UTILITY OF INFLATION ACCOUNTING DATA TO INVESTORS

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DECLARATION:
This thesis is entirely the candidate's own work.

TABLE OF CONTENTS

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ABSTRACT

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The objective of financial reporting is to provide information about an entity which is useful to a wide range of users in making economic decisions. This study empirically investigates the utility of inflation accounting data to investors, by examining the ability of this data to explain the share prices of UK listed companies. Previous research supports a relation between historical cost accounting data and share prices from a conceptual and empirical perspective. Prior evidence from studies on the utility of inflation accounting data to investors is mixed. However, many of these suffer from methodological problems which cast doubts on their ability to evaluate the utility of inflation accounting data. This study overcomes some of the problems encountered in earlier studies and incorporates additional research design features.

In evaluating inflation accounting data, this study explores whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data. The investigation was undertaken for 2 periods to discover whether or not a learning lag exists in relation to the inflation accounting data.

To achieve the objectives of this study, a recently developed cross sectional valuation model was used. The model incorporates measures from both the balance sheet and income statement, which allows the value relevance of key financial report disclosures to be assessed.

The analysis reveals evidence supporting the utility of inflation accounting data to investors. The results show that a company's policy towards disclosing inflation accounting data in the premandatory period is associated with the explanatory power of this data. The significance of the inflation accounting data appears to be greater for the companies disclosing inflation accounting data in the premandatory period (Supportive Companies), than for companies which commenced disclosure in the first mandatory period (Reluctant Companies). There is also, evidence showing a differential response to the inflation accounting data for the Supportive and Reluctant Companies. The analysis fails to find any evidence of a learning effect in respect of the inflation accounting data.

ABBREVIATIONS

AICPA	American Institute of Certified Public Accountants
ASC	Accounting Standards Committee
ASB	Accounting Standards Board
ASSC	Accounting Standards Steering Committee
ASE	American Stock Exchange
ASR	Accounting Series Release
CAPM	Capital Asset Pricing Model
CAR	Cumulative Abnormal Return
CC	Current Cost
CCA	Current Cost Accounting
CPP	Current Purchasing Power
ED	Exposure Draft
EMH	Efficient Market Hypothesis
E/P	Earnings/Price Ratio
FASB	Financial Accounting Standards Board
GAAP	Generally Accepted Accounting Principles
HC	Historical Cost
HCA	Historical Cost Accounting
IASC	International Accounting Standards Committee
IEP	Incremental Explanatory Power
MBAR	Market Based Accounting Research
NIH	Naive Investor Hypothesis
NYSE	New York Stock Exchange
OLS	Ordinary Least Squares

OTC	Over The Counter
PAT	Positive Accounting Theory
P/E	Price/Earnings Ratio
PhD	Doctor of Philosophy
PSSAP	Provisional Statement of Standard Accounting Practice
SAB	Staff Accounting Bulletin
SEC	Securities and Exchange Commission
SFAS	Statements of Financial Accounting Standards
SPSSx	Statistical and Presentation Software Systems Version x
SSAP	Statement of Standard Accounting Practice
UK	United Kingdom
US	United States of America
VIF	Variance Inflation Factor

LIST OF TABLES

LIST OF APPENDICES

CHAPTER 1

THE NATURE AND SCOPE OF THE STUDY

CHAPTER 1

THE NATURE AND SCOPE OF THE STUDY

1.1 INTRODUCTION

This study investigates the utility of inflation accounting data for investment decision making by examining the ability of this data to explain share prices. The inflation accounting variables examined were disclosed in compliance with Statement of Standard Accounting Practice (SSAP) 16. This chapter presents the rationale and framework for the study. It considers:

- the background to the study (1.2);
- definitions of key terms (1.3);
- the study's objectives (1.4);
- an overview of the research methodology used (1.5);
- the limitations of the study (1.6); and,
- the plan of the study (1.7).

1.2 BACKGROUND TO THE STUDY

Since the early 1970s, considerable emphasis has been placed on the utilitarian nature of financial reporting. This is recognised in both the British and Americian literature, e.g., Accounting Standards Steering Committee (ASSC) (1975, p. 28), Accounting Standards Board (ASB) (1991), Americian Institute of Certified Public Accountants (AICPA) (1973, p. 13) and Financial Accounting Standards Board (FASB) (1978a, para. 34). Bromwich (1992) defines financial reporting as "the measurement and communication of financial and economic information to decision makers" (p. 1).

Users of financial reports include present and potential investors, employees, lenders, suppliers and other trade creditors, customers, governments and their agencies, and the public (e.g., ASB, 1991). The diverse information needs of these users pose major difficulties for the development of a single universally accepted normative theory of financial reporting (see Demski, 1973).

In the absence of a general theory of financial reporting, some accounting researchers have turned to the market mechanism to provide insight to the development of accounting theory. Walker (1992) asserts that theories need to be tested empirically before they can be adopted as a reliable basis for policy making and market based accounting research (MBAR) provides one framework within which some of the ideas propounded by accounting theorists can be tested.

A major thrust of MBAR (May and Sundem, 1976) has been concerned with assessing the utility of accounting data to decision makers. This utility is measured by examining users' reactions to accounting disclosures, and by assessing the explanatory power of these disclosures in relation to market variables. These measures are studied as a means of inductively deriving preferred reporting alternatives (O' Brien, 1979, p. 3).

MBAR has been particularly concerned with the reaction of investors to accounting data. The investor group comprises the providers of capital and their advisers (ASB, 1991). Revsine (1973, p. 29) commented that investors are generally presumed to be the most important readers of financial reports, both in terms of numbers and magnitude of transactions. Recently, the ASB (1991) and the Financial Reporting Commission (1992) confirmed the investor as the primary user of financial reports. Tisshaw (1982, p. 2) stated that this group is regarded as the most skilled and dynamic of all users, and their needs subsume those of most other user groups. Thus, the issue of relevance is particularly important to this category of users. For this reason, this study focuses on this user group to evaluate the utility of inflation accounting data.

Although financial reports are based on past events, investors use them to predict the future performance of a company as a basis for decision making (Beaver, Kennelly and Voss, 1968). Baxter (1986, p. 290) suggested that accounting provides a framework of background information that may be helpful to decision making.

Prediction of a company's future performance is used by investors to assess that company's ability to generate future cash flows and their variability. The finance literature reviewed in Chapter 3 establishes that cash flows and their related risk (i.e. variability) are the measures of principal interest to investors.

This future flow concept is relevant for accounting policy makers. However, the predictive ability of accounting measures may be seriously impaired if conventional accounting practices are employed in periods of unstable prices. Arnold, Boyle, Carey, Cooper and Wild (ABCCW) (1991) stated that

> "financial reports must now meet the wider need of informing present and future economic decisions. This is not the purpose for which the historical cost model was designed, and it is an objective which it is unlikely to achieve." (p. 14).

The high rate of inflation during the 1970s prompted close scrutiny of conventional accounting practices. By ignoring the effects of inflation, accounts prepared under the historical cost accounting (HCA) convention deduct acquistion costs incurred in earlier periods from current revenues as if both were expressed in a homogeneous unit. This practice gives rise to the reporting of misleading information because of inflation induced distortions in accounting measurements. These distortions are discussed in detail in 2.6 (pp. 33-34).

Furthermore, Cross (1982, p. 109) pointed out, since inflation affects companies differently, the accounting measurement errors will not be systematic across companies. Therefore, financial reports which ignore the impact of inflation undermine the utility of reported income and balance sheet totals. This led to criticism of conventional reporting practices and these are discussed in 2.5 and 2.6 (pp. 30-31 & pp. 33-34).

It was widely believed that inflation accounting data would improve the predictive ability of accounting measures. This is reflected in the FASB's (1979) standard on inflation accounting, Statement of Financial Accounting Standards (SFAS) 33, which states that

> "the board has concluded that there is an urgent need for enterprises to provide information about the effects on their activities of general inflation and other price changes. It believes that users' . . . ability to assess future cash flows will be severely limited until such information is included in financial reports." (pp. 4-5).

In the United States of America (US), this thinking resulted in large companies being required to disclose replacement cost and constant dollar information (see Accounting Series Release (ASR)

190, Securities and Exchange Commission (SEC), 1976; and SFAS 33, FASB, 1979). Their counterparts in the United Kingdom (UK) were required to disclose current cost accounting (CCA) information for accounting periods beginning on or after 1 January, 1980 (see SSAP 16, Accounting Standards Committee (ASC), 1980).

Accounting policy makers acknowledged that their pronouncements on inflation accounting would involve a substantial learning process on the part of preparers and users. For example, the FASB (1979, SFAS 33, para. 14) allowed more flexibility within the guidelines of SFAS 33 than was customary in Board Statements. It encouraged preparers to develop techniques that would further the understanding of the effects of price changes on companies. It also recommended that the inflation accounting data should be presented in supplementary statements, as it felt users understanding of this data might be enhanced if they were able to compare it with the HCA measurements included in the primary statements. Similarly, in the UK, the ASC (1980) allowed for the supplementary disclosure of CCA data. Also, when SSAP 16 was published it was accompanied by a statement from the ASC recommending that no changes should be made to the Standard for at least 3 years, to

> "enable producers and users to gain uninterrupted experience in dealing with the practical problems of implementation and interpretation of the information" (Carsberg, 1984, p. 1).

No other subject in accounting has caused as much debate and controversy as the problem of accounting in periods of unstable prices. However, today, accounting policy makers are no nearer to finding a generally acceptable solution. The business community and many academics have questioned the utility of inflation accounting data. Empirical studies on the utility of the data have yielded mixed findings (see Chapter 4). However, many of the earlier studies suffered from several deficiencies. These included the absence of a well developed theory linking inflation accounting data to share values, difficulties in the sample selection process, the limited availability of time series data, and shortcomings in the methodological design used (see Chapter 6).

Unfortunately, commitment to resolving the inflation accounting problem seems to be a function of the level of inflation. For example, periods of high inflation generally evoke an abundance of comments in the media and critical debate in the accounting literature (see Financial Times editorial, Feb. 8, 1971 and Tweedie and Whittington, 1984, p. 346). However, in periods of low inflation, the issue is pushed to the background. In the US and the UK, when the inflation rate dropped in the 1980s, interest in inflation accounting disclosures waned, while the critics of the standards became more vocal. But, Baxter (1984, p. viii) warns that only a bold man would say that we shall never again see high levels of inflation.

Therefore, continued discussion and research are needed. Otherwise, policy makers will be forced once again to respond within a limited time scale. The need for continued research is endorsed emphatically by ABCCW (1991, p. 34) in their recent paper entitled "The Future Shape of Financial Reports". These writers asserted that evolutionary reform of financial reporting is critical if a new system of financial reporting is to be developed which meets users' needs. They view further work in testing the market's reaction to the use of current values as a critical part of this process.

To date, the majority of research on the utility of inflation accounting data has focused on identifying a market reaction to the disclosure of this data. However, a review of these information content studies shows that they suffer from methodological problems (see 6.2, pp. 179-191) and, therefore, cannot solely be relied upon in deciding on the utility of inflation accounting data. For this reason, other researchers (e.g., Lev and Ohlson, 1982; Atiase and Tse, 1986) have suggested the use of a valuation approach. This approach offers a potentially useful perspective that is different from and complementary to that provided by information content studies. A small number of studies (see 4.4) have used the valuation approach, and the findings from these studies are more promising in relation to the utility of inflation accounting data. The recent literature (e.g., Walker, 1992) also, suggests that researchers should take greater care and attention in the development of theoretical foundations of their research.

In the light of the above comments, additional research, incorporating improved methodogical design, appears warranted. It is hoped that the additional evidence provided by this study will contribute to the discussion on inflation accounting. Before describing the objectives of the study, the next section defines key terms used throughout the thesis.

1.3 DEFINITIONS

Inflation Accounting is any method of accounting which takes account of the effects of changes in the purchasing power of money, either specific or general price changes.

Financial Reporting is the external disclosure of financial information by entities to external users.

Financial Reports are the means usually used by entities to disclose financial information externally and include financial statements consisting of a balance sheet, profit and loss account, funds (or cash) flow statement together with explanatory notes and other financial data.

1.4 OBJECTIVES OF THE STUDY

This study aims to provide an insight to the explanatory power of inflation accounting data in relation to the share prices of UK listed companies. It is hoped that the findings will serve as a useful input to the deliberations of accounting policy makers in their considerations of inflation accounting.

The specific objectives of this research are set out below.

To examine the conceptual framework within which the utility to investors of accounting data in general, and inflation accounting data in particular, might be evaluated.

To critically assess those studies which evaluated the utility of inflation accounting data to the securities markets.

To provide additional empirical evidence on the incremental explanatory power (IEP) of inflation accounting data in relation to the share prices of UK listed companies.

To determine whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data.

To discover whether or not a learning lag exists in relation to the inflation accounting data.

1.5 RESEARCH METHODOLOGY

To achieve the objectives of this study, a valuation model is used to explore the relationship between accounting variables and share prices. The model used in the study is based on a model of accounting based asset valuation, developed by Ohlson (1989). An explanation of the model together with a discussion of its advantages in the context of the objectives of this study are presented in Chapters 6 and 7.

The valuation model is used to determine the explanatory power of historical cost (HC) and inflation accounting variables. The inflation accounting variables are derived from current cost (CC) measures disclosed in compliance with SSAP 16. The use of share prices as a test of the utility of accounting data to investors is justified in Chapter 3 by reference to developments in capital market theory.

The methodology employed in this study overcomes some of the problems encountered in earlier studies (see 6.4.1, pp. 200-205) and has the additional features outlined below.

The valuation model used is based on Ohlson's (1989) model. The model incorporates measures from both the income statement and the balance sheet, which allows for the value relevance of key financial report disclosures to be assessed. Recent articles, e.g., Brennan and Schwartz (1982a, 1982b), Ou and Penman (1989) and Brennan (1991) have recommended this form of model. Furthermore, as very few studies have empirically tested Ohlson's model, this study will provide evidence on its practical application.

A large number of industrial UK listed companies, drawn from a wide range of industries, is included in the sample.

The sample of companies is divided into 2 groups based on the companies' policy towards the disclosure of inflation accounting data in the premandatory period. Under the requirements of SSAP 16, companies were required to disclose CCA data for accounting periods beginning on or after 1 January 1980. For the purposes of this study, companies were classified as being

'Supportive' if they disclosed inflation accounting data prior to the mandatory period and 'Reluctant' if disclosure commenced in the first mandatory period.

Separate cross sectional models are derived for the Supportive and Reluctant companies.

The models test the IEP of cumulative unrealised holding gains and unrealised holding gains arising in the period.

The analysis is performed for 2 periods to help determine if there is a learning effect associated with inflation accounting data.

1.6 LIMITATIONS OF THE STUDY

The limitations of this study are now listed.

The sample is limited to large industrial UK listed companies required to comply with SSAP 16. Accordingly, any inferences drawn are limited to this population.

The study is concerned only with assessing the extent to which the variables included in the model meet the information needs of 1 user group, namely investors. It is possible that the data may be of use to other users, as financial decision makers are a heterogeneous group potentially possessing different abilities and decision models.

The analysis focuses only on the information needs of the investor group with respect to determining an investment's value. Furthermore, the variables included in the model are but a subset of the total information available to the investment community. Thus, the model may suffer from an omitted variable problem. However, this approach was adopted to keep the study within reasonable bounds.

The analysis is confined to 2 periods. Therefore, conclusions drawn must be qualified in this respect. The length of the test period is a function of the availability of inflation accounting data.

Despite these limitations, this research has the potential to provide additional evidence on the relationship between share prices and inflation accounting data.

1.7 PLAN OF THE STUDY

To achieve the objectives set out in 1.4 (pp. 10-11), this research is organised in the manner outlined below.

Chapter 2 provides the framework for examining the utility of accounting data to investment decision making. It begins by examining the objective of finacial reporting. It identifies the provision of decision relevant information to users as the objective of financial reporting. In this context, investors' informational needs are examined together with the qualitative characteristics of financial reports which help meet these needs. The chapter discusses the limitations of HCA and puts forward the case for the disclosure of inflation accounting data. The literature on inflation accounting is reviewed and a brief outline is provided of the major UK and US regulatory prouncements on inflation accounting. The final section reviews SSAP 16, the UK standard on inflation accounting.

Chapter 3 examines the developments in capital market theory and explores the implications of these developments for evaluating the utility of accounting data to investors. It describes the share pricing mechanism and identifies the key factors which determine a share's value. It discusses why it is reasonable to expect a relationship between share values and accounting data in an efficient capital market.

A number of empirical studies are then reviewed which confirm a relationship between HCA information and share prices.

Chapter 4 examines empirical studies which explored a relationship between inflation accounting data and share prices and evaluated the decision utility of inflation accounting data from an investor's perspective.

The findings from empirical studies which assessed users' and preparers' perceptions of the relevance and reliability of inflation accounting data are presented in Chapter 5.

Chapter 6 provides a critical evaluation of the methodologies used in the studies reviewed in Chapters 3 and 4. The chapter also presents the case for the valuation approach used in this study, to explore the utility of accounting data to investors.

A description of Ohlson's model and its application in this study is provided in Chapter 7. The sample selection procedures and the sample period are explained.

The model is derived in Chapter 8 and its statistical validity is tested. In addition, the chapter reports the results of the empirical analysis and offers an interpretation of the findings.

Finally, Chapter 9 sets out a summary of the research, its major findings, implications and conclusions. Directions for further research are highlighted.

1.8 SUMMARY

This chapter provided the background to and rationale for the study. It set out the study's objectives, its limitations and the contribution it will make to knowledge. The research methodology was described briefly as was the organisation of the remainder of the study.

Following this introduction, the next chapter describes the objective of financial reporting and the measures taken to achieve this objective. In the light of this objective it examines the case for inflation accounting.

CHAPTER 2

OBJECTIVE OF FINANCIAL REPORTING AND THE CASE FOR INFLATION ACCOUNTING DATA

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2.1 INTRODUCTION

The background to the demand for inflation accounting is first examined in the wider context of financial reporting.

Financial reporting is a function of the economic, legal, political and social environment in which it operates. Changes in this environment create a need for persistent development, this is recognised in the Trueblood Report (AICPA, 1973), which states that

> "the objectives of financial statements are not and should not be static, just as the business and financial environment in our country is not static." (p. 5).

This chapter examines the objective of financial reporting and the attributes which financial reports should possess to achieve this objective. Investors' decision needs and the role of financial reporting in meeting them are considered. The decision relevance of the HCA model is explored and its limitations in periods of unstable prices are examined. The case for inflation accounting is presented and the literature and proposals on the subject are discussed. Specifically, the principle issues explored in this chapter are:

- the objective of financial reporting (2.2);

- the qualitative characteristics of financial reports (2.3);

- financial reports and investors' information needs (2.4);

- financial reporting, capital and income (2.5);

- the limitations of HCA model in periods of unstable prices (2.6);

- alternative valuation models and the development of inflation accounting (2.7); and,

- the requirements of SSAP 16 (2.8).

2.2 OBJECTIVE OF FINANCIAL REPORTING

The FASB (1974a) defines an objective as "something toward which effort is directed, an aim or end of action, a goal." (p. 13)

The early objective of financial reporting was to present the results of the stewardship of management to the owners of the business (see Whittington, 1983, p. 23). As businesses expanded, the objective of financial reporting changed to reflect the changing nature of the business environment. Carsberg, Hope and Scapens (1978) give an historical account of this development. Dearing (1988) emphasises this feature of accounting, noting that

> "with a fast-moving worldwide financial community, the need for clear, unambiguous and widely understood accounts has become still more important to the effective working of the economy." (p. 2).

Today, accounting is essentially an utilitarian discipline, whose function is to serve user needs. Recognition of this responsibility is found in the Corporate Report (ASSC, 1975), which states that the fundamental objective of financial reports is

> "to communicate economic measurements of and information about the resources and performance of the reporting entity useful to those having reasonable rights to such information." (p. 28).

