELIZA) |
| 1133 | 974355 | ENTERPRISE OIL |
| 1134 | 974577 | GLOBAL GROUP |
| 1135 | 974585 | NORTHAMBER |
| 1136 | 974653 | BODY SHOP INTL. |
| 1137 | 974678 | HAVELOCK EUROPA |
| 1138 | 974696 | FASTRACK GROUP DEAD - DEAD 09/08/01 |
| 1139 | 974711 | CANNONS GROUP DEAD - 07/08/01 |
| 1140 | 974734 | MIDDLESEX HDG. |
| 1141 | 974825 | CML MICROSYSTEMS |
| 1142 | 974847 | QUADRANT GROUP |
| 1143 | 974873 | TAY HOMES |
| 1144 | 974966 | WILLISHAM GROUP |
| 1145 | 974975 | HIGH-POINT RENDEL |
| 1146 | 981250 | SHANKS GROUP |
| 1147 | 981405 | DIGITAL SPORT |
| 1148 | 991081 | ROLFE & NOLAN |
| 1149 | 991218 | SINCLAIR WM.HLDG |
| 1150 | 991304 | SCOT.RADIO HDG. |
| 1151 | 991330 | PACIFIC MEDIA |
| 1152 | 991439 | COMMUNITY HOSPITALS DEAD - DEAD 17/07/01 |
| 1153 | 991538 | ULTIMA NETWORKS SUSP - SUSP 17/08/01 |
| 1154 | 991547 | CAPITAL RADIO |
| 1155 | 991575 | ROWE EVANS INVS. |

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