In the US, the Trueblood Committee (AICPA, 1973) suggested a similar objective. They agreed that

> "the basic objective of financial statements is to provide information useful for making economic decisions" (p. 13).

As part of its task of developing a conceptual framework for financial accounting, the FASB (1978a), detailed the objectives of financial reporting as follows:

> to provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions (paragraph 34);
>
> to provide information to help investors, creditors, and others to assess the amounts, timing, and uncertainity of perspective net cash inflows to the related enterprise (paragraph 37); and,
>
> to provide information about the economic resources of an enterprise, the claims to those resources, and the effects of transactions, events and circumstances that change its resources and claims to those resources in a manner that provides direct and indirect evidence of cash flow potential (paragraphs 40 and 41).

The user orientated approach towards financial reporting was confirmed recently by Solomons (1989, p. 9), the International Accounting Standards Committee (IASC) (1989) and the ASB (1991). Thus, financial reports are vehicles of communication, intended to convey information

> "about the financal position, performance and financial adaptability of an enterprise that is useful to a wide range of users in making economic decisions."
> (ASB, 1991, para. 12)

2.3 QUALITATIVE CHARACTERISTICS OF FINANCIAL REPORTS

Attributes which financial reports should possess to enable them to fulfil their objective have been identified by the ASSC (1975, pp. 28-29), the FASB (1980), Solomons (1989, pp. 29-41), and the ASB (1991). These attributes are called qualitative characteristics and a similar list of attributes has been suggested by UK and US accounting policy makers. Table 2.1 lists the qualitative characteristics proposed by Solomons (1989, pp. 30-31).

Table 2.1

QUALITATIVE CHARACTERISTICS OF FINANCIAL REPORTS

Relevance
- Predictive value
- Confirmatory value
- Corrective value
- Timeliness

Reliability
- Representational faithfulness
- Comprehensiveness
- Verifiability

Consistency

Neutrality

Feasibility

Subject to considerations of cost, financial reports should possess the maximum level of these attributes. Relevance and reliability are regarded as the 2 primary attributes (FASB, 1980, p. 2; Solomons, 1989, p. 30; ASB, 1991). Solomons (1989, p. 30) stated that relevance must come first, on the grounds that if information is irrelevant, it does not matter what other qualities it possesses.

Information is relevant to a decision making situation if it has the capacity to help a decision maker to form, confirm or revise expectations about the future, or to confirm or correct prior expectations about past events (Solomons, 1989, p. 31). Accounting reports are reliable if the user has reasonable assurance that they faithfully represent what they purport to represent (Solomons, 1989, p. 32).

Although financial reports must be both relevant and reliable to be useful, they may possess both characteristics to varying degrees. The problem of accounting for inflation has brought into prominence the question of the relative importance of these 2 attributes. Their significance to the inflation accounting debate is considered in 5.3.

Any definition of relevance assumes an awareness of the information needs of users. As mentioned in 1.2 (p. 3) this study is concerned with the investor user group. The next section examines the role of financial reports in providing decision relevant information to investors.

2.4 FINANCIAL REPORTS AND INVESTORS' INFORMATION NEEDS

Investors are concerned with whether they should buy, hold or sell investments (ASB, 1991). This decision is based on the risk inherent in, and return provided by, the investments. The return and risk of an investment is determined by the amount and uncertainity of the cash flows which that investment can generate (see 3.5 pp. 58-60). Thus, investors need information to help them assess an enterprise's ability to generate cash flows. Consequently, the utility of financial reports can be judged by their ability to provide information which assists in estimating the amount and timing of cash flows. The IASC (1989) claims that

> "users are better able to evaluate this ability to generate cash and cash equivalents if they are provided with information that focuses on the financial position, performance and changes in financial position of an enterprise." (para. 14).

Finanical reports will be useful if they provide a track record upon which forward looking estimates can be based. When considering present financial reporting, Solomons (1989) states that

> "its value for decision-making lies largely in the information it provides about an enterprise's present financial position and its recent past operating results as a basis for drawing conclusions about its probable future results and future financial position." (p. 12).

Empirical evidence (see Lee and Tweedie, 1981; Anderson, 1981; Hines, 1982; Chang, Most and Brain, 1983; Arnold and Moizer, 1984; Day, 1986 Cready and Mynatt, 1991) has shown that investors view financial reports as important sources of information about an enterprise. Based on their analysis of trading, Cready and Mynatt (1991) concluded that the annual report was a particularly significant source of information for the small investor. Given investor's reliance on financial reports the next section examines their effectiveness in measuring an enterprise's financial position (capital/value) and performance (income). Recently, the ASB (1991) confirmed its view, that users are better able to evaluate a company's ability to generate cash flows if they are provided with information that focuses on the financial position, performance and cash flows of the company.

2.5 FINANCIAL REPORTING, CAPITAL AND INCOME

2.5.1 Introduction

Information about a company's financial position is primarily provided in a balance sheet. Information about the performance of a company is primarily given in a profit and loss statement. The financial position of a company is normally described in terms of the shareholders' equity (capital), which is represented by the value of the net assets of the company (Lee, 1985, p.5). If it is desired to convey information on a company's capital and performance (income), the selection of a basis of measurement which captures this information is required. The 2 main approaches discussed in the literature are the economist's and the accountant's approach. The main features of both these approaches are outlined.

2.5.2 Economist's Approach

Lee (1985 p. 68), Kam (1990, p. 136) and Bromwich (1992, p. 32) suggested that the economist's approach to the measurement of capital and income is the ideal measure. Bromwich (1992, p. 69) commented that the widespread advocacy of portfolio theory for investment decisions (see 3.5, pp. 58-60) supports the economic approach to capital and income measurement. The economic model values capital on the basis of discounted future net cash flows (Lee, 1985, p. 13). In deriving this value, cash flows expected from both tangible and intangible assets are taken into account.

Although Fisher (1906) is credited with formulating the present value approach in a way that is serviceable to accountants, it was Canning (1929) who demonstrated its relationship to accounting concepts showing that at least in theory, the value of an asset or liability is the present value of the future net cash flows related to it (see Kam, 1990, p. 142).

Under the present value approach, income for a period is given by the net increase in the economic value of capital after adjusting for net capital movements. This reflects Hicks's (1946, p. 171) widely accepted definition of income (Lee, 1985, pp. 7-8).

Hicks's definition, applied to a company, defines income as

> "the maximum value which a company can distribute during a period, and still expect to be as well off at the end of the period as it was at the beginning."
> (see Edwards, Kay & Mayer, 1987, p. 2)

Eonomists compute capital in order to measure income (Lee, 1985, p. 7). However, the practical application of the present value approach is frequently impossible (see Shwayder, 1967; Barton, 1974). The principal problem lies in estimating the size and the duration of future cash flows and deciding on the appropriate discount rate. Furthermore, Kam (1990, p. 145) asserted that it is virtually impossible to identify the specific stream of net cash flows for a particular asset used in conjunction with other assets. Harvey and Keer (1983, p. 26) claimed that the value in use of any asset will be dependent upon other assets, some of which may be intangible. Given these difficulties, accountants have effectively rejected the economic approach to capital valuation and income measurement.

2.5.3 Conventional Accountant's Approach

Conventional accounting practice uses past transactions as its foundation. These are generally recorded using the HC basis of valuation. The approach relies on a series of principles and rules such as the realisation principle and the concepts of matching and prudence.

The realisation principle means that changes in the value of capital are not recognised in the accounts until there is objective evidence of a market valuation through a business transaction. This is normally taken as the point of sale or purchase. Conventional accounting income excludes unrealised holding gains. This results in periodic income containing a heterogeneous mixture of current and prior period gains (Lee, 1985, p. 53). Several writers (e.g., Myers, 1959; American Accounting Association Committee, 1965, Horngren, 1965) claim that application of the realisation principle leads to a misleading computation of accounting income and capital. The situation is further confused by the application of the prudence concept which requires accountants to recognise unrealised losses prior to realisation, while ignoring unrealised holding gains.

Once the revenues and costs have been recognised, they are then matched to derive the income for the period. This matching gives rise to judgemental problems in deciding on the allocation of costs to an accounting period. Hence, the validity of conventional accounting measures, depends on the soundness of the judgements made in revenue recognition and cost allocation. A major consequence of the matching principle is that it relegates the balance sheet to a repository of unallocated costs (Kam, 1990, p. 178). Thus, the balance sheet's use as a measure of a company's financial position is seriously impaired. Sprouse (1973) described the balance sheet as a "dumping ground for balances that someone has decided should not be included in the income statement" (p. 173).

Although the basic inputs into the computation of accounting income are net cash flows, the application of the realisation, prudence and matching principles yields a measure of periodic income which is likely to be considerably different from economic income (Edwards, Kay and Mayer, 1987, p. 18). However, there is evidence to suggest that accounting income may be useful in predicting permanent economic income (see Rees, 1990, pp. 272-273; Beaver, 1989, pp. 98-101).

2.5.4 Demand for Change

Given the imperfections of the conventional HCA model, some writers have suggested the use of alternative valuation models. They believed these latter models have greater utility as they incorporate economic thinking into the conventional accounting model without making it wholly prediction based (Lee, 1985, p.64). A discussion of these models and their relevance to inflation accounting is presented in 2.7 (pp. 36-42).

In periods of unstable prices, the limitations of the conventional HCA model are more apparent and its decision utility is seriously impaired (Kam, 1990, p. 176). The presidents of 5 leading accountancy bodies of the Consultative Committee of Accountacy Bodies (ASC, 1986) asserted that where a company's performance and financial position are materially affected by changing prices, HC accounts alone are insufficient, and information on the effects of changing prices is vital for an appreciation of a company's performance.

The FASB (1979) believed that the absence of inflation accounting information could lead to the following difficulties

> "resources may be allocated inefficiently, investors' and creditors' understanding of the past performance of an enterprise and their ability to assess future cash flows may be severely limited." (p. 2)

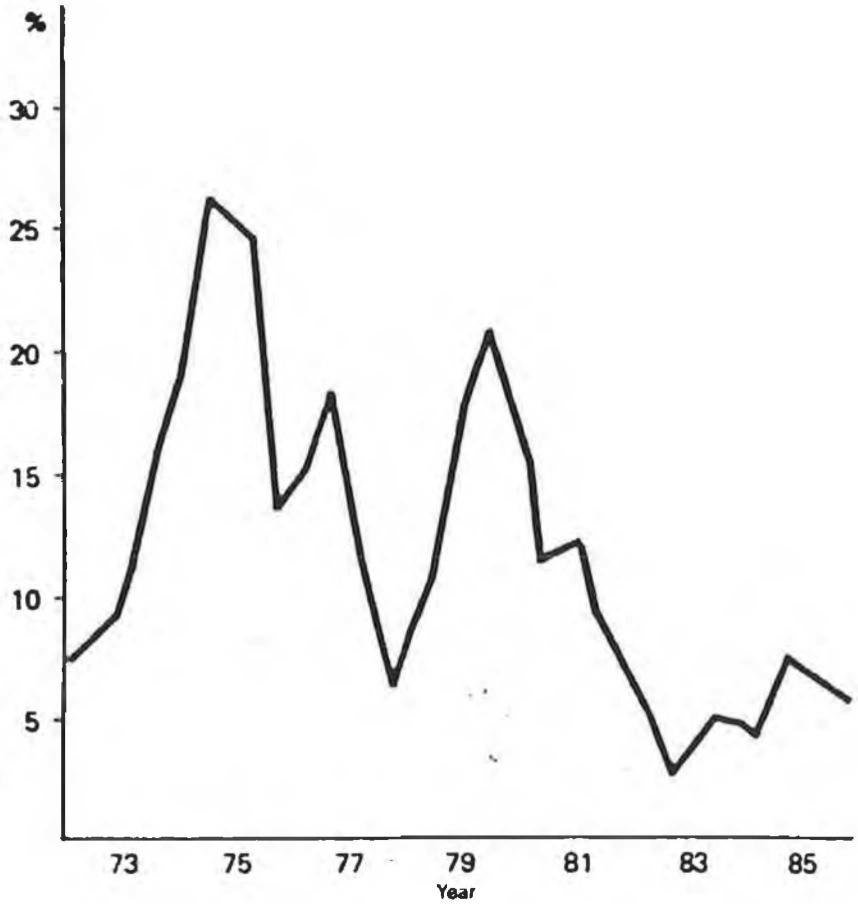
The deficiencies of HCA in periods of unstable prices are described in the next section.

2.6 LIMITATIONS OF THE HCA MODEL IN PERIODS OF UNSTABLE PRICES

In the period from the early 1970s to the mid 1980s the UK experienced the highest inflation (i.e. general reduction in the purchasing power of money) rates in its modern history (see Fig. 2.1).

FIG. 2.1

UK INFLATION RATES 1972 TO 1985



During the period 1972 to 1985 there have been annual rates of inflation ranging from 3.6% to 26.1%. Cumulative inflation in the period was 460%.

Source: June and December figures supplied by the Central Statistical Office

The seriousness of these price rises, compared with other periods, is well documented by Myddelton (1984, pp. 1-6). The period experienced inflation rates ranging from 3.6% to 26.1%, with cumulative inflation in the period 1972-1985 reaching 460%.

Given that accountants rely on the monetary unit as a common denominator to record past transactions, its instability in periods of unstable prices can have serious implications in interpreting the results of this process. Moonitz (1961, p. 18) pointed out that 2 or more objects must be expressed in identical units before any meaningful mathematical operations, such as addition or subtraction, can be performed. However, in an economy with large changes in the purchasing power of money, the summation, subtraction or comparison of accounting figures in terms of an unadjusted monetary unit is meaningless. Thus, the suitability of money as a common denominator over time is called into question.

In periods of unstable prices, accounts prepared under the HC convention are considered to suffer from serious deficiencies described by the ASC (1986, p. 9) as follows:

(1) reported results may be distorted as a result of the matching of current revenues with costs incurred at an earlier date. The full distribution of profits calculated on that basis may result in the distribution of sums needed to maintain capital;

(2) the amounts reported in a balance sheet in respect of assets may not be realistic, up to date measures of the resources employed in the business;

(3) as a result of (1) and (2), calculations to measure return on capital employed may be misleading;

(4) because holding gains or losses attributable to price level changes are not identified, management's effectiveness in achieving operating results may be concealed;

(5) there is no recognition of the loss that arises through holding assets of fixed monetary value and the gain that arises through holding liabilities of fixed monetary value; and,

(6) a misleading impression of the trend of performance over time may be given because no account is taken of changes in the real value of money.

A major consequence of these limitations is that HCA provides unsatisfactory guidance for decision making. In particular, the ASC (1986, p. 11) commented that dividend payments, investment and financing decisions, and pricing and pay policies should not be decided upon without taking account of the effects of changing prices. The serious consequences of ignoring price changes is demonstrated by the statistics released by the FASB (1981, p.2) on corporations subject to the requirements of SFAS 33, where for 1980, on a CC basis, dividends exceeded profits, resulting in a disinvestment rate of 2.4%.

Some companies have attempted to compensate for the imperfections of HCA by adopting modified HC accounts, under which certain assets are included in the balance sheet at revalued amounts. However, most of these companies undertake revaluations comparatively infrequently and do not revalue all their assets (ASC, 1986, p. 13). This results in many of the limitations of pure HCA remaining.

These limitations led to the consideration of the use of valuation models which would be more decision relevant in periods of unstable prices. The review which follows examines these alternatives and in particular, considers their contributions to the debate on inflation accounting. A more detailed consideration of the subject is given by Whittington (1983).

2.7 ALTERNATIVE VALUATION MODELS AND THE DEVELOPMENT OF INFLATION ACCOUNTING

As early as 1918, William Paton (1918) recognised the problems caused by an unstable monetary unit in understanding unadjusted financial reports. He viewed conventional accounting practices as failing to meet users needs, arguing that

> "accounting systems must become more sensitive and accurate gauges of economic data - and certain long-standing theories and policies of accountants must undergo modifications if the purposes of the various interests in the business enterprise are to be adquately served."
>
> (Paton, 1920, p. 30)

Paton was concerned with maintaining the economic well being of the business unit. Replacement cost was identified as the appropriate basis of valuation. In his first paper (1918), he advocated the separate reporting of unrealised holding gains in the income statement. Such a proposal was revoluntionary as it violated the cherished realisation principle. Scapens (1981, p. 12) observed that the publication of Paton's views evoked little response from other American accountants, except to give rise to some objections to the use of replacement costs as a basis for depreciation. Paton (1920) was forced to take a more conservative posture in his subsequent work.

Sweeney, (1936) proposed a systematic recognition of price level changes to adjust for the distortion caused by changes in the purchasing power of money. In 1936 he developed a technique which is referred to as stablised accounting, which is the antecedent of constant purchasing power (CPP) accounting. He provided detailed descriptions and numerical examples of how to stablise either historical costs or replacement costs by adjusting for general price level movements. He believed that the capital, to be maintained intact, should be measured as a proprietory concept in terms of real command over goods and services in general, rather than in terms of the specific assets owned by the company. His preferred approach was to apply the CPP adjusment to replacement cost values rather than HC values, as this took account of both specific and general price level changes. However, Sweeney's approach was rejected by several writers (e.g., Griffith, 1937; Bowers, 1950; Bell, 1953; and Warner, 1954) on the grounds that it was impossible to determine which price index should be used. It was argued that the use of an inaccurate index would obscure the company's real performance (see Kirkman, 1974, pp. 52-64 for a discussion of UK indices).

In 1961, Edwards and Bell (1961) advocated the merits of replacement cost accounting as a method of splitting conventional accounting income. They chose replacement cost on the grounds that replacement is generally more relevant to a business which will continue its operations in the foreseeable future. Income derived on this basis is referred to as business income. The system proposed by them segregates operating gains from holding gains, and also abandons the realisation principle. Business income is equal to the aggregate of (a) current operating income of the period, (b) realised holding gains of the period, and (c) unrealised holding gains of the period. Edwards and Bell claimed that this analysis of income facilitated the prediction of a company's cash flows as

> "current operating profit can be used for predictive purposes if the existing production process and the existing conditions under which that process is carried out are expected to continue in the future" (p. 99).

Finally, Edwards and Bell (1961, p. 278) suggested adjusting business income to allow for general price level changes. The resulting measure they referred to as Real Business Income. By implementing this approach, Edwards and Bell proposed to show, within a single set of accounting statements, a variety of information which they considered to be necessary for a full evaluation of a company's activities. The approach draws attention to the multiple dimensions of a company's performance and de-emphasises the "bottom line" of the income statement. Other early contributions on replacement cost accounting came from Sprouse and Moonitz (1962), American Accounting Association (1966) and Revsine (1973).

Because of the numerous measurement problems, Drake and Dopuch (1965) and Prakash and Sunder (1979) argued against the potential usefulness of replacement cost income. They argued that it involved subjective judgments and unrealistic assumptions. However, Chambers (1965) was Edwards and Bell's greatest critic.

Chambers asserted that replacement cost measures are irrelevant to users. He stated that users make decisions in order to adapt themselves to the environment, so they need to know their present position in relation to the environment. He suggested that replacement cost, or indeed any entry value, does not measure such a position. Rather, current cash equivalent or any exit value is what is relevant to users. Chambers presented a comprehensive proposal for exit value accounting which is referred to as "continuously contemporary accounting". Although Chambers is regarded as the principal proponent of exit value accounting, MacNeal (1929) is accredited as the orginator. Other writers of the period who supported exit value accounting for financial reports were Thomas (1969 and 1974) and Sterling (1979). Recently, the ICAS (1988) advocated net realisable valuation.

It is generally agreed among its advocates, that the exit values used should be those assuming orderly rather than forced resource realisations, and be based on market prices existing at the time of measurement for the resources in their existing state (Lee, 1985, p. 91). The model is based on the economic concept of opportunity cost. For practical purposes, the net realisable value is usually commended as the most reasonable opportunity cost to use. The approach maintains capital in terms of its generalised command over goods and services (Lee, 1985, p. 101). Under this approach, both realised and unrealised holding gains are included in income as they both represent an increase in potential purchasing power. Advocates of exit value accounting also recommended adjusting exit values for general price level changes (see Sterling, 1980).

However, exit value accounting did not go unchallenged, the main attack coming from writers who support "deprival value" (value to the business). The major criticism levelled against the approach is that it implies liquidation rather than continuity of a business entity (see Solomons 1966a and 1966b; Baxter 1967 and 1975; Largay and Livingston 1976, p. 141).

In addition, insisting that value is determined by exchange, Chambers (1966) defines an asset as the "severable means in the possession of an entity" (p. 103). Critics of exit value accounting find the stipulation of severability to be unduly restrictive. Kam (1990, p. 475) commented that a company can consider an asset to have value because of its use in the business rather than its sale. He stated that its economic value is determined by its scarcity and utility, not its exchangeability. In this respect, specialised assets may have very little resale value, but may be of considerable value in generating future cash flows if used in the company.

Wright (1964), Solomons (1966a and 1966b), Stamp (1971) and Baxter (1975) advocated using "value to the business". The approach uses mixed values to measure the performance (income) and financial position (capital) of an enterprise. Believing that assets are normally held for either use or resale, an asset's value is the lower of its replacement cost and the higher of its economic value and net realisable value. The approach has been attacked by a number of writers, e.g., Chambers (1971), Gray and Wells (1973), and Whittington (1974), who suggested it is more suitable to entity management than to investors and other external users of financial reports. It is critised for its assumption of continuous entity equilibrium and profitability (see Wanless, 1974). Furthermore, the practical difficulties of deriving replacement values in an advancing technological environment can result in major measurement problems and tremendous reliance on subjective judgements (Ma, 1976).

Despite the objections to "value to the business" as a valuation basis, it was this approach which pervailed in the CCA standards of the UK and the US. The approach is described in greater detail later in this chapter when the requirements of the UK Standard (SSAP 16) on CCA are examined.

Apart from a normative approach to developing a system to account for price level changes, accounting policy makers have made numerous recommendations. The pronouncements of UK and US policy makers are of interest to the present study as most of the studies reviewed in Chapter 4 use data disclosed in accordance with these pronouncements. A chronological review of the US and UK proposals is presented in Appendices 2.A and 2.B respectively. This review is confined to the period from the early 1970s to the late 1980s, as the studies in Chapter 4 and the present study use inflation accounting data released in this period. An examination of the review shows that, in both countries, accounting policy makers found it extremely difficult to develop a standard which met with general acceptance. The efforts of the ASC were finally reflected in SSAP 16. Its requirements are now examined as the present study uses data derived from SSAP 16 disclosures in its valuation model described in 7.3 (pp. 218-220).

2.8 SSAP 16

SSAP 16 was published in March 1980 on the basis that no material changes would be made for at least 3 years. Its principal feature was that companies coming within its scope were required to produce CC accounts. This requirement applied for accounting periods beginning on or after 1 January, 1980 until the mandatory status of the Standard was removed in June, 1985. The objective of CCA was

> "to provide more useful information than that available from historical cost accounts alone for the guidance of the management of the business, the shareholders and others on such matters as: (a) the financial viability of the business; (b) return on investment; (c) pricing policy, cost control and distribution decisions; and (d) gearing." (para. 5).

The standard applied to all financial reports intended to give a true and fair view, unless the entity concerned was specifically exempted. The entities exempted were:

companies which were not listed on the Stock Exchange and which satisfied at least 2 of the following 3 criteria:

(i) turnover was less than £5,000,000 per annum,

(ii) the historical cost balance sheet total at the beginning of the accounting period was less than £2,500,000,

(iii) the average number of employees was less than 250;

wholly owned subsidiaries where the parent presents CC accounts;

authorised insurers and property companies; and, entities such as charities and building societies whose long term financial objective was other than to achieve an operating profit.

Compliance with SSAP 16 could be achieved in one of the following ways:

by presenting HC accounts as the main accounts with supplementary CC accounts which were prominently displayed;

by presenting CC accounts as the main accounts with supplementary HC accounts; or,

by presenting CC accounts as the main accounts accompanied by adequate HC information.

The principal feature of CCA as proposed by SSAP 16 was to maintain the "net operating assets" of the business. SSAP 16 defined net operating assets as fixed assets (including trade investments), stock and monetary working capital. To maintain this operating capability SSAP 16 required 3 adjustments to be made to the HC operating profit as follows:

a depreciation adjustment in relation to fixed assets;

a cost of sales adjustment in relation to stock; and,

an adjustment based on the monetary working capital of the company.

These adjustments represented the additional resources required to meet the change in prices of resources consumed in the period. They produced a measure of income which was derived by matching against revenues the value of the assets consumed in generating those revenues.

If the net operating assets were partly financed by external borrowings, the Standard required a gearing adjustment to be made to determine the CC income attributable to shareholders.

Assets and liabilities were to be included in the balance sheet at their "value to the business". This term "value to the business" was of fundamental importance to CCA. It is based on the concept of "deprival value" first expounded by Bonbright (1937, p. 71). He applied the principle in considering compensation for the loss of property and stated that

> "the value of a property to its owner is identical in amount with the adverse value of the entire loss, direct and indirect, that the owner might expect to suffer if he were deprived of the property." (p. 71).

Application of this valuation concept means that an asset is stated at its net current replacement cost, or, if there is a permanent diminution in the asset's value, at its recoverable amount. The recoverable amount is the greater of the net realisable value of the asset or the expected proceeds from future use. Simply expressed, value to the company is the lowest cost avoided by owning the asset.

All unrealised value to the business changes, and all income statement provisions (in excess of the equivalent HC data, and net of the gearing factor), were to be transferred to a CC reserve. Thus, holding gains were to be excluded from income, as they represented amounts which must be retained in the business.

Implementation of SSAP 16 valuation principles resulted in a company retaining sufficient resources in the business to maintain the shareholders' proportion of its operating capability. Thus, a physical capital maintenance concept was followed by SSAP 16 which supports an entity approach to income measurement and asset valuation.

However, SSAP 16 has been severely criticised, the main criticisms relating to the gearing and monetary working capital adjustments. Edwards, Kay and Mayer (1987, p. 93) claimed that the combination of the monetary working capital and gearing adjustments produced a financial correction which was sensitive to the allocation of items between the 2 components. Kennedy (1978) argued that the gearing adjustment should reflect the debt financed proportion of total holding gains (realised plus unrealised gains). However, SSAP 16 limited the gearing adjustment to the 3 CC operating adjustments on the basis that this conforms with the fundamental accounting concept of prudence (SSAP 16, para. 19).

Edwards, Kay and Mayer (1987, p. 90) regarded the exclusion of unrealised holding gains from CC income as a major deficiency of this income measure. They asserted that unrealised holding gains represented actual economic phenomena which occurred in the period and should be included in the accounts. In contrast, SSAP 16 considered these gains as amounts which must be retained within the business if it was to maintain its operating capability. The arguments concerning the treatment of holding gains are examined in greater detail in 7.3.1 (pp. 220-226).

Tweedie and Whittington (1985) also criticised SSAP 16 for its inconsistency in applying the gearing adjustment. Under SSAP 16 a gearing adjustment was not required if a company had negative net borrowings. Thus the fall in the real value of excess monetary assets was not included in the measurement of income. Furthermore, application of the gearing adjustment assumed that the proportion of assets financed externally would remain the same. Lee (1985, p. 112) suggested that this may be an unreasonable assumption.

Although SSAP 16 was introduced by accounting policy makers to take account of the effects of inflation, it ignored general price level changes, as it only adjusted for the effects of specific price changes. Edwards, Kay and Mayer (1987, p. 73) argued that to measure income which is relevant for economic analysis, it is necessary to combine the "value to the business" model with a general index adjustment to capital which allows for the effects of inflation. This would allow a company to preserve its operating capability in real terms. On the other hand, Gynther (1974) asserted that general price level restatement is meaningless, as the resulting measures are difficult to comprehend and there is a problem in selecting the appropriate index.

An additional problem associated with SSAP 16 disclosures was their reliability. Many of the studies reviewed in Chapter 5 show that the difficulties encountered in deriving SSAP 16 current value measures led preparers and users to doubt their utility.

2.9 SUMMARY

This chapter identified the provision of decision useful information to users as the major objective of financial reporting. The qualitative characteristics likely to affect the utility of financial reports were discussed and relevance and reliability were identified as being of primary importance.

The users of financial reports include investors who require information on a company's financial position and performance as a basis for predicting the cash flows associated with their investment. The ability of conventional accounting data to provide this information was considered. In particular, the chapter examined the limitations of HC data in periods of unstable prices. The case for financial reports which incorporate adjustments for price level changes was presented and a review of the relevant literature showed that the debate yielded many proposals. Accounting policy makers found it extremely difficult to develop a generally accepted standard. Finally, the chapter examined SSAP 16, the major policy document issued by the UK policy making body on inflation accounting.

The next chapter presents details of the share pricing mechanism and identifies the determinants of share prices. It describes the framework within which the utility of accounting data to investors can be assessed.

CHAPTER 3

THE CAPITAL MARKET, SHARE PRICING AND ACCOUNTING DATA

CHAPTER 3

THE CAPITAL MARKET, SHARE PRICING AND ACCOUNTING DATA

3.1 INTRODUCTION

Chapter 2 established that the objective of financial reporting is to provide decision relevant information to users of financial reports. Investors have been identified as the primary users of financial reports (see 1.2 p. 3). Attempts have been made to assess the utility of accounting data in meeting their information needs. This chapter focuses on 2 issues which impinge on that assessment - developments in capital market theory and the relationship between accounting data and share prices/returns. The empirical evidence supporting a relationship between accounting data and share prices/returns is also examined.

Particularly, this chapter:

describes the efficient market theory (3.2), the evidence supporting market efficiency (3.3) and explores the implications of market efficiency for financial reports (3.4);

provides an insight to portfolio theory and the pricing mechanism (3.5) and examines the market model (3.6) and the capital asset pricing model (CAPM) (3.7);

explores the basis for the expectation of a link between share prices/returns and accounting data in an efficient capital market (3.8); and,

reviews the empirical evidence on the information content (3.9) explanatory power (3.11 & 3.12) and predictive ability (3.13) of accounting data, and evaluates whether or not the relationship between share returns and accounting data is mechanistic (3.10).

3.2 CAPITAL MARKET EFFICIENCY

The capital market describes the market in which securities are traded. Its objective is to facilitate the transfer of funds between investors and borrowers and to set the price at which securities are exchanged. The efficiency of this process of pricing is significant in ensuring an optimal allocation of scarce capital resources (see Firth, 1986, p. 1). Fama (1970) describes the capital market as being efficient when share prices 'fully reflect' all available information. This definition has been operationalised to mean that all available information is impounded in share prices immediately and in an unbiased manner (Hendriksen, 1982, p. 89, Foster, 1986, p. 301). As Jensen (1978) observes

> "a market is efficient with respect to information set Θt if it is impossible to make economic profits by trading on the basis of information set Θt." (p. 96).

The existence of an efficient market depends upon there being a fair, well regulated, competitive market place. The protagonists of the efficient market theory state that there are so many competing expert analysts evaluating the available data that they bring a share's price to its correct level, i.e., the best available estimate of its "intrinsic value" (see Firth, 1977, p. 107).

Kantor (1979) regards the operation of the security market as a near perfect illustration of the rational expectations hypothesis which states that, in a competitive world, economic agents exploit all available information to take advantage of perceived profit opportunities.

3.3 EVIDENCE OF MARKET EFFICIENCY

Much of the research in finance has examined share price behaviour to test the efficiency of the capital market. These tests are usually classified into categories which reflect the cost of the information set Θt used to test the efficiency of the market (see Watts and Zimmerman, 1986, p. 19). The categories are set out below.

Weak Form Tests which test whether current prices fully reflect all past prices so that it is impossible to develop superior security trading rules based solely on a knowledge of past prices.

Semistrong Form Tests which test whether or not current prices fully reflect all publicly available information and adjust rapidly to new information so that no trading rules or strategies based on such information will permit the earning of excess returns.

Strong Form Tests which test whether superior trading rules exist, even for those having insider information.

3.3.1 Evidence of the Weak Form of the EMH

In general, weak form tests fall into 2 groups. The first group examines the degree of statistical independence between share price movements and movements in share price indices, while the second group investigates the ability of mechanical trading strategies to out perform random selection procedures. The main finding from these studies is considered below. A detailed review is provided by Henfrey, Albrecht and Richards (HAR) (1986, pp. 262-265), Keane (1983, pp. 120-128) and Dyckman and Morse (1986, pp. 27-31).

Statistical Dependence Tests: These studies considered if the dependence in successive price changes was sufficient to permit the existence of consistently profitable trading rules. Studies in the US (Schwartz and Whitcomb, 1977a and 1977b; Rosenburg and Rudd, 1982) and in the UK (Brealey, 1986, pp. 312-329; Kemp and Reid, 1971; Grimes and Benjamin, 1975) found some serial dependence in share prices. However, other studies (Solnick, 1973; Rozeff and Kinney, 1976) found that the possibility of earning abnormal returns was eliminated when returns were adjusted for risk. (A more detailed dicussion on risk is provided in 3.5, pp. 59-60).

Trading Rule Tests: These studies tested whether mechancial investment strategies can earn abnormal returns. Amongst the various investment strategies tested were filter rules, fixed proportion maintenance strategies, moving averages and relative strength tests. The majority of studies in the US and the UK (see Jensen and Bennington, 1970; Dryden, 1970; Beaver and Landsman, 1981) found the strategies to be unprofitable. Indeed, many of the strategies consistently performed below the market index, especially when transaction costs and risk adjustments were included in the analysis. Keane (1987), in a summary of this research, offers the following observations:

> "It should be said, however, that the statistical tests that have been carried out (fairly intensively since the 1950s) strongly support the view that the market is in fact efficient in the weak sense." (pp. 7-8).

3.3.2 Evidence of Semistrong Form Market Efficiency

Tests of the semistrong form of the efficient market hypothesis (EMH) have studied the reaction of share prices to information announcements. These tests are based on the premise that if the market is semistrong efficient, the disclosure of economically significant information which revises expectations should give rise to a share price reaction. The EMH predicts that this reaction will occur prior to or almost immediately after the public announcement. As the investment community may learn of the information prior to its public disclosure, the existence of a price reaction before that date would not be unusual. A reaction on the announcement date would be caused by information not anticipated by, or previously disclosed to, market participants. However, if the market is semistrong efficient, there should be an immediate reaction following the announcement, thereby removing any possibility for future abnormal returns (Dyckman and Morse, 1986, p. 31).

The studies reviewed by Keane (1983, pp. 128-153), HAR (1986, pp. 265-268), Dyckman and Morse (1986, pp. 31-39) suggest that the market is semistrong efficient. Many of these studies used accounting data in their testing and some of them are examined later in this chapter.

3.3.3 Evidence of Strong Form Market Efficiency

A market is strong form efficient if both public and private information are quickly impounded in share prices. This implies that holders of private information cannot consistently earn abnormal returns. A problem with testing this level of efficiency is that private information, by its nature, is unobservable. Indirect methods are used; for example, researchers examine portfolio returns likely to reflect private information, such as mutual funds and the returns earned by insiders. Another indirect approach used is to examine returns and trading volume prior to public announcements.

Tests in the UK and US on Mutual Fund and Pension Fund performance have generally shown that such funds failed to make abnormal returns (see Keane, 1983, pp.136-137; Dyckman and Morse, 1986, pp. 40-41; HAR, 1986, pp. 269-275; Rees, 1990, p. 242). However, this may be due to their inability to obtain private information. Tests in the US into whether "insiders" (defined by the SEC as directors, managers and owners of not less than 10 per cent of the shares of the company) can earn abnormal returns have shown that insiders appear to have information that is not impounded in share prices (see Dyckman and Morse, 1986, pp. 41-42).

The findings from studies by Morse (1980), Keown and Pinkerton (1981) and Abdel-Khalk and Ajinkya (1982) into price and volume changes prior to an information announcement suggest that the market is not strong form efficient. As most of these studies are American, the extent to which the findings can be applied to the UK market is not clear. Therefore, further research work is needed to determine the extent to which the UK market is strong form efficient.

3.4 IMPLICATIONS OF MARKET EFFICIENCY FOR FINANCIAL REPORTS

A semistrong efficient market implies that all publicly available data which captures value relevant factors is impounded in share prices. As financial reports are part of the public information set, this provides a setting within which their utility to the securities market can be assessed. This assessment requires a model which identifies the determinants of share prices in equilibrium. The relevance of accounting data can then be inferred by examining the relation between the accounting disclosures and the determinants of share prices.

2 models which capture the determinants of share prices are the market model and the capital asset pricing model (CAPM). Both models are extensively used to investigate the information content of accounting data. A brief description of these models is presented in sections 3.6 (pp. 61) and 3.7 (pp. 62-64). For a more detailed discussion, see Sharpe (1963, 1964). The models originate from developments in portfolio theory which are now considered.

3.5 PORTFOLIO THEORY AND THE PRICING MECHANISM

The origins of portfolio theory dates back to the eighteenth century work of Bernoulli (1954) on the theory of risk. It was first applied rigorously to the analysis of the investment decision in the work of Tobin (1958) and Markowitz (1959).

The major decision facing an investor is whether to buy, hold or sell shares in a company (ASB, 1991). To make that decision an investor must estimate the value to himself of owning shares in the company. That value is determined by the expected return and risk associated with that investment (see Dickinson, 1986, p. 18; Rutterford, 1985, p. 29). The return is calculated as follows:

$$R = \frac{V_n + D - V_o}{V_o}$$

where

R = return on the investment

V_o = the value of the share holding at the beginning of the investment period

V_n = the value of the share holding at the end of the investment period

D = dividends received in the period

This calculation requires a value for the share holding at the start and end of the investment period. Various approaches have been used to estimate a share's value (see Foster, 1986, pp. 422-426; Davis, 1986, pp. 193-206). The most widely advocated normative share valuation model involves discounting the expected cash flows from the share holding to their present value, using a rate of interest which is appropriate for the risk attaching to that investment (see Arnold, 1984, p. 105).

The valuation process requires the estimation of cash flows and their associated risk (i.e. their uncertainty). Portfolio theory is particularly important in the estimation of risk.

The portfolio model of investment behaviour is based on a theory of rational choice under uncertainty, i.e., the expected utility hypothesis. This hypothesis, developed by Von Neumann and Morgenstern (1944, ch. 3), implies that investors are risk averse and prefer a greater return for a given level of risk or a lower risk for a given level of return (Hendriksen, 1982, p. 94). This implies that a rational investor will hold a portfolio of securities, as diversification offers the opportunity for risk reduction. Therefore, portfolio return and risk are the key factors in valuation analysis (Hendriksen, 1982, p. 94).

A portfolio return is measured by the weighted average return of the individual securities in the portfolio. The portfolio risk is measured by the variance of the portfolio return. However, this variance is not usually the weighted average of the variances of the individual security returns. For large portfolios, the portfolio risk is measured by the average of the covariances among the securities in the portfolio, as a portion of the variance of the individual security returns can be eliminated by diversification. The risk which can be eliminated is referred to as "unsystematic risk", while the undiversified component is referred to as "systematic risk" (Dyckman and Morse, 1986, p. 13).

Application of the portfolio model was very cumbersome until it was facilitated by advances in computer technology. Instead, the market model developed by Markowitz (1952, 1959) and Sharpe (1963) was used to estimate a share's return.

3.6 THE MARKET MODEL

Sharpe (1963), in recognising that securities are subject to common influences, believed that the expected return on any security could be expressed as a linear function of the expected return on the market. In practice, past data on returns are used to derive the following relationship:

$$R_i = a_i + B_i R_m + e_i$$

where

R_i is the return on security i,

R_m is the return on a market index,

a_i and B_i are the intercept and slope, and

e_i is the error term

B_i captures the impact of events which affect the return on all securities in the market, while the term e_i captures the impact of events which affect only the return of the individual security. The term e_i is also referred to as the abnormal return (Bromwich, 1992, p. 210).

Although the market model is attractive in its simplicity in explaining share returns, it has no theoretical foundation (see Rutterford, 1985, p. 231). This led to the development of a series of capital asset pricing models (see Sharpe, 1964; Lintner, 1965; Mossin, 1966).

3.7 THE CAPITAL ASSET PRICING MODEL (CAPM)

The capital asset pricing model (CAPM) is a theoretical model which attempts to explain differences in rates of return across all assets. It is based on several very restrictive assumptions. (Details of these assumptions are given in Appendix 3.A, for a discussion on the implications of relaxing the assumptions see Dyckman and Morse, 1986, pp. 69-74). Foster (1986, pp. 337-338) describes the original one period CAPM as follows:

$$E(\tilde{R}_i) = R_f + B_i(E(\tilde{R}_m)-R_f)$$

where

$\tilde{R}_i$ is the return on security i

R_f is the return on the risk free asset

$\tilde{R}_m$ is the return on the market portfolio (i.e. return on all assets)

$$B_i = \frac{\mathrm{Cov}(\tilde{R}_i,\tilde{R}_m)}{\mathrm{Var}(\tilde{R}_m)}$$

$\mathrm{Cov}(\tilde{R}_i,\tilde{R}_m)$ is the covariance of the return on security i with the return on the market portfolio

$\mathrm{Var}(\tilde{R}_m)$ is the variance of the return on the market portfolio

B_i is the systematic risk which cannot be eliminated by diversification. It is worth noting that unsystematic risk does not enter the pricing model as it can be eliminated by diversification and is not compensated for in the market.

The multiperiod derivation of the CAPM "values an asset based on its expected cash flows and the expected rate of return the market requires for the risk of those cash flows" (Watts and Zimmerman, 1986, p. 29). Essentially, this means there is no contradiction between the CAPM and the widely advocated normative share valuation model discussed in 2.4 (pp. 24) and 3.5 (pp. 58).

A major problem in using the above CAPM in empirical work is quantifying the return on the market portfolio. To overcome this problem, stock market indices have been used as a surrogate for the return on the market portfolio (Bromwich, 1992, p. 209). Also, there is evidence which suggests that the CAPM may be misspecified and the implications of this for studies which assess the information content of accounting data are discussed in 6.2.3 (pp. 188-191).

Despite the foregoing difficulties, numerous empirical market based accounting research studies have relied on the descriptive validity of the market model or the CAPM. In particular, studies which examine the information content of accounting numbers (these are reviewed in 3.9, pp. 65-75). However, first consideration is given as to why a relation between accounting data and share prices can be expected.

3.8 SHARE PRICES AND ACCOUNTING DATA

The potential for accounting data to assist investors depends on how well it conveys information on value relevant factors (cash flows/return and risk). Chapter 2 (see 2.5.3, pp. 28-30) examined the approach adopted by accountants to measure the value (financial position/capital) and change in value (income) of a company. In an efficient capital market, share prices and returns also reflect value and changes in value. Therefore, it is not unreasonable to expect some association between accounting data and share prices.

Rees (1990, p. 312) stated that even if shares are traded in an efficient market, accounting data can act as a useful supplement to capital market data in estimating return and risk. Firth (1977) asserted that all knowledge relating to the value of a company should be known if securities are to be accurately priced. This requirement stems from market imperfections and the real world of uncertainty.

Arnold (1984, p. 108) also argued that accounting data aids investors by confirming their beliefs, or, by causing a revision in these beliefs.

The remainder of this chapter focuses on those studies which provide empirical confirmation of the utility of HCA data to the investors. Studies of this nature are relevant to this study as they provide empirical evidence on the validity of some theoretical issues and indicate which accounting variables are important to investors. A critical evaluation of the methodologies used in these studies is presented in Chapter 6.

3.9 INFORMATION CONTENT STUDIES

The objective of these studies is to establish if accounting disclosures are of sufficient economic importance to cause a market reaction. Gonedes (1973) stated that this research is important to accounting policy makers as

> "the extent to which accounting numbers reflect information that is impounded in market prices serves as a means of empirically evaluating the information content of accounting numbers. (p. 407).

Beaver (1968a) defined information as a change in expectations about the outcome of an event. Accounting data possesses information content

> "if it leads to a change in investors' assessment of the probability distribution of future returns (or prices), such that there is a change in equilibrium value of the current market price."
> (Beaver, 1968a, p. 68)

Accounting data are also considered to be informative if "this information helps individual investors select an optimal portfolio of securities" (Beaver, 1974, p. 564).

Thus, accounting data convey information if they cause a share price reaction or lead investors to alter their portfolio position. Failure to find a market reaction suggests that the disclosure is irrelevant and/or that it merely confirms market expectations. This led researchers to select the behaviour of share prices as an operational test of the information content of accounting data.

In share price reaction studies the information content of accounting numbers is assessed by examining the link between the accounting disclosures and abnormal rates of return. This methodology requires a model to predict expected share returns. Expected rates of return are typically determined using the market model or the CAPM. The difference between the expected return and the actual return is the abnormal (unexpected/excess) return.

An early study of the relationship between share prices and accounting numbers is provided by Ball and Brown (1968) who investigated the relation between the sign of unexpected earnings changes and abnormal returns. They predicted that unexpected increases in earnings are accompanied by positive abnormal returns and unexpected decreases by negative abnormal returns.

They selected a sample of 261 New York Stock Exchange (NYSE) companies over the period 1957-1965. An index model and a random walk model were used to compute expected earnings. Then the companies were classified as producing unexpectedly good or unexpectedly bad earnings. An abnormal performance index was derived for both groups of companies, over an 18 month period, commencing 12 months before the earnings announcement and ending 6 months after the announcement. Findings showed that companies with positive earnings changes had positive cumulative abnormal returns, while negative earnings change companies had negative abnormal returns and a statistically significant relationship between the sign of unexpected earnings changes and the sign of the abnormal returns was reported.

Ball and Brown observed that the market continually adjusted for new information. They found that 85-90 per cent of the share price change occurred before the month of the earnings announcement while the remaining 10-15 per cent occurred in the month of the announcement. This suggests that annual earnings releases are not a timely source of information.

Brown and Kennelly (1972) and Foster (1977), using similar methodologies to Ball and Brown, found that quarterly earnings announcements contained information that led to share price changes. Foster used several earnings expectation models to test the sensitivity of the Ball and Brown methodology to model specification errors. In addition, he used daily price data which improved the sensitivity of the test procedure. His analysis showed that the security market reacted to the size as well as the sign of the earnings change.

Beaver, Clarke and Wright (1979) also found that the market reacted to the sign and magnitude of the earning's change. Using observations of annual earnings for 276 companies for the period 1965 to 1974, they formed 25 portfolios of companies/years based on the magnitude of each observation's percentage unexpected earnings. The mean annual abnormal return was calculated for each portfolio for a 12 month period ending 3 months after the companies' fiscal year. The results showed a significant relationship between the magnitude of the unexpected annual earnings change and the annual abnormal return, but the relationship was not one to one. Beaver, Lambert and Ryan (1987) confirmed that prices move in the same direction as earnings but not on a one to one basis.

Watts and Zimmerman (1986, p. 55) suggested several reasons for the relation being less than one to one, namely that earnings measure cash flows with error, that uncorrelated factors are present, and that earnings are transitory in nature. Beaver (1989) viewed the transitory nature of earnings as the most likely reason and provided supporting evidence in the Beaver, Lambert and Morse (1980) study.

Earlier, Beaver (1968a) developed 2 additional methods to examine the information content of earnings - a price variability test and a volume test. These tests do not require an earnings expectation model. Beaver used the annual earnings of 143 US companies over the period 1961-1965. In selecting his sample, he attempted to control for the effects of non earnings factors on trading volume.

The price variability test is based on the premise that if accounting earnings lead to changes in the equilibrium prices of shares, then the variance of price changes should be greater in periods when earnings are reported than in nonreport periods. The price change variable used in the study was the residual e_{it}, from a market model. Beaver observed that the magnitude of the price change in the report week was 67 per cent higher than the average during the nonreport weeks. The evidence also indicated that the adjustment to earnings was rapid and that there was no abnormal price variability in the weeks following the announcement.

Beaver's volume test showed that the trading volume was 33 per cent higher in the week of announcement than during other periods and that the effect was largely dissipated by the end of the announcement week. This is consistent with investors using the earnings information to adjust their portfolio positions. Lev and Ohlson (1982) regard this as an indication of better risk sharing.

Beaver (1968a) highlighted the importance of the distinction between the price test and the volume test claiming that

> "the former reflects changes in the expectations of the market as a whole while the latter reflects changes in the expectations of individual investors." (p. 83).

Beaver stated that the volume test provides a good insight to the extent to which investors hold heterogeneous expectations. However, Verrecchia (1981) and Hakansson, Kunkel and Ohlson (1984) have questioned the suitability of the volume test as a means of measuring the degree of consensus among investors.

Commenting on Beaver's 1968 study, Chambers (1974) argued that his results merely confirmed that the announcement of earnings causes a market reaction, but it did not specifically prove that earnings per se were the cause of this reaction. However, Foster (1973) found that the market reacts to the information contained in the announcement of earnings rather than to the announcement per se.

Beaver's methodology has been applied to earnings announcements of companies listed on other stock exchanges in the US. May (1971) applied it to the quarterly earnings announcements of American Stock Exchange (ASE) companies over the period 1964-68. Hagerman (1973) tested the earnings announcements of 97 bank shares listed on the Over the Counter (OTC) market over the period 1961-1967. Both studies found results similar to Beaver's. Morse (1981), Patell and Wolfson (1979, 1981) applied the methodology to daily return data and found evidence supporting the information content of earnings.

Information content studies have been replicated in other countries. Using the Ball and Brown methodology, Brown (1970) monitored share price movements for Australian companies. His results confirmed the importance of earnings for investment decision making, and indicated that new information is quickly discounted. In a UK study, Firth (1981) examined the information content of interim and annual accounts. He concluded that these reports conveyed substantial information to the security market. In another UK study, Maingot (1984) found that

> "the annual earnings numbers released by U.K. companies do possess information. However, while the maximum response did take place at Week O there did appear to be some anticipatory reaction in the week preceding [week - 1] the announcement week." (p. 57).

To date the studies examined have focused on earnings' announcements. Further studies investigated the information content of other accounting disclosures. Studies by Aharony and Itzhak (1980), Asquith and Mullins (1983), Brickley, (1983), and Dielman and Oppenheimer (1984) examined the behaviour of share prices when dividends were announced. A significant positive association was found to exist between share price movements and dividend announcements. Also, earning forecast announcements have been shown to convey information to the security market (Patell, 1976; Waymire, 1984). Foster, Jenkins and Vickey (1986) examined the information content of incremental information in financial reports. The incremental information set included: segmental data; replacement cost data; and details of accounting changes. Earnings and dividends were excluded from the information set. The results showed that the incremental information in financial reports did not induce revisions in share prices.

As financial reports are not the only source of information available to investors, researchers have examined the variation in information content of annual earnings announcements. Grant (1980) investigated the relative information content of annual earnings announcements of NYSE and OTC companies. His results were consistent with the view that the information content of earnings announcements varies with the number of alterntive sources of information. McNicholas and Manigold (1983) observed a reduction in the relative information content of annual earnings announcements following the 1962 requirement that ASE companies report quarterly earnings. Jennings and Starks (1985) tested the speed of the share price adjustment, and concluded that

> "although we are able to distinguish between the price adjustment process of low and high information content news events, the difference in adjustment times was not extreme. . . . Even the high information content price effects dissipated in less then two trading days, on average. Thus it appears the market is able to adjust to even high information content news items in a reasonably timely manner." (p. 349).

Many of the early information content studies (e.g. Ball and Brown, 1968; Beaver, 1968a) found that abnormal returns could not be earned after the announcement. Subsequent studies by Jones and Litzenberger (1970), Joy, Litzenberger & McEnally (1977), Watts (1978), Brown (1978), Latane and Jones (1979), Rendleman, Jones and Latane (1982), and Foster, Olsen, and Shelvin (1984) reported abnormal returns following annual or quarterly earnings announcements. Initially, it was suggested (see Ball 1978, Foster, Olsen and Shevlin, 1984; Bernard and Thomas, 1989) that these studies suffered from methodological problems. In particular, misspecification of the pricing model, failure to control fully for risk, absence of transactions costs were offered as explanations for the post earnings announcement drift. However, Bernard and Thomas (1990) suggested that research design flaws were unlikely to account for the post earnings announcement drift. Instead, evidence from studies by Freemen and Tse (1989) and Bernard and Thomas (1989 and 1990) are consistent with share prices reflecting naive earnings expectations. Bernard and Thomas (1989) also observed that the delayed reaction to earnings was quite significant.

In addition, DeBondt and Thaler (1985 & 1987) have reported evidence which suggests that the market tends to over react to corporate news. Studies by Basu (1983), and Jaffe, Keim and Westerfield (1989) have also, found that smaller firms tend to earn higher returns than larger firms with equivalent systematic risk. Furthermore, Ou and Penman (1989) have shown that the nonearnings information in financial reports can be used to construct forecasts of future earnings which can be used as a basis for developing trading rules which earn abnormal returns. The results from the latter study suggests that, at least for the years covered by the study, the NYSE was informationally inefficient to the nonearnings information contained in the financial reports of US companies.

Brennan (1991) commented that the findings from the forementioned studies, offers a severe challenge to market efficiency, however, Ball (1990) cautioned that any conclusions on market efficiency cannot be divorced from some assumed model of market equilibrium, the correctness of which is not only unknown, but unknowable.

Despite this recent evidence challenging market efficiency, the findings from the information content studies suggest a strong association between accounting data and share price changes. It has been argued throughout this study that underlying this association is the notion that accounting data convey information on cash flows in terms of their amount and/or risk. It is this characteristic of accounting data which makes it relevant to the securities market. This suggests that manipulation of reported accounting data which have no cash flow consequences should not cause a reaction in the securities market. The market's ability to discriminate between real and cosmetic earnings changes has been extensively researched. The next section reviews some of these studies.

3.10 IS THE RELATIONSHIP BETWEEN SHARE RETURNS AND ACCOUNTING DATA MECHANISTIC?

The question now being considered is whether the association between accounting data (in particular earnings) and share prices, as identified in the previous studies, is a mechanistic one. In other words does the market react naively to a positive (negative) reported earnings change with an upward (downward) revaluation of the share price, or does it look at the economic aspects underlying the reported earnings number? In discussing this topic Lev and Ohlson (1982) state that

> "the basic idea is straight forward: Rational individuals are not concerned with the 'packaging' of information, their beliefs about future states are unaffected by the form of disclosure. Hence, if there

> are no effects on firms' cash flows, then it follows that market values should be unperturbed by firms' choices of (cross-sectional differences) or changes in (time-series differences) accounting techniques." (p. 298).

A mechanistic perspective has been advanced by some writers, e.g., Sterling (1970), who supports the Naive Investor Hypothesis (NIH). This states that investors are conditioned to react to, say, an accounting earnings number and may continue to react in the same manner even if the measurement method underlying the earnings number changes. Belief in the NIH is implicit in the actions and statements of many company officials.

> "In summary, the author's conclusions are that as a group the corporation managers responsible for the choice of financial accounting methods did indulge in a type of financial statement income manipulation whereby accounting changes were introduced in relatively unsuccessful years to boost financial statement income."
>
> (Blain, 1970, p. 201)

Naive behaviour at the individual level does not necessarily imply naive behaviour at the market level. The existence of a few sophisticated investors who have access to large amounts of capital may be sufficient to guarantee market efficiency. However, if the NIH does occur at the market level, then cosmetic accounting changes could cause share price changes.

While early research (Jensen, 1966; Greenball, 1968) was conducted in the form of experimental and simulation studies, there is now a considerable body of empirical research available (see O' Donnell, 1965; Archibald, 1972; Ball, 1972; Beaver and Dukes, 1973; Good and Meyer, 1973; Sunder, 1973, 1975, Cassidy, 1976; Abdel-Khalik and McKeown, 1978; Biddle and Lindahl, 1982). These studies show that investors can distinguish between real and cosmetic accounting policy changes. However, recent evidence casts some doubt on the market's ability to adjust fully for the effects of accounting policy changes (see e.g., Ricks, 1982; Hand, 1990; Harris and Ohlson, 1990; and Tinic, 1990). So, the percise extent of the market's ability to see through accounting policy changes is still an open question.

For a proper understanding of the results from the forementioned studies, the market's reaction to the accounting changes would have to be predicted. This requires the development of a theory which explains accounting practice variations. This would involve establishing the motivation of individuals responsible for selecting accounting policies. Any hidden but significant cash flow consequences associated with the accounting change would have to be uncovered, e.g., the effect of the accounting change on borrowing costs, management compensation costs and political costs. This area of research is strongly supported by Watts and Zimmerman (1986) but it is still in the early stages of development.

So far the studies reviewed have relied on accounting data conveying information about the amount of cash flows as the basis for their utility in determining share prices. The earlier discussion on share pricing also identified risk (uncertainity of future cash flows) as central to the share pricing process. This led researchers to investigate the relation between accounting data and risk. These studies are considered next.

3.11 ACCOUNTING DATA AND SYSTEMATIC RISK

Earlier, in the discussion on portfolio theory, systematic risk (beta, i.e., *B*) was identified as the appropriate risk measure in the return equilibrium process. In this context Beaver (1972) describes the importance of accounting data as being

> "its predictive ability with respect to *B* (systematic risk coefficient). Hence *B* analysis becomes extremely important as a research method if one wishes to assess the value of accounting information to the individual investor (p. 24).

The earliest published study which examined the association between accounting data and beta was by Ball and Brown (1969). Using a sample of 261 companies over the period 1946-1966, they computed an estimate of beta for each company based on share price data and an analogous beta measure based on 3 different definitions of accounting earnings. The analysis showed that the accounting betas were highly correlated with the market beta estimates.

An influential study by Beaver, Kettler and Scholes (BKS) (1970) extended the Ball and Brown study by examining the associations between 7 accounting risk measures and the market beta. The analysis used data from 307 NYSE companies over 2 periods: 1947-1956 and 1957-1965. The accounting based risk measures considered in the study were: liquidity, asset size, asset growth, leverage, dividend payout, earnings variability, and accounting beta.

Correlations were derived between each of the 7 accounting variables and the market beta for each company and for portfolios of 5 companies for the 2 sample periods.

The signs of all the correlation coefficients were in the predicted direction with the exception of the liquidity measure in period 2. The correlation coefficients for leverage, dividend payout, earnings variability and accounting beta were significant in both periods at the 99% confidence level. In addition, the correlation coefficients for the 5 security portfolios were larger than those for individual securities. BKS concluded that

> " accounting data do reflect the underlying events that determine differential riskiness among securities in the market prices of securities." (p. 679).

The second part of the BKS study examined the ability of accounting risk measures to predict the market beta. The researchers found that

> "accounting data provided superior forecasts of the market determined risk measure for the time periods studied." (p. 681).

BKS's results were challenged by Gonedes (1973). Using a sample of 99 companies, Gonedes found a statistically significant relationship between market based and accounting based beta values when the accounting income numbers were transformed into first differences. Accounting beta values based upon untransformed accounting income data were not significantly associated with market beta values. This finding is inconsistent with the results obtained by BKS. Gonedes suggested that the inconsistency could be due to differences in the scaling methods used for the accounting income numbers. BKS used share prices as the scaling factor, while Gonedes used total assets, and so developed a pure accounting variable. This led Gonedes to posit that BKS's results might be spurious as both the market and accounting beta values incorporated share price data.

In trying to resolve the controversy, Beaver and Manegold (1975) used 3 scaling factors to construct accounting betas: share prices; the book value of equity; and total assets. They found that while accounting betas based on the BKS definition tended to be more highly correlated with contemporaneous market betas than pure accounting betas, the latter betas were also significantly correlated with market betas.

Other studies by Hamada (1969, 1972), Lev (1974), Thompson (1976), Bildersee (1975), Eskew (1979), Rosenberg and Mc Kibben (1973), Rosenberg and Guy (1976a, 1976b),and Hill and Stone (1980) have confirmed an association between accounting data and systematic risk and the superiority of models based on accounting variables in forecasting the market risk. However, Elgers (1980) found that after controlling for measurement errors in estimated ordinary least squares (OLS) market beta's using Bayesian statistical techniques, accounting variables did not produce more accurate estimates of the market beta.

Furthermore, using data on 25 UK companies, Capstaff (1991) found no evidence of a relationship between accounting risk measures and the market beta. Instead, he found that both the market beta and accounting risk measures were used to derive analysts' risk perceptions. He suggested that this implied that analysts use accounting data for information on company specific elements of risk and use the information in ex-post market betas in their assessments of the market based elements of risk. However, Capstaff recommended that, before firm conclusions are made with respect to the relationship between the market beta and accounting risk measures in the UK market, further analysis is needed using a larger sample of companies.

It is apparent from the weight of evidence in the forementioned studies that accounting variables are associated with the market based risk measure. This association was found to exist for a broad range of accounting risk measures as well as for different methods of defining such measures.

To date the informativeness of accounting data has been assessed by examining the relation between one accounting variable and share prices/returns and trading volumes. The next section examines multivariate studies which provide evidence on the significance of accounting numbers in explaining share prices/returns.

3.12 EXPLANATORY POWER OF ACCOUNTING DATA

Multivariate studies have attempted to model the investor's decision making process. The objective of these studies was to develop a share valuation model which could be used to identify over and under valued shares. Chapter 6 (see 6.3, pp. 191-199) discusses in detail the merits and limitations of this approach and its relevance to the present study. The aim of this review is to examine the findings from these studies as they indicate which accounting numbers are relevant in explaining share prices/returns.

The review begins by looking at those studies which used accounting data to explain share price movements (returns). Studies using accounting data to explain relative share prices are then considered.

3.12.1 Explaining Share Returns

Benston (1967) constructed regression models showing share returns as a function of dividends, earnings, market conditions and accounting numbers such as sales and net income. He found very little, if any, relationship between the share returns and the independent accounting variables and concluded that

> "the information contained in published accounting reports is a relatively small portion of the information used by investors." (p. 28).

Benston's results may have been affected by methodological problems as he used lagged variables in his models. However, Ball and Brown (1968) showed that share prices are continually moving to take account of new information.

O'Connor (1973) used financial ratios as the independent variables to test the relationship between accounting data and share returns. The study covered the period from 1950-1966, with financial ratios for 127 companies being used as the explanatory variables. The dependent variables were the share returns for holding periods of 1, 3, and 5 years. Univariate and multivariate approaches were used to investigate the explanatory power of the accounting variables. The univariate analysis revealed that ratios used singly were not effective in differentiating between high and low return shares. The multivariate models explained between .08 and .3 of the variance. O'Connor concluded that "explanatory variables have some ability to explain the variation in the explained variable." (p. 348).

He also tested the predictive ability of his models and found that they performed no better than a naive investment strategy. This led O'Connor to doubt the utility of financial ratios to investors for predicting future returns. Again, the poor results may have been caused by methodological problems. His tests might have yielded more meaningful results if changes in the ratio values had been used rather than the absolute values themselves.

Gonedes' (1974) study used multiple discriminant analysis to test if financial accounting ratios could discriminate between companies with positive and negative abnormal returns. Estimated accounting ratios were used as discriminatory variables and the results showed that the multivariate model appeared to have weak discriminatory power.

Further analysis revealed that the power of the multivariate model over the univariate model in generating abnormal returns was minimal. However, Gonedes noted that his results were conditional upon the models and estimation procedures used.

In a recent US study, Easton and Harris (1991), used univariate and multivariate models and showed that the current earnings levels variable and the earnings change variable were significant in explaining share returns. They observed that for the period 1969-1986, for the pooled sample and for several individual years, the multivariate model explained significantly more of the variation in the returns, suggesting a role for both variables in share valuation. However, the overall explanatory power of the individual models was relatively low, R^2 ranged from .008 to .231 for the multivariate models.

The above studies provide very little support for the explanatory power of accounting data in relation to share returns. The studies which follow examine the association between accounting variables and relative share prices.

3.12.2 Explaining Share Prices

Attempts to construct share valuation models date back to the early part of this century. Meader (1935) formulated a regression model to explain share prices where the independent variables were stock turnover, book value per share, net working capital per share, earnings per share and dividends per share. Although the study was replicated by Meader (1940) in 1940, the results from both studies were disappointing. The models' explanatory power were weak and parameter estimates were unstable over time, the main problem being that the variables were not adjusted for the size of the company. To overcome this problem most researchers deflate the share price into a measure of relative valuation. The most commonly used measures are the price earnings ratio (P/E) or its reciprocal, the earnings yield.

Walter (1959) used linear discriminant analysis to identify which accounting measures could discriminate between high and low earnings yield companies. 2 samples were selected from the largest 500 industrial companies in the US: 50 companies with the highest earnings yields and 50 companies with the lowest earnings yields. Discriminating variables were: average dividend payout; change in the return on investment; average current ratio; change in sales; average interest cover; and the market beta.

The analysis showed that dividend payout and beta were the only significant explanatory variables. The model was applied to the original data and it correctly classified 87% of the companies into their original groups. When the model was used to classify a further 60 companies its accuracy fell to 80%. Eisenbris (1977) and Altman (1981) have questioned the suitability of multiple discriminant analysis for this type of study. Furthermore, Walter's use of 5 year averages may have diluted any differences which may have existed between the 2 groups. However, his results do suggest that dividends and systematic risk are significant factors in determining share prices. Gonedes (1974) confirmed the importance of dividends in share valuation models.

Benishay (1961) formulated a model to examine the determinants of the differences in rates of return of corporate equities. The rate of return was hypothesised to be a function of 7 variables - the earnings trend, the share price trend, the payout ratio, the expected stability of future income streams, the expected share price stability, company size, and the debt/equity ratio. Average values of the independent variables were used in the analysis. The cross sectional regression results revealed company size, share price stability, and earnings stability as the most significant variables. However, the use of averages may have diluted any possible relationship between the dependent and the independent variables. This may explain why the dividend variable was found to be an insignificant explanatory variable.

Whitbeck and Kisor (1963) used forecasted data in their valuation model. The P/E ratio was regressed on expected growth in earnings, the expected dividend payout ratio and the expected standard deviation of earnings about a trend line. The model was developed using data for 135 US companies. The model's ability to identify over and under valued shares was tested on 4 different dates. They found that shares whose actual P/E ratio was below 85 per cent of the estimated P/E ratio outperformed the market and that shares whose actual P/E ratio was greater than 115 per cent of the estimated P/E ratio underperformed the market. The extent of this abnormal performance was weak as it ranged from only 1% to 12% over the period covered. Malkiel and Craig (1970) performed further tests on the Whitbeck and Kisor model. They tested the cross sectional explanatory power of the model and found R^2s ranging between .7 and .85. But the coefficients of the model, particularly the earnings per share growth variable, were unstable over time. The temporal instability in the relationship between share prices and earnings is a major stumbling block in the construction of share valuation models (see Keenan, 1970, Lev, 1989).

Another study using forecasted data was undertaken by Ahlers (1966). The independent variables were: estimated earnings growth; dividend yield; and earnings variability. The model was derived using quarterly data for a small sample of 24 companies. Although Ahlers claimed that his model was able to outperform the market by a substantial amount, supporting evidence was not given.

Focusing on the electric utilities industry, Miller and Modigilani (1966) constructed a share valuation model for the years 1954, 1956 and 1957. They regressed market value of the companies on the latest earnings figure and average total asset growth rates. The R^2s associated with the models ranged between .56 and .77. The earnings coefficient was highly significant and reasonably stable over time.

In a UK study, Weaver and Hall (1967) developed a share valuation model which was subsequently reported to be in active use by their employers. They selected the dividend yield as the dependent variable. The independent variables were: the dividend payout ratio; forecasted short term earnings growth; the forecasted long term dividend growth; earnings variability; and the historical earnings growth rate. The model explained 58.7 per cent of the variance in the dividend yield and outperformed a simple buy and hold policy when used to make investment decisions. The dividend payout ratio was identified as the most relevant explanatory variable. However, in selecting the dividend yield as the dependent variable the analysis could have been biased in favour of the dividend payout ratio.

Martin (1971) developed a model to explain relative earnings yield using current and lagged independent variables selected on the basis of the results of a questionnaire sent to Chartered Financial Analysts. The explanatory variables included: rate of growth in earnings plus depreciation; capital expenditure to sales; a measure of sales stability; dividend payout ratio; total assets; income plus depreciation to debt; operating income to sales; and net income to book equity. The tests were carried out on 98 companies from 4 different industries. The analysis confirmed that published financial statements convey decision relevant data for equity investment decisions. Specifically, the historical earnings growth rate, the operating margin, and book return on capital were identified as significant variables.

Beaver and Morse (1978) regressed earnings price (E/P) ratios against systematic risk and 3 earnings growth measures. These explanatory variables accounted for approximately 50 per cent of the cross sectional variation in E/P ratios over the period 1956 to 1970.

With the exception of the Weaver and Hall (1967) study, the studies so far have concentrated on the P/E ratio or its reciporcal as the relative measure of market valuation. This may cause a spurious relationship between the dependent variable and the independent earnings variable. Dopuch (1971) considered this problem in his review of Martin's (1971) study and commented that

> "I am not as confident as Martin that this study demonstrates the utility of accounting information ... since his empirical model uses the accounting variable (smoothed earnings) on both sides of the regression equation, he ends up testing the relationship of accounting data to both stock prices and accounting data." (p. 38).

In response to Dopuch, Martin referred to Kuh and Meyer (1955) who claimed that the question of spurious correlation "does not arise when the hypothesis to be tested has initially been formulated in terms of ratios." (p. 407).

To test the sensitivity of the valuation model to spurious correlation Tisshaw (1982) used 2 measures of relative stock market valuation, the earnings yield and the valuation ratio. The latter was defined as follows:

$$\text{Valuation Ratio} = \frac{\text{Book Value of Equity}}{\text{Market Value of Equity}}$$

The analysis was applied to a sample of 547 UK companies for the period 1st August 1976 to 31 July 1977. 3 analytical techniques were employed - Multiple Regression Analysis (MRA); Linear Discriminant Analysis (LDA); and Automatic Interaction Detector (AID).

The analysis revealed a statistically significant relationship between accounting information and share prices which was stronger when the valuation ratio was used as the dependent variable. This result was independent of the methodology employed. The accounting numbers identified as being significant were: earnings; the dividend payout ratio; the marketability of the shares; and short term liquidity. A surprising omission was the absence of any measure of risk in any of the models.

The previous review has demonstrated that accounting information is impounded in share prices. In particular, earnings, earnings growth, dividends and a measure of risk were identified as significant explanatory variables.

3.13 PREDICTIVE ABILITY OF ACCOUNTING NUMBERS

This final section reviews research studies which examined the utility of accounting data in predicting corporate failures. Although these studies are not capital market studies, they are relevant to the present study because they provide evidence on the utility of accounting data in measuring corporate health, a factor of major importance in determining a company's value.

The objective of empirical research on corporate failure was to compare the financial ratios of failed companies with those of nonfailed companies in order to detect systematic differences which might assist in predicting failure.

The first main study to focus on the predictive abilities of accounting ratios was by Beaver (1966). He computed 30 conventional ratios for 79 failed and 79 nonfailed companies. His findings showed that the failing companies had poorer ratios than the successful companies and that the warning signs were evident 5 years prior to actual failure. On subsequent application of his model he found that it was 90 per cent accurate in classifying companies. However, this analysis was an ex-post discrimination and not a prediction of corporate failure.

Beaver (1968b) and Aharony, Jones and Swary (1980) compared the predictive power of accounting ratios with that of share prices. Both studies observed very little difference in the predictive ability of the ratios and the share prices. The evidence indicated that the market was revising downward its performance expectations for bankrupt companies 5 years before bankruptcy.

Altman (1968) used multiple discriminant analysis to distinguish between failed and nonfailed companies in the period 1946 to 1965. His final model comprised 5 ratios: working capital/total assets; retained earnings/total assets; earnings before interest and taxes/total assets; market value of equity/book value of debt; and sales/total assets. The model correctly classified 96 per cent of the sample companies into their respective groups but it proved unreliable when applied to earlier data. Also, the small sample size casts doubts on the general application of the model.

Taffler (1976) also used a multivariate approach to derive a bankruptcy prediction model for UK companies. Since the development of his original model Taffler (1983a and 1983b) has developed a second model which is reported to have undergone a considerable amount of testing and general assesment in several practical situations. The key variables identified by the model measured profitability, working capital position, financial risk and liquidity. The model was 98 per cent accurate in categorising all quoted industrial companies that failed since 1976 at least 1 year prior to failure.

In a more recent study El Hennaway and Morris (1983)(described in Taffler, 1984) tested if the predictive ability of the models could be improved by the inclusion of general economic and industry indicators in the model. A number of models were derived and they all highlighted the significance of the profitability ratio. Industry membership was also identified as a significant factor.

Watts and Zimmerman (1986) identified one major problem common to the above prediction studies, i.e., the ad hoc selection of independent variables. They commented that

> "there isn't an underlying theory of accounting ratios' magnitudes prior to bankruptcy. Hence, the selection of variables depends on the researcher's intuition and, more often than not the availability of the data." (p. 117).

Despite this problem, the previous empirical evidence suggests that, for a period of at least 5 years prior to failure, the financial ratios of failed companies are significantly different from those of nonfailed companies. This finding supports the claim that financial ratios, and profitability ratios in particular, are useful in measuring the financial health of a company.

3.14 SUMMARY

This chapter reviewed developments in capital market theory which provide the foundation for empirically based market research studies in accounting. A description of the share pricing mechanism was given and return (cash flows) and risk were identified as the fundamental determinants of a share's value. 2 models which capture these factors - market model and the capital asset pricing model were described.

The basis for the expectation of a link between share prices/returns and accounting data in an efficient capital market was explained. Studies which used the market model or CAPM to test the information content of accounting data by detecting a price and volume reaction to this data were reviewed. The review revealed that generally, the market response to this data is rapid and unbiased. Studies which investigated whether or not the market is misled by accounting policy changes were also reviewed. The evidence from these studies suggest, that although the precise extent of the markets ability to see through accounting changes is in question, it appears that the market does not passively accept published accounting data. Other studies showed that accounting numbers are highly associated with and useful in predicting a share's systematic risk.

Studies which evaluated the explanatory power of accounting data identified certain accounting variables, especially earnings and dividends, as being significant in explaining share returns/prices. Accounting ratios were also found to be useful in measuring the financial health of a company.

The studies reviewed in this Chapter focused on the utility of HCA data to the capital market. However, in high inflation periods the limitations of HCA measures (see 2.6, pp. 33-34) may diminish the utility of this information. Adjusting financial reports to take account of the affects of inflation may give a more meaningful measure of a company's performance and financial position. The extent to which this is true can be empirically assessed by examining the capital market's response to inflation accounting data. The next chapter reviews those studies which undertook this empirical investigation.

CHAPTER 4

LITERATURE REVIEW OF THE RELEVANCE OF INFLATION ACCOUNTING DATA TO THE SECURITIES MARKET

CHAPTER 4

LITERATURE REVIEW OF THE RELEVANCE OF INFLATION ACCOUNTING DATA TO THE SECURITIES MARKET

4.1 INTRODUCTION

In periods of high inflation, the utility of financial reports prepared under the HC convention is seriously impaired (see 2.6, pp. 33-34). Therefore, to improve the utility of financial reports, companies began disclosing inflation accounting data. This chapter presents the findings from empirical studies which assessed the utility of these disclosures to the securities market. (While a number of methodological issues are raised in this discussion, a general appraisal of the methodologies used is deferred to Chapter 6.) The studies reviewed are classified into the following 4 groups:

studies which tested the information content of inflation accounting data (4.2);

studies which examined the association between inflation accounting risk measures and systematic risk (4.3);

studies which evaluated the explanatory power of inflation accounting data in relation to share prices/returns (4.4); and,

studies which investigated the predictive ability of inflation accounting data (4.5).

4.2 INFORMATION CONTENT STUDIES

4.2.1 Introduction

The review in 3.9 (pp. 65-75) illustrated that accounting data possesses information content if it causes a market reaction. The latter was identified as including, a price reaction and/or an increase in the volume of trading. This approach has been used to assess the information content of inflation accounting data. Whereas the relevant studies had a shared focus, in terms of their ultimate aim, there was considerable variation in the approaches adopted, making it difficult to review this research in an aggregate manner. Therefore, an overview of some of the major studies now follows.

4.2.2 Arbel and Jaggi (1978)

In a US study, Arbel and Jaggi (1978) tested the information content of replacement cost disclosures. They formed 2 portfolios consisting of 99 reporting companies and 81 nonreporting companies. Using daily return data for a 21 day period beginning 10 trading days prior to disclosure, the cross sectional average residual for each day and the cumulative abnormal return (CAR) for each portfolio was computed. The average residuals for the reporting companies and nonreporting companies were examined and no significant difference in the residual distributions around the announcement date was found. This may be explained by some companies being unfavourably affected by the disclosures while others were favourably affected. However, their analysis revealed that the CAR for the nonreporting companies was slightly larger than the CAR for the reporting companies, but no statistical test was performed to determine the significance of the difference.

The daily residuals of each company were then compared to their standard expected residuals. Using binomial and nonparametric tests, any differences in this statistic between the reporting and non reporting companies was investigated. The evidence showed that the abnormal returns of reporting companies were not significantly different from the abnormal returns of the nonreporting companies.

To determine if there was a relationship between the magnitude of the replacement cost disclosures and investors' reactions, the reporting companies were partitioned into 5 subgroups on the basis of the difference between HC net income and replacement cost net income. The residual analyses were performed for each subgroup, but no significant differences were found. Finally, when the correlation between the cumulative return for each share and the replacement cost income adjustments was computed, the test showed an insignificant relationship.

Based on their analysis, Arbel and Jaggi concluded that replacement cost information does not induce investors to revise their expectations. They suggested that the lack of an observed reaction could be explained by the information being already impounded in share prices, the existence of a learning lag, or the unreliability of the replacement cost data.

4.2.3 Beaver, Christie and Griffin (1980)

Beaver, Christie and Griffin (BCG) (1980) who focused on 3 important announcement dates (the ASR 190 proposal date, the ASR 190 adoption date and the 10-K release date), investigated the information content of ASR 190 data. In their first test, their sample of reporting companies were partitioned into 8 equal beta portfolios. Portfolio returns were computed, and each portfolio was paired so as to maximise the difference between the HC and the replacement cost data. Using Hotellings T statistic, they found no statistical differences in the portfolio returns for the period surrounding the 3 dates nor for the cumulative period.

To test the sensitivity of the results to the matching procedure the tests were replicated using the difference between the actual replacement cost adjustments and Value Line estimates of these adjustments as the basis for pairing. Using a Hotelling T test no significant differences in returns were found. Then a t test was used to compare the returns of reporting and nonreporting companies, which revealed no significant differences in the returns.

Finally, BCG compared the price volatility of the share returns in the weeks surrounding the announcement dates with the price volatility in nonreport periods for both reporting and nonreporting companies. The analysis revealed no significant differences in the volatility ratio for either group.

When analysing their results, BCG questioned the validity of their matching procedure which they believed may have been inappropriate given the size differences between reporting and nonreporting companies (see 6.2.2, pp. 183-185 for a discussion of the size effect). They also suggested that it was impossible to determine whether the lack of significance was due to the ASR 190 disclosures or the Value Line data. Furthermore, the length of the test periods used may have prevented the detection of an impact to the replacement cost data as the 31 day period may have been too short and the 480 day period too long. In a study reviewed later, Lustgarten (1982) illustrated that a reaction to replacement cost disclosures occurred over a 10 month period.

4.2.4 Gheyara and Boatsman (1980)

Gheyara and Boatsman (1980) used a variety of methodologies to assess the information content of ASR 190 data. Using the market model the abnormal return for each day of a 50 day period (-30 to +19) surrounding the announcement date was computed for 106 reporting companies and 83 nonreporting companies. The residual was then squared and deflated by the residual's variance in the nonreport period. The resulting deflated residuals were then averaged across the 2 samples of companies. In the absence of abnormal returns, the expectation of the resulting statistic is approximately unity. Using graphic analysis, they found no evidence supporting the information content of replacement cost disclosures. In a later US study, Soroosh Joo (1982) used this approach to test the information content of CC and constant dollar data. As in the Gheyara and Boatsman study, he failed to detect a market reaction to either set of disclosures.

Gheyara and Boatman also used a matched pair design approach to test for differences in the returns of reporting and nonreporting companies which were matched on the basis of their systematic risk. The analysis was performed over periods of 5, 30, 40 and 50 days around the 10-K release date. No significant differences in returns were detected for any of the periods.

In a final test, Gheyara and Boatsman partitioned the reporting companies into high and low holding gain groups. They calculated the abnormal return associated with a trading strategy of buying the high gain companies and selling short the low gain companies for each day of the 19 day period covering the announcements. The average abnormal return was then computed and, based on a t test no evidence of a significant abnormal return was found.

The consistency of the above results, across a variety of testing procedures, suggests that replacement cost disclosures do not provide information to the securities market. However, Gheyara and Boatsman commented that their study suffered from methodological problems, in particular their use of historical costs to generate expectations and the comparison of reporting and nonreporting companies without controlling for possible size effects.

4.2.5 Grossman, Kratchman and Welker (1980)

Using weekly return data, Grossman, Kratchman and Welker (GKW) (1980) assessed the information content of replacement cost disclosures for the years 1976 and 1977. They partitioned a sample of 72 reporting companies into 2 groups, using the unexpected replacement cost income adjustment divided by sales as the partitioning variable. Companies with a large value of this variable were placed in group A, while companies with a small value were placed in group B. The cumulative average weekly abnormal returns of the two groups for a period of -13 to +26 weeks either side of the company's 10-K release date were then compared using graphic analysis. The comparision revealed no significant differences in 1976, but large differences were found in 1977. Despite the lack of explicit statistical tests, this study presented evidence which appears to support the information content of replacement cost disclosures. However, GKW suggested that their results may have been biased because of the assumptions used to partition the companies. Their results are also suspect, as the CAR experienced by group B persisted for several weeks after the disclosure date.

4.2.6 Friedman, Buchman and Melicher (1980)

A study by Friedman, Buchman and Melicher (FBM) (1980) also found evidence of a reaction to replacement cost disclosures. FBM examined the relationship between abnormal weekly returns and unexpected replacement cost earnings over the period October 1976 to July 1977. The sample of 54 companies was divided into 3 portfolios. 39 of the companies that had positive unexpected HC earnings were split into portfolios 1 and 2 using the variable:

$$\%CH = \frac{\text{Replacement cost adjustment}}{\text{HC income}}$$

Portfolio 1 contained the companies with higher than average values of %CH and portfolio 2 contained the companies with lower than average values. Portfolio 3 contained 15 companies with negative unexpected HC earnings.

An examination of the CAR indicated a market reaction to the replacement cost disclosures for the companies in portfolios 1 and 2. The analysis also revealed that portfolio 1 had significantly larger abnormal returns than portfolio 2. Given the small sample size, these finding must be considered highly tentative.

4.2.7 Ro (1980)

Ro (1980, 1981), in 2 separate studies, investigated the information content of replacement cost data and the effect of compliance costs on the securities market. In his first study, he used a matched pair design approach to test for the effect of compliance costs on share returns. A sample of 83 reporting companies was matched with 83 nonreporting companies on the basis of: their market beta; the sign of their HC earnings per share change between 1975 and 1976; the week of release of their 10-K reports; and industry membership.

Ro identified 8 events (see Appendix 4.A) which served as signals for revaluing the companies affected by ASR 190. The effect of compliance costs was investigated by comparing the returns of the reporting and nonreporting companies at each event date. Using a t test, Ro found no evidence that ASR 190 imposed significant compliance costs on the companies.

To test for the information content of the replacement cost data, Ro classified 78 of his paired companies into 2 subgroups using the sign of their unexpected replacement cost earnings per share (EPSrc) variable. He derived the average return difference between the good news (+EPSrc) and bad news (-EPSrc) pairs for the 26 weeks surrounding the ASR 190 events. Using a t test, he found a statistically significant difference in returns at the 10 per cent level. However, Ro was unable to determine if this return difference was due to unexpected RC data or unexpected HC data. To explore this issue he repeated his test using a 52 week and a 10 week test period. The results for both these tests showed an insignificant t value at the 10 per cent level.

4.2.8 Ro (1981)

In his second study, Ro (1981) investigated whether weekly trading volume changed as a result of the release of replacement cost data. To identify a trading reaction reporting companies were matched with nonreporting companies using the same criteria as in Ro's 1980 study and the additional criterion of a share's volume beta. This yielded 73 pairs of companies.

The reporting and nonreporting companies were also separated into 2 subgroups (High and Low) using the following classification variables: volume beta, price beta, and 5 ratios based on historical and replacement cost data. Ro identified 9 events (see Appendix 4.A) associated with the implementation of the disclosure of replacement cost data and each event week was selected as a test period. Using a paired t test, Ro compared the cross sectional average weekly transaction volume of the nonreporting companies with those of reporting companies. The tests were performed on the 73 pairs of firms and repeated for each of the subgroups.

A significant reaction was observed for the week in which ASR 203 was announced which Ro argued should be ignored as it was in the wrong direction. He found that the transaction volume was higher for the nonreporting companies than for the reporting companies. However, this may have been caused by investors in nonreporting companies altering the balance of their portfolios between nonreporting companies and reporting companies in the light of the protection offered by ASR 190.

A significant reaction was also observed in the week in which ASR 190 was adopted and Staff Accounting Bulletin (SAB) No. 7 was released. This time the reaction was in the hypothesised direction. However, Ro concluded that this result alone was not sufficient proof that replacement cost disclosures led to a change in the volume of trading. Commenting on Ro's study, Freeman (1981) questioned Ro's use of the matched pair design because of size differences between the nonreporting and reporting companies (see 6.2.2, pp. 183-185).

4.2.9 Noreen and Sepe (1981)

Noreen and Sepe (1981) used a price reversal method to identify a share price reaction to FASB deliberations on inflation accounting. This approach avoided many of the limitations associated with previous studies. The analysis concentrated on 3 specific events associated with the FASB deliberations: the report in January

1974, stating that compulsory inflation accounting disclosures had been placed on the FASB agenda; the report in November 1975, stating that the FASB had decided not to issue a statement in 1975; and the report in January 1979, stating that the FASB had once again proposed that inflation accounting disclosures be required. Noreen and Sepe's approach was based on the proposition that companies favourably (unfavourably) affected by the initial proposal to disclose inflation accounting data would be favourably (unfavourably) affected by events that increased the probability of that disclosure and would be unfavourably (favourably) affected by events that decreased the probability.

To test their hypothesis, they identified the events in January 1974 and January 1979 as increasing the probability of requiring inflation accounting data and the event in November 1975 as decreasing that probability. They hypothesised that the correlation between the abnormal returns for the events in January 1974 and January 1979 should be positive and the correlation between the event in November 1975 and each of the other two events should be negative. The analysis was performed on a sample of 578 US companies. The results showed a negative correlation between the event in November 1975 and each of the events in January 1974 and 1979, and a positive correlation between the events in January 1974 and January 1979.

To further their investigations, Noreen and Sepe selected a subsample of 100 companies which were best capable of showing the impact of the FASB deliberations. The analysis revealed that the impact of the FASB deliberations was greater for these companies.

To detect the cause of the market's reaction to the FASB deliberations, Noreen and Sepe re-ran their test using a sample of exempt companies. They found weaker evidence of a market reaction by the exempt firms to the deliberations. However, due to the inherent differences between the affected and exempt subsamples, they noted that it would be premature to draw conclusions regarding the cause of the market reaction.

Using a research design complemetary to Noreen and Sepe's approach, Basu (1981) found evidence supporting Noreen and Sepe's results.

4.2.10 Board and Walker (1984)

Tests to detect a market reaction to the disclosure of inflation accounting data have not been confined to the US securities market. In a UK study, Board and Walker (1984) assessed the information content of SSAP 16 earnings changes. Following Ball and Brown (1968), they investigated if companies whose CC reports contained "good news" experienced a superior stock market performance. Initially, the study covered a sample of 52 companies whose accounting year ended on 31st December. The companies were classified using the sign of the change in their earnings per share figures between 1980 and 1981. The classification was performed using HC earnings and CC earnings. The market model was used to construct two measures of abnormal return for each company. Measure 1 covered the period January 1981 to December 1981 and measure 2, May 1981 to April 1982. However, both measures yielded identical results.

The analysis began by examining the association between HC earnings and abnormal returns. In the case of HC earnings the hypothesised result was observed for 32 of the companies, i.e., favourable earnings changes were allied with high share returns or unfavourable earnings changes were allied with low share returns. This result was significant at the 90 percent level. The results for SSAP 16 earnings were slightly less impressive. Only 30 companies had the expected result and this was not significant at the 90 percent level.

The incremental information content of HC earnings and CC earnings was investigated. Using simple regression, the extra information e_i which is provided by changes in CC earnings was isolated by eliminating the part of the change association with HC earnings. The part of the stock market return that is not associated with changes in HC earnings u_i was also derived. Then the association between e_i and u_i was examined. The results showed no evidence that CC earnings had incremental information content over HC earnings. When the procedure was reversed to assess the incremental information content of HC earnings over CC earnings, again, no incremental information content was found. This finding is consistent with a high correlation between CC earnings changes and HC earnings changes, this was confirmed by a correlation coefficient of .89 between both variables.

To test the sensitivity of their results to the sample size, the tests were repeated on a sample of 164 companies. This time the results showed a significant association between HC earnings changes and returns and CC earnings changes and returns. Again, there was no evidence of HC earnings having incremental information content over CC earnings or of the reverse situation.

4.2.11 Appleyard and Strong (1980)

Using the same general approach as BCG (1980), Appleyard and Strong (1984) examined the market's reaction to SSAP 16 disclosures. Their selected sample consisted of 52 UK companies reporting CCA information for the first time and with accounting years ending on or around 31 December 1980. The study concentrated on the depreciation adjustment and the working capital adjustment. Both variables were scaled by total shareholders' interest. They used 2 approaches to measure the unexpected information content of the CCA disclosures. Firstly, it was assumed that the entire CCA adjustments were unexpected and secondly, unexpected CCA adjustments were taken as the difference between the actual CC numbers and estimates of these numbers. Using each unexpected measure, the sample of companies was partitioned as follows:

TABLE 4.1

APPLEYARD AND STRONG'S COMPANY CLASSIFICATION

GROUP	DEPRECIATION ADJUSTMENT	WORKING CAPITAL ADJUSTMENT
1	High	High
2	High	Low
3	Low	Low
4	Low	High

The companies in each group were partitioned into equal beta portfolios and portfolio returns were computed. The portfolio return of companies in group 1 were compared with the portfolio return of companies in group 3, and the portfolio return of group 2 companies with that of group 4 companies. Using Hotelling's T test, they found no statistical differences in returns for any of the partitioning schemes, a result similar to the BCG study.

However, as in the BCG study, the failure to detect a price reaction may be attributed to the partitioning scheme adopted, the small sample size, the information being already impounded in the share price, a learning lag, and/or investors' lack of confidence in the CCA disclosures. This latter point may be particularly significant in this study as all companies were disclosing the CCA information for the first time.

4.2.12 Brayshaw and Miro (1985)

Employing a matched pair design, Brayshaw and Miro (1985) examined if the CC adjustments made in response to the Hyde Guidelines (ASC, 1977) had an impact on share prices. A sample of 112 UK industrial and commerical reporting companies was matched with 112 nonreporting companies.

The reporting companies were partitoned into 2 subgroups - those with CC earnings higher than the estimated industry average and those with CC earnings below the estimated industry average. This resulted in 35 reporting companies in the former group and 75 reporting companies in the latter. Nonreporting companies were then partitioned into 2 similar subgroups by matching them with their respective reporting company.

Using the market model, CAR was derived for 3 periods of 11, 21, and 30 weeks centering on the annual report release date. For the 3 periods the results revealed no significant difference in the cumulative returns of the reporting and nonreporting companies for either subgroup. As this result may have been caused by the disclosure of other relevant items during the test period, Brayshaw and Miro compared the return of reporting companies which reported above average CC earnings with the returns of companies which reported below average CC earnings after controlling for the effects of other influences. This was accomplished by computing the difference in mean returns between the former group and their matched companies and the latter group and their respective matched companies and then comparing the cumulative return differences of both groups. Again, the tests failed to show a significant difference in returns.

4.2.13 Matolcsy (1984)

In an Australian study, Matolcsy (1984) examined the joint and incremental information content of inflation accounting and HCA numbers. Tests were performed on a sample of 197 companies for the total period of 1970-1978, and 2 subperiods of 1970-1974 and 1975-1978. His analysis showed that the joint information content of HC and inflation accounting income numbers was significant at the 1 percent level. However, the incremental information content of the inflation accounting income numbers was zero. These results were evident for the total period and each of the subperiods.

4.2.14 Summary

So far the studies described in this chapter have concentrated on identifying a price reaction or an increase in the volume of trading as evidence of the information content of inflation accounting data. A variety of testing procedures were used and many of the studies assessed the sensitivity of their results to the length of the test period. The analysis was also performed in different capital markets. Despite this, the majority of these studies found no statistically significant market reaction specific to the disclosure of inflation accounting data. This result is consistent with a number of possible explanations which are set out below.

The market lacked the expertise and experience to respond to the inflation accounting information.

The research designs were inadequate. Chapter 6 critically assesses the appropriateness of the procedures used in the previous information content studies. However, at this point, it can be stated that the results were consistent across a wide range of alternative research designs and markets.

Inflation accounting information is not relevant to the market's needs, as it is a poorer measure of economic reality than HCA data. This suggests that the advocates of inflation accounting were wrong.

The market did not accept the inflation accounting information because it believed that the information was not reliably prepared. (Studies reviewed in Chapter 5 examine the reliability of the inflation accounting disclosures).

The market has already discounted the effects of inflation accounting information prior to its disclosure in financial reports.

The purpose of the next 2 sections is to examine evidence from studies which are helpful in deciding to what extent the last explanation holds. The review begins by focusing on those studies which investigated the association between inflation accounting risk measures and systematic risk.

4.3 INFLATION ACCOUNTING DATA AND ITS ASSOCIATION WITH SYSTEMATIC RISK

4.3.1 Introduction

As discussed earlier in 3.11 (pp. 78-82), studies by Ball and Brown (1969), Beaver Kettler and Scholes (1970), Gonedes (1973), Beaver and Manegold (1975) showed that HCA risk measures were associated with the market risk measure (beta). This led researchers to consider testing the association between inflation accounting risk measures and the market beta.

4.3.2 Short (1978)

In an early study, Short (1978) investigated if accounting risk ratios derived using general price level adjusted HC (GPLAHC) data explained a greater proportion of the variation in market risk than their HC counterparts. His analysis was applied to a sample of 259 US companies for the year 1972. In this study, it was necessary to estimate the price level adjusted data due to its absence in financial reports. Using a cross sectional regression model to explain the market beta, Short found that the model with the greatest explanatory power included the GPLAHC ratios. However, no statistical tests were performed to determine the significance of the difference in the explanatory power of the HC and GPLAHC models.

4.3.3 Baran, Lakonishok and Ofer (1980)

Using cross sectional correlation analysis Baran, Lakonishok and Ofer (BLO)(1980) explored the extent to which general price level accounting betas contained information not provided by HCA betas. Again, it was necessary to estimate the price level adjusted data. The tests were performed on a sample of 242 US companies. Using time series regression analysis the different accounting betas and the market beta were estimated. To reduce the possibility of measurement errors in estimating the betas, Bayesian adjustment procedures at the portfolio level (1, 5, and 10 securities) were employed. The analysis was carried out for the total period of 1957-1974 and 2 subperiods of 1957-1965 and 1966-1974.

Inflation was relatively low in the first subperiod, while, in the second, it was high. For the total period, the analysis revealed a higher association between the market beta and the price level accounting betas than between the market beta and the HCA beta. This was true for the 2 beta specifications (Bayesian and non-Bayesian) and the 3 portfolio sizes. Similar results were found for the second subperiod. However, in the first subperiod, the HCA beta showed the highest association with the market beta. This may be explained by the poorer price level estimation procedures in this period as fewer observations were available to derive the estimates, or, by the relatively low rate of inflation.

Studies by Yohe and Karnosky (1969), and Gibson (1972) showed investors' awareness of the effects of inflation increased during the 1960s.

4.3.4 Cooper (1980)

Cooper (1980) examined the relationship between market beta and unrealised holding gains. This study was based on the premise that financial leverage is an economic determinant of systematic risk, and that unrealised holding gains reduce financial leverage by increasing a company's equity base. Coopers's analysis revealed a significant negative relationship between systematic risk and unrealised holding gains. Cooper believed this implied that financial leverage measures derived using a replacement cost model would correlate more closely with the market beta than their HC determined counterparts.

4.3.5 Nunthirapakorn and Millar (1987)

A more recent study by Nunthirapakorn and Millar (1987) again examined the association between accounting betas and the market beta. The accounting betas were determined using the following measures of income: historical cost/nominal dollar (HC), historical cost/constant dollar (HC/CD), current cost/nominal dollar (CC), and current cost/constant dollar (CC/CD). To derive the accounting betas, estimated data was used for the period up to 1978 and actual data for the period 1979 to 1981. It was decided to include only companies for which this estimation procedure appeared reasonable, which resulted in the sample of companies being reduced from 235 to 74. Using the Spearman's rank coefficient of correlation, the researchers found at the individual security level, and the 5 and 10 portfolio level there was a statistically significant association between the accounting betas and the market beta.

Applying the Friedman test, it was then shown that the ability of historical cost/ nominal dollar income to explain systematic risk was equal to or greater than the alternative accounting beta measures. This conflicts with the results from the earlier studies, but the divergence may be explained by the small sample of 74 companies spread across 46 industries. Perhaps statistically significant results would have been found if the analysis had been applied to companies from a single industry (see Lobo and Song, 1989 and Hopwood and Schaefer, 1989). In the studies by Short (1978) and BLO (1980) the sample sizes were over 200. Furthermore, the estimation procedures used in the Nunthirapakorn and Millar study appear to be unreliable, as the number of companies for which they were reasonable was quite low.

4.3.6 Summary

The previous studies show that there is evidence supporting a relationship between inflation accounting risk measures and the market measure of risk. However, whether this relationship is stronger than for HCA risk measures is still unclear. More research is needed to determine the relative explanatory power of inflation accounting risk measures and HCA risk measures in relation to the market beta.

4.4 INFLATION ACCOUNTING DATA AND SHARE PRICES/RETURNS

4.4.1 Introduction

The objective of the studies reviewed in this section is to provide evidence of the ability of inflation accounting data to explain share returns/prices, and to examine the incremental explanatory power (IEP) of this data.

4.4.2 Easman, Falkenstein and Weil (1979)

Easman, Falkenstein and Weil (EFW) (1979) examined the correlation between generally accepted accounting principles (GAAP) income, sustainable income and economic income, and share returns. Sustainable income was measured as revenues less the CC of goods sold, less CC depreciation, less all other expenses conventionially measured. Economic income was equal to conventional GAAP income plus unrealised holding gains on inventory and plant. A sample of 80 US companies was selected and the annual change in the income variables was measured for the period 1972-1977. EFW found that the correlation between GAAP income changes and share returns was 0.12, compared to 0.19 for sustainable income. The difference in correlation was significant at the 12 per cent level. When they extended their sample to 125 companies, they still found that sustainable income yielded the best correlation with share returns. The correlation between economic income and share returns was not reported, possibly because the relationship was negative for the majority of companies.

4.4.3 Beaver, Griffin and Landsman (1982)

Beaver, Griffin and Landsman (BGL) (1982) used cross sectional regression analysis to investigate the explanatory power and the IEP of replacement cost earnings variables. The analysis was applied to 313 US companies whose accounting year ended on 31st December. Returns for the calender years 1977 and 1978 were derived and their association with: percentage changes in historical cost earnings (HC); percentage changes in pre holding gain net income (PRE); percentage changes in cash flow (CF); and post holding gain net income (POST) was determined. The results revealed that HC earnings had the highest correlation with returns for both 1977 and 1978.

Two stage regression analysis was used to test the IEP of the various earnings variables. This involved taking one of the inflation accounting earnings variables and regressing it on HC earnings to obtain a residual *Z*. Then the security return was regressed on HC and *Z*. The IEP of the inflation accounting earnings variable was determined by testing the significance of *Z*'s regression coefficient. The approach was adopted to test the IEP of each inflation accounting earnings variable and the HC earnings variable. The analysis showed that HC earnings had additional explanatory power over all other earnings measures, but the reverse did not hold in any of the cases.

To test the sensitivity of their results to the holding period, BGL repeated their tests using 6 different 1 year holding periods. For all periods HC earnings had the highest correlation with returns. They also found that altering the dependent variable to the abnormal returns for each of the 6 holding periods did not revise their earlier results. Furthermore, when the two stage regression was applied to data pooled for 1977 and 1978 the initial results were confirmed.

Commenting on the difference in their results from the results of the EFW (1979) study, BGL suggested that the difference could be attributed to the following factors.

They used a cross sectional regression approach while EFW used a time series approach.

Their inflation measures were based on ASR 190 replacement cost data, while EFW used estimates.

The years studied were different.

Different companies were included in the 2 samples.

The definition of the variables and the rules for deletion of observations were also different for the 2 studies.

To try and explain the different results BGL applied their research design to the EFW data and applied the EFW approach to their data. This led them to conclude that the different findings was probably due to their use of a cross sectional approach as opposed to a time series approach.

4.4.4 Lustgarten (1982)

Lustgarten (1982) used multiple regression to test the relation between CARs and unexpected RC and unexpected HC earnings. The study was based on a sample of 581 US companies. The CARs were derived from the CAPM using monthly data. To ensure that his results were not affected by the choice of deflator, his regression model was computed using 5 different deflators.

Initially, the regression equations were derived using only the deflated HC earnings variable. In this case each deflated model yielded a statistically significant relationship between HC earnings and the CAR. However, the overall explanatory power of the models was very low, the highest R^2 value was .042 when assets were used as the deflator.

The replacement cost variable (depreciation adjustment) and the sales variable were then added to the regression equation. The results showed that the significance of the replacement cost variable was affected by the choice of deflator. The variable was significant at the 1 per cent level in 3 of the 5 models. In a later study, Christie (1987) shows that Lustgarten should have used the market value of the company as the deflator.

To address the problem of heteroscedasticity, weighted least squares were used to estimate the regression functions. This time, the replacement cost variable was significant in 4 of the 5 models, being insignificant when the market value of the company was used as the deflator.

Lustgarten believed that the difference between his results and those of Gheyara and Boatsman (1980), BCG (1980), and Ro (1980) could be attributed to his research methodology. He claimed that the power of the abnormal performance index to detect small price effects is limited. This factor was considered in a study by Brown and Warner (1980) who reported in their simulations of a 5% (1%) share price reaction to an informational signal, that the very best of the tests captured the effect only 28% (9%) of the time.

To help identify the reasons for the difference in his results from those of the earlier studies, Lustgarten decided to replicate the analysis using a technique which closely resembled the research design of the earlier studies. Using dichotomous partitioning, the sample of companies was partitioned into 4 portfolios and the average abnormal return for each portfolio was computed. However, unlike the results from the earlier studies, both parametric and nonparametric tests indicated significant differences in the abnormal returns of each of the portfolios at the 1 per cent level. Lustgarten attributed this inconsistent finding to his partitioning of the companies into 4 portfolios as opposed to the usual 2 used in the earlier studies. He also observed some evidence of a threshold effect below which no reaction took place and argued that this effect may obscure the impact of CCA information when 2 portfolios are used.

An examination of the timing of the market's reaction to replacement cost disclosures showed that its effects were observed 8 or 9 months before the data was filed. He offered 2 explanations for this early response. First, the publicity surrounding the announcement of ASR 190 stimulated the production of similar information from other sources. Second, the replacement cost variable used was a proxy for some determinant of share price response that had been omitted from the study.

Lustgarten noted further limitations of his study. His choice of the RC variable was only decided after 2 alternative measures had failed to yield significant results. The R^2 statistics derived from fitting his regression equation were all less than 0.1, implying that many significant determinants of abnormal return had been omitted, perhaps causing biased regression coefficients. Furthermore, Lustgarten offered no explanation for the inclusion of the sales variable in his regression equation.

4.4.5 Beaver and Landsman (1983)

In 1983, Beaver and Landsman (BL) applied the approach they adopted in the BGL (1982) study to SFAS 33 disclosures. A sample of 731 US companies whose accounting year ended on 31st December was selected for analysis. The tests were performed for each of the years 1979 to 1981. They found that the SFAS 33 disclosures did not provide significant information over and above that provided by the HC data. In addition to the tests undertaken in the BGL study they applied a multivariate approach to determine which variables were significant in explaining differences in share returns. The independent variable set included 6 earnings percentage change variables determined using HC and inflation accounting data.

It was the residual form of these variables which was used in the multivariate analysis. An examination of the R^2 associated with each of the multivariate equations showed that there was a significant increase in the R^2 value when the SFAS 33 variables were included in the regression equation for 2 of the 3 years. However, BL rejected this finding as evidence of the SFAS 33 variables having significant explanatory power. They argued that the F ratio was likely to be biased due to the possible existence of positive cross sectional dependence in the residuals. In addition, they observed that the signs and magnitudes of the t values of the individual variables provided mixed results.

Beaver and Landsman extended their research design to examine the ability of various earnings measures to explain differences in companies' market values. The following 7 earnings variables were selected as the independent variables:

historical cost earnings (HCE);

income from continuing operations under current cost (PRE);

income from continuing operations under current cost plus purchasing power gains (PREP);

income from continuing operations under current cost plus gross holding gains (POST);

income from continuing operations under current cost plus purchasing power gains plus net holding gains (POSTP);

income from continuing operations plus constant dollar (CD); and,

income from continuing operations under constant dollar plus purchasing power gains (CDP).

The market value of common equity was the dependent variable. All variables were deflated by the sales figure to adjust for differences in companies' sizes. They derived 4 cross sectional regressions models for each earnings variable for each year. The significance of the earnings variable was determined by examining the R^2 associated with each regression equation. In all years, the models including the HC earnings variable had the greatest explanatory power.

Beaver and Landsman then used the two staged regression analysis approach to determine the IEP of the earnings variables. The results revealed that 5 of the 6 SFAS 33 variables failed to yield regression coefficients of a consistent sign across years or of a "correct" (predicted) sign. The exception was the CD variable which had a small amount of additional explanatory power. Beaver and Landsman were hesitant to accept the superior performance of the CD variable. Instead, they argued that its performance could be due to chance and was unlikely to be sustained in subsequent years. To provide evidence on this issue, they derived a multivariate regression model which incorporated all variables from the two stage approach. The resulting regression equation for each year showed that none of the coefficients of the SFAS 33 variables were consistent across the years and their signs were frequently incorrect. An examination of the R^2 associated with each regression equation showed that the inclusion of the SFAS 33 variables led to an increase in R^2. Despite this evidence, Beaver and Landsman concluded that none of the SFAS 33 variables possessed IEP, as the increase in R^2 was only accomplished by placing negative coefficients on many of the SFAS 33 variables.

To complete the analysis, they repeated the procedures and tested the IEP of the HC earnings variable. In all years, the evidence confirmed the IEP of the HC variable.

Beaver and Landsman's findings were upheld when several extensions were applied to the initial valuation tests. These extensions included examining the sensitivity of their results to the choice of deflator, increased sample sizes and the deletion of utility companies. However, when interpreting their results, BL suggested that the possible existence of measurement errors in the SFAS 33 data results in this data being "garbled", leaving it difficult to interpret.

4.4.6 Schaefer (1984)

Schaefer (1984) investigated whether CC income from continuing operations (CCIFCO) provided information content beyond contemporaneous dividends and historical income. The tests were performed separately for the 2 years 1980 and 1981, with 121 companies being studied in the first year and 262 in the second year. For the purposes of the study, Schaefer derived unexpected measures of historical income, dividends, CCIFCO and returns.

His analysis revealed that, once the information provided by unexpected dividends and historical income was taken into account, the information content of unexpected CCIFCO tended to disappear. For the first year, neither unexpected dividends nor unexpected CCIFCO demonstrated information content beyond one another, although individually both variables demonstrated significant explanatory power. The second year results showed both unexpected CCIFCO and unexpected dividends to have incremental information effects beyond one another. However, for both years, unexpected CCIFCO did not provide incremental effects beyond historical income.

In analysing his results, Schaefer questioned the validity of the assumptions made in defining the variables and the grouping techniques. He noted also that the problem of cross sectional dependencies may not have been adquately dealt with, and its continued existence could have distorted the results.

4.4.7 Page (1984a)

In a UK study, Michael Page (1984a) explored the explanatory power of CCA information using a sample of 25 companies in the Brewery sector, 33 Mechnical Engineering companies and 41 Electrical companies. Data was extracted using the most recent financial reports for the period prior to the 30 April 1983. Initially, regression models were derived with HC earnings or CC earnings as the independent variable and share prices as the dependent variable. These models revealed that the explanatory power of CC earnings and HC earnings was similar.

The analysis was then repeated, this time the variables being deflated by shareholders' equity per share, dividends per share, or turnover per share. Overall, the results indicated that CC earnings performed as well as HC earnings in explaining the share prices of Breweries and Electrical companies and that neither of the earnings variables was significant in explaining the share prices of Mechanical Engineering companies. The analysis also revealed that the relative importance of the 2 earnings measures varied with the deflator used.

Page then used the two stage regression approach to investigate the IEP power of CC and HC earnings for Breweries and Electrical companies. For Breweries, the results showed that CC earnings had IEP in the unscaled and in 2 of the 3 scaled models. HC earnings had IEP in the unscaled model and in 1 of the scaled models. For Electricals, the significance of CC earnings was greater than HC earnings in all 4 models. However, the t statistic exceeded 2 only once, when dividends were used as the deflator.

Page's findings on the IEP of the variables is inconsistent with the findings from the studies by BGL (1982) and BL (1983) who also applied the two stage approach. This difference may be attributed to, first, the use of different companies and different markets in the studies, or, second, Page's use of regression equations for each industry, in contrast to the cross sectional regression models used in the BGL and BL studies. The importance of this latter point is illustrated in Page's study as CC earnings appeared to be significant for 2 out of the 3 industries studied (also, see Lobo and Song, 1989; and Hopwood and Schaefer, 1989).

In his final test, Page used stepwise regression to investigate the explanatory power of the individual CCA adjustments. The cost of sales adjustment was shown to be the most significant variable, followed by the depreciation adjustment and the monetary working capital adjustment, while the gearing adjustment provided little explanatory power.

Page extended his analysis to 49 companies classified as Stores in the Times 1000. Using 1981 and 1982 data, he found HC earnings had greater explanatory power in 1981 while CC earnings had greater explanatory power in 1982. He also repeated his test for the Mechanical Engineering, Electrical and Brewery companies using 1981 data and share prices at 30 April 1982. The results of these extensions confirmed the previous analysis, but the explanatory power of CC earnings was shown to be greater for Breweries in 1982 than in 1981. The improvement in the explanatory power of CC earnings in 1982 for Stores and Breweries may indicate that investors' confidence in this information increased, or may be taken as evidence of a learning effect.

4.4.8 Peasnell, Skerratt and Ward (1987)

Peasnell, Skerratt and Ward (PSW) (1987) extended the study of Skerratt and Thompson (1984) which had uncovered small but significant associations between share returns and CC disclosures. In the 1984 study, the analysis had been carried out on a sample of 17 UK companies using data for the years 1981 and 1982. In the PSW study, the sample was increased to cover approximately 200 companies between 1980 and 1984.

The model regressed share returns on the HC earnings forecast error per share, CC earnings per share and the return on a market index. The CC variable was expressed as the proportionate change in CC earnings per share over the previous year. The model was estimated for holding intervals of 1, 5, 10, 15, 25, and 35 days up to the announcement date. The tests confirmed the results of the earlier study - a share price effect for both HC and CC information. However, the significance of the CC variable was less than the HC variable.

The tests were then repeated using the annual change in the CC rate of return on capital as the CC variable. The results were similar to those based on the earnings per share measurements. In addition, the robustness of the results was tested to variations in the deflator employed and to adjusting the model to take account of cross company variations. In all cases, the general findings remained the same.

PSW then regressed the share returns on the return on the market index, the HC forecast error and their estimates of the CC adjustments. The results showed that the impact of the CC disclosures was greatly reduced, with the CC coefficients being statistically significant over the 5 and 10 day holding periods only. When CC capital employed and sales were used as deflators, the CC effect completely disappeared. However, when the model was run having weighted the market index by the companies' beta (to account for cross company variations), the CC effect was significant over 1, 5 and 10 day holding periods. This was the case even when alternative deflators were used.

To compare the results of this study with earlier studies, PSW employed an experimental design similar to the approach taken in the earlier studies. The results showed when there was good news on the basis of HC information, the market appeared to distinguish further between shares on the basis of the CC information. However, if there was HC bad news no further discrimination occurred. This result is consistent with a risk averse market in which current costs act as a marginal correction to the primary HC signal.

PSW's final test study investigated the potential of CC earnings to drive share prices over a longer period. This issue had been considered by BGL (1982), but, unlike BGL who used a 1 year holding period to determine share returns, PSW used a 2 year holding period. As in the BGL study, the results showed that the proportionate change in HC earnings per share was the only significant influence on long run share returns. Both the proportionate change in CC earnings per share and the market variable were insignificant as evidenced by their related t values. However, the lack of significance of the market factor in the model casts doubts on the appropriateness of the regression model.

To test the sensitivity of the results to a 2 year holding period, PSW replicated the test using a 1 year holding period. Again, the results showed that the CC variable did not increase the explanatory power of the regression equation and, in this instance, the market factor was significant.

In concluding their study PSW listed the limitations set out below.

They did not consider the extent to which their results were driven by outliers. They hoped their use of different deflators in the regression models and the employment of the abnormal performance index would reduce the impact of extreme observations.

They had no strong theoretical justification for the form of the model adopted. This may have resulted in a loss of statistical power due to model misspecification.

Their model did not take account of any industry effect. This omission could be significant as Page's (1984a) study suggested that the responsiveness of share prices to CC disclosures varies between industries.

Their method of estimating the CC profit may be inappropriate.

Despite these limitations, PSW provide evidence that the market does react to CC disclosures, even though the information is viewed as being supplementary to HC disclosures.

4.4.9 Bublitz, Frecka and McKeown (1985)

Bublitz, Frecka and McKeown (1985) tried to resolve the conflict between the findings of the earlier studies by BGL (1982) and BL (1983) and those of Lustgarten (1982). Their objective was to reexamine the issue of whether ASR 190 and SFAS 33 income variables add explanatory power to models containing HC variables. They derived cross sectional regression models for each of the years 1978 through to 1983, using samples of manufacturing companies. They measured the IEP of the inflation accounting variables by focusing on whether the addition of these variables to a regression equation including HC variables leads to a significant increase in the adjusted R^2.

Their results showed that the ASR 190 variables possessed little incremental explanatory power beyond that provided by HC income measures. This is consistent with the results of BGL (1982). In contrast, they found that the SFAS 33 data possessed IEP and this remained unchanged when industry indicator variables were added to the regressions. However, when separate industry regressions were run, the results were not very convincing. This could have been caused by the smaller sample sizes reducing the power of the industry tests. The results were also tested for their sensitivity to different variable deflators, extreme observations and alternative market return metrics. In most cases these factors did not cause a revision of earlier results. However, when they replicated a portion of the BL (1983) study on their sample, they found that their results were virtually equivalent to the findings of BL. Thus, they believed that the difference in their findings was due to their use of additional variables and performing the tests for 2 additional years. The difference may also be explained by their use of the adjusted R^2s to investigate the IEP of inflation accounting variables, instead of examining the significance of the regression coefficients as in earlier studies.

The analysis also revealed that several SFAS 33 variables had stable correlations with the dependent variables. In particular, the evidence relating to the realised holding gains variables was very encouraging. The good performance of these variables can possibly be attributed to the low correlation between them and the HC variable. The poor results associated with the other regression coefficients may have been caused by multicollinearity.

4.4.10 Murdoch (1986)

Another study, prompted by the Beaver and Landsman (1983) study was undertaken by Murdoch (1986). When reviewing the Beaver and Landsman (1983) study, he observed that their data suggested that SFAS 33 return on equity variables possessed greater IEP than most of their earnings change variables. This led Murdock to examine the explanatory power of SFAS 33 returns on equity, relative to the explanatory power of historical returns on equity.

The analysis was undertaken for the years 1980, 1981 and 1982. Companies were matched using beta to control for cross sectional correlation of the dependent and independent variables. The final number of pairs in each year were 161 for 1980, 168 for 1981, 167 for 1982 and 159 for the three year mean. For each pair of companies, in each year, the difference in share returns and the 5 accounting returns were calculated.

First, simple regressions were used to regress the difference in share returns on the differences in each accounting return. The analysis showed a stronger correlation between HC returns and share returns than any other accounting return measure. However, the difference in the explanatory power of the HC return model and the CC return model was significant in only 1 of the years.

To test whether SFAS returns data possessed IEP, differences in share returns were regressed on differences in the HC return and each SFAS 33 return variable. The r^2 of the simple regression models were compared to the adjusted R^2 of the multiple regression models. The results showed that difference in purchasing power returns was the only variable which possessed explanatory power beyond the HC returns variable. Tests for the IEP of constant dollar returns were inconclusive, but there was no evidence that CC or net holding returns possessed IEP. This conflicts with the results of the Bublitz, Frecka and McKeown (1985) study which used a similar approach to assess the IEP of inflation accounting data. The difference may be due to Murdoch focusing on differences in returns of matched companies.

When the IEP of HC returns was tested, the results showed that HC returns possessed explanatory power beyond that provided by constant dollar, purchasing power, and net holding returns. However, HC returns failed to demonstrate IEP relative to CC returns.

4.4.11 Darnell and Skerratt (1989)

Darnell and Skerratt (1989) used a valuation approach to assess the importance of CCA information in determining relative share values. They used the same data as the PSW (1987) study. A simple share valuation model was derived using data over the years 1980-1983. The form of the model used was as follows:

$$P_{jt} = a + bHCA_{jt} + cADJ_{jt} + e_{jt}$$

where

P_{jt} = closing price of share j on the announcement day of the annual earnings of year t;

HCA_{jt} = the annual historical cost earnings per share for year t;

CCA_{jt} = the annual current cost earnings per share for year t;

ADJ_{jt} = HCA_{jt} - CCA_{jt}; and

e_{jt} = error term.

The results from the simple pricing model showed that both variables were significant at the 5% level of significance. This result was confirmed when the White (1980) correction to the OLS standard errors was made to adjust for heteroscedasticity.

4.4.12 Lobo and Song (1989)

Many of the previous studies (e.g., Murdoch, 1986) failed to identify the actual disclosure date of the inflation accounting information. This failure was citied as an explanation for the apparent irrelevance of this information in determining share prices. Aware of this situation, Lobo and Song (1989) identified the dates on which both HC income and inflation acccounting income was released to the securities market. They investigated the IEP of alternative measures of constant dollar and CC operating income over HC income. The empirical findings showed that the inflation income measures had IEP over HC income. The analysis also showed significant differences across industries in the relationship between unexpected returns and unexpected inflation accounting income, as for some industries the regression coefficients for the inflation variables were negative. They attributed this to companies' abilities to respond to price level changes. This issue is considered in greater detail in the review of the next study.

4.4.13 Hopwood and Schaefer (1989)

Hopwood and Schaefer (1989) considered the extent to which a reaction to inflation accounting information is company specific. The analysis is based on Revsine's reasoning (1973, pp. 108-116), which states that, if companies can pass on price increases, then the disclosure of CCA information may be viewed positively, as it indicates future cash flows increases while, if companies cannot pass on price increases, the information may be viewed negatively, as it indicates future cash flows decreases, while for some companies, future cash flows will remain the same. Thus, they hypothesised a positive association between CC adjustments and returns for some companies and, *ceteris paribus*, a negative (zero) association for others. Based on this reasoning, they argued that traditional cross sectional analysis, which assumes a homogeneous response from companies, is unsuitable for assessing the IEP of CC accounting information.

Hopwood and Schaefer tested their hypothesis on a sample of 402, 402, and 395 US companies in 1981, 1982, and 1983 respectively. They began by measuring companies' responses to price changes. The companies were then ranked from the highest to lowest, based on this response. Share returns models were then derived for all companies, and for 2 separate groups comprising the companies with the highest and lowest 1/3 of the price response measure. They found that the association between the CC income variable and security returns differed significantly across the groups. In particular, they observed that the sign of the CC coefficient for the high and low cost subgroups was different, this was consistent with their reasoning.

Furthermore, the models used to test the IEP of CC income showed these variables possessed IEP for each of the subgroups, but this was not the case when the analysis was performed on all companies. The evidence also indicated that companies within an industry tended to be categorised in either the low or high price response group. This suggests, that although the information contained in CC adjustments is not company specific it is largely industry specfic.

4.4.14 Bernard and Ruland (1987)

Bernard and Ruland (1987) took a different approach from many of the previous studies in assessing the IEP of CC income. They examined the explanatory power of CC and HC income within a time series context, believing that this approach overcame serious limitations associated with previous cross sectional studies. Criticising these studies for assuming a homogeneous response to price level changes, they argued that the presence of severe multicollinearity in these studies distorted the results. Bernard and Ruland hoped to reduce the severity of these problems in their study by using time series analysis which focused on a subset of industries where the correlation between unexpected HC income and unexpected CC income was relatively low.

Their sample consisted of 113 US companies from 27 major industries. The analysis was performed on data for the years 1961-1980. The CC income figures were estimated and compared with actual figures (when available). The researchers found their estimations to be highly correlated with reported CC income. Time series regressions were derived for each industry. They found some evidence of IEP associated with CC data for industries where the correlation between unexpected CC income and unexpected HC income was lowest. However, this result only applied to a small subset of industries. Furthermore, only a small number of companies was included in each industry group. Thus the assumption that the variables in the model are stationary over time is unlikely to hold. The results also indicated that the degree of collinearity between unexpected HC and CC income was extremely high for most industries. Bernard and Ruland's overall conclusion was that

> "even though the incremental information in current cost data is more evident in a time-series analysis than in a cross-sectional analysis, it is still not strong." (p. 719).

4.4.15 Bernard and Ruland (1991)

Using data from their 1987 study, Bernard and Ruland (1991) used cross sectional analysis to test the IEP of CC income. The tests were performed for each year of the test period 1962-1980. First, they regressed share returns on unexpected first differences in HC and CC income. An examination of the t values showed that unexpected HC income was positive and significant in 6 of the years and unexpected CC income was positive and significant in 1 year. They believed that the poor performance of the CC variable could be attributed to its high collinearity with the HC variable.

To reduce the effects of high collinearity the second approach pooled the data. They used 2 approaches to pool the data, and both approaches provided evidence of IEP of HC income, but not CC income.

The final approach used cross sectional valuation models to regress the market value of the company against HC and CC income for each year of the period 1961-1980. Results showed that HC income was positive and significant in 10 of the years and CC income was positive and significant in 11 of the years. Overall, Bernard and Ruland suggested that although the evidence indicated that both variables have IEP, econometric difficulties prohibited firm conclusions being made.

Critically examining the Bernard and Ruland (1991) study, it is possible that they may have been too quick to reject the IEP of CC income. They used the first difference form of the variables in their returns analysis. However, if the regression coefficients are unstable, this approach may be unsuitable. Previous evidence suggests that the coefficients of cross sectional valuation models are unstable (see Lev, 1989 for a review of this evidence). There is a strong probability that Bernard and Ruland's models were affected by unstable regression coefficients, as the HC variable was significant in only 6 of the 19 models and this could be explained by unstable regression coefficients.

Furthermore, in their returns analysis, they found a negative coefficient for the HC variable for 2 of the years and a negative coefficient for the CC variable in 10 of the years. Bernard and Ruland dismiss these findings and attribute the negative relationship to high collinearity between the variables. However, a negative relationship is also consistent with unstable regression coefficients. A further explanation is also available for the CC variable. A negative relationship is consistent with the findings of the Hopwood and Schaefer (1989) study, where it was shown that if companies are unable to pass on price changes, then the CCA variables would be viewed negatively. If the feasibility of a negative relationship is accepted, a reexamination of Bernard and Ruland's study reveals that the CC variable was negative and significant in 3 of the returns models. On this basis, the information content of the HC variable is only slightly better than the CC variable in the returns models.

Hopwood and Schaefer also found that companies' responses to the CC adjustments was industry specific. As the Bernard and Ruland study includes 113 companies spread across 27 industries, it is possible that the differential response to the inflation accounting adjustments offset one another, making it very difficult to detect an informational effect.

Bernard and Ruland dismiss their findings from their valuation models on the basis that the results may be seriously affected by econometric problems. However, no firm evidence is given on the extent to which their models were affected by econometric issues.

These criticisms of Bernard and Ruland's study suggest that their overall conclusion that CC income has no IEP may be premature.

4.4.16 Summary

The previous review shows that studies which tested the explanatory power of inflation accounting data have been performed in a number of countries using a variety of inflation accounting variables. Most of the studies investigated the ability of inflation accounting data to explain share returns and the findings from these studies were mixed. However, the findings from those studies which tested the ability of inflation accounting data to explain share prices was more promising. A number of the latter studies showed that the inflation accounting variables possessed IEP. This was particularly evident when more refined sampling techniques were employed.

The final set of studies reviewed in this chapter evaluate the utility of inflation accounting data by focusing on its predictive ability. A brief review of some of these studies follows.

4.5 PREDICTIVE ABILITY OF INFLATION ACCOUNTING DATA

A number of studies evaluated the utility of inflation accounting variables in predicting business failures. Ketz (1978) and Norton and Smith (1979) tested the ability of general price level accounting data to predict business failures. Ketz found evidence that the predictive ability of the price level data was greater than the HC data. However, Norton and Smith concluded that

> "in spite of the sizable differences in the magnitude that existed between general price-level and historical cost financial statements, little difference was found in the bankruptcy predictions." (p. 72).

Mensah (1983), Keasey and Watson (1986), and Skogsvik (1990) evaluated the utility of CCA data in predicting corporate failures. In both Mensah's US study and Keasey and Watson's UK study there was no evidence to suggest that CC ratios were better at predicting bankruptcy than HC ratios. However, Skogsvik (1990) in his study of Swedish industrial companies, found weak support for the superior predictive performance of the CCA ratios in periods of high inflation.

Sami and Trapnell (1987) examined whether SFAS 33 disclosures improved the ability of changes in HC earnings per share (EPS) to predict share price changes. They regressed cumulative returns on precentage changes in HC earnings per share and a combination of percentage changes in inflation accounting earnings per share. The inflation accounting measures included: historical cost / constant dollar (HC/CD); current cost (CC); and current cost / constant dollar (CC/CD).

The cumulative returns were computed for an 11 week period surrounding the dates of the company's 1980 and 1981 earnings announcement and a 12 month period which included the annual earnings announcement dates. Predictive models were estimated for each industry group.

For both test periods, the analysis revealed that the model including the HC variable only competed favourably with the models which included both HC and inflation accounting variables.

In a recent US study, Bartley and Boardman (1990) tested the utility of inflation accounting data in classifying companies as takeover targets. Studies by Simkowitz and Monroe, (1971), Harris, Stewart, Guilkey and Carleton (1982), Wansley, Roenfeldt and Cooley (1983), and Palepu (1986) developed classificatory models using HC data. Given the success of these studies, Bartley and Boardman (1990) considered if a model incorporating CC and constant dollar accounting data in conjunction with HCA data would have greater predictive ability in classifying companies as takeover targets than a model based solely on HCA data. They found that the extended model had greater predictive power.

The implications from the above studies is that the predictive ability of inflation accounting variables is still an unresolved issue.

4.6 SUMMARY

This chapter reviewed those studies which assessed the utility of inflation accounting data to the securities market. Most of the early studies focused on identifying a market reaction to the inflation accounting data. The vast majority of these studies failed to observe a market response to this information. However, this evidence should not be solely relied upon to assess the utility of inflation accounting data. The market's failure to react could be explained by the market having discounted the information prior to the release of the financial reports. Furthermore, there are methodological limitations associated with market reaction studies which cast doubts on the appropriateness of this approach for this type of research. These are reviewed in detail in Chapter 6.

The studies reviewed in 4.3 examined the association of inflation accounting risk measures and the market's risk measure (Beta) and the evidence from these studies was mixed.

Other researchers used regression analysis to investigate the explanatory power of inflation accounting information. Most of these studies evaluated the ability of inflation accounting data to explain share returns, while a smaller number were concerned with explaining relative share prices. Again, the findings from these studies were mixed. However, a reasonable number showed that the inflation accounting variables had incremental explanatory power. Chapter 6 examines the advantages and disadvantages of using this latter approach to evaluate the utility of inflation accounting data (see 6.4, pp. 199-210).

Many of the studies reviewed in this chapter cited lack of confidence in the reliability of inflation accounting data as a reason for its lack of utility. This issue is addressed in the studies reviewed in the next chapter.

CHAPTER 5

NON MARKET BASED EVIDENCE ON THE ATTITUDE TO AND RELIABILITY OF INFLATION ACCOUNTING DATA

CHAPTER 5

NONMARKET BASED EVIDENCE ON THE ATTITUDE TO AND RELIABILITY OF INFLATION ACCOUNTING DATA

5.1 INTRODUCTION

The utility of inflation accounting data is likely to depend on users' and prepares' attitudes towards this data. Their attitudes will be influenced by their familiarity with and confidence in the data. This led researchers to adopt alternative approaches to the market based studies previously reviewed, to investigate the utility of inflation accounting data. These alternatives are explored in this chapter, which examines the following research:

studies which focused on users' and preparers' commitment to and attitude towards inflation accounting data (5.2); and,

studies which investigated measurement problems associated with deriving inflation accounting data (5.3).

5.2 COMMITMENT AND ATTITUDE TO INFLATION ACCOUNTING DATA

Given the importance of users' and preparers' attitudes to the fate of inflation accounting data, a number of empirical studies have examined users' and preparers' commitment to this data in practice.

In a US study, Benston and Krasney (1978) examined the uses and attitudes towards alternative financial accounting measurement methods by 2 groups of sophisticated investors - common stock and direct placement investment officers of life insurance companies. Direct placement officers can request any financial data they desire from companies with whom they negotiate loans. In contrast, common stock investment officers can use only publicly available data for their investment decisions. This selection offered the following advantages:

the sample contained people who had the practical experience to understand the alternative accounting measurements;

the group consisted of people who had uses for financial accounting information beyond supporting a recommendation to buy or sell a share; and, in the short term, at least some of the information production costs would be internalised by the life insurance companies, thus tempering their requests for additional information.

Using a questionnare, the practices and opinions of the officers of 62 life insurance companies were surveyed. The response rate was 94 per cent. The direct placement officers were asked for their preferred valuation bases for 17 specific financial report items which they regularly requested as supplementary data for use in lending decisions and their single preferred valuation basis for financial reports. The common stock investment officers were also asked to indicate their preferred valuation bases for the same 17 specific financial report items and for the reports as a whole. In addition, they were asked to indicate the measurements they preferred as supplements to the present GAAP. The results of the questionnare showed that 89 per cent of the direct placement and 66 per cent of the common stock investment officers preferred GAAP as the valuation basis for financial reports. GAAP was found to be used overwhelmingly by the direct placement officers who can request and legally obtain alternative valuations. In relation to the 17 specific financial report items, the direct placement officers showed very little enthusiasm for different valuation bases. The common stock investment officers' preference for GAAP generally concurred with those of the direct placement officers.

However, when they assumed that the data would be supplemental to that presently reported, they exhibited a stronger preference for additional valuations.

The impact of the scale of investment operations of the life insurance companies, and the experience of the officers that responded, was examined. It was found that the scale of the investment operation as measured by portfolio size or total assets was not a significant determinant of the demand for alternative financial reporting measurements. The years of professional experience of the direct placement officers was not significantly related to their responses. However, the more experienced common stock investment officers were much more GAAP oriented than were their less experienced colleagues. Overall, the results of the study showed very little support for the use of alternative financial reporting measures.

In a UK study, Boys and Rutherford (1984) assesssed the use of financial reporting data by institutional investors. Their report dealt with the following issues:

the weight attached to CCA data in relation to HCA data;

the particular uses made of CCA data;

analysts' attitudes to technical issues in CCA; and,

the reasons given by analysts for making little or no use of CCA data.

A final sample of 13 institutional investors (i.e., 3 insurance companies, 3 pension funds, 4 merchant banks, and 3 unit trusts) was used. The study focused on discovering how analysts use financial reporting data in making recommendations about investment decisions and what information analysts need from financial reports. This was achieved by presenting the analysts with the reports of a manufacturing company, and observing them as they went through the analytical process and then asking them a series of questions. The analysts were unaware that the chief subject of inquiry was the CCA data. This avoided leading analysts to overemphasise the use of the data presented in the CC accounts.

The review of the analytical process showed that little attention was given to CCA data. The only exception to this was the CC dividend cover figure. The major reason given for this was that the rest of the market reacts to HCA data and analysts do not want to be out of line with the market since in the short term it is unlikely to prove advantageous. This is consistent with the view expressed by Peasnell Skerratt and Ward (1987) in their study. They claimed that

> "...since investors are unfamiliar with the CCA measurement system, it is difficult to see how they could realistically expect the expectations of others (and hence share prices) to be driven entirely by the new aggregation procedures for measuring corporate performance." (p. 4).

Other reasons given were:

the very weak support given to the CCA system by companies' management and brokers' analysts;

the lack of knowledge and understanding of SSAP 16 on the part of analysts;

the lack of sufficient years' figures to provide a long term trend;

the analysts' belief that they can derive the same information from funds flow data; and,

the likelihood of inflation being reduced to a level at which analysts consider that it will no longer present a problem for financial reporting.

In interpreting the preceding studies the possibility of bias distorting the results must be considered. This could be caused by the sample selection procedure used, the method of assessment employed, and failure to control for the effects of nonresponse bias. Boys and Rutherford considered the problem of bias and asserted that

> "... insofar as it is possible to identify the direction in which bias might occur, it appears that the use of current cost accounting information by investment institutions generally is likely, if anything, to be exaggerated by the present research." (p. 123).

Thus, the evidence suggests little use was made of CC accounts, but, it must be remembered that these conclusions are based on a small sample of only 13 institutional investors.

Carsberg and Day (1984) considered the use made of CCA data by another group of analysts and stockbrokers. Using an approach similar to Boys and Rutherford, a sample of 15 stockbrokers was asked to openly examine the financial reports of 2 UK companies. Again, the analysts were unaware that the main purpose of the study was to assess the relevance of CCA data. The results indicated weak support for this data. The majority supported continued disclosure of the CCA information on a supplementary basis and, as in the previous study, dividend cover was regarded as the most significant figure. The study also showed that most of the analysts accepted the maintenance of operating capability as a useful basis for the computation of profits. Again, when interpreting the results the presence of selection bias and the small sample size must be considered.

Bayliss (1984) took a different approach to the previous 2 studies in evaluating analysts' use of CCA data. He investigated the importance attached to CCA data in comparision with HCA data in the financial press and in stockbrokers' reports. This approach was adopted as he believed the extent to which investors use CCA data is likely to be conditioned by the way in which the data is treated in the media which convey it. First, he examined 649 press articles commenting on the annual results of 58 companies to establish the extent of reference to CCA data. The analysis revealed that even when references were made to CCA, they were supplementary and of secondary importance to the HCA content. The evidence also showed that the press coverage of CCA had fallen from 1982 to 1983.

In the second part of his study, Bayliss analysed stockbrokers' circulars. The approach was designed to complement the investigation undertaken by Carsberg and Day (1984), in that circulars were obtained from the same companies that were included in the Carsberg and Day study. In all, 66 circulars, representing a cross section of companies of varying size and industrial classification, were analysed for their CCA content. The findings revealed that stockbrokers disseminate CCA data to a greater degree than the press, as 50% of the cases mentioned CCA information. But, again, the information was regarded as secondary to the HCA data. In addition, the analysis showed that over time stockbrokers consistently used the CCA data. Bayliss also showed that industry classification, company size, and the share recommendation were independent of the amount of CCA comment. Overall, the study showed weak commitment towards the disclosure of CCA data. Again, when interpreting the results, the presence of selection bias and the small sample size must be considered.

It is highly likely that analysts' attitudes to inflation accounting data will be partly conditioned by the attitude of the companies required to disclose this data. This prompted Archer and Steele (1984) to examine the attitude of UK companies towards compliance with SSAP 16. Their analysis was based on a sample of 494 listed companies, which were surveyed by a postal questionnaire. The examination of 484 usable replies showed that there was widespread and increasing lack of enthusiasm for SSAP 16.

This may be observed from Table 5.1 below.

TABLE 5.1

ENTHUSIASM FOR SSAP 16

	Initially (1980) %	(1983) %
Happy to comply	16	7
Lukewarm towards compliance	19	18
Sub-total	35	25
Complying from obligation	54	60
Failing to comply	7	11
Sub-total	61	71
Exempt	4	4

The above table illustrates how initially only 35% of respondents reported a positive or fairly positive attitude to compliance and that proportion had shrunk to 25% by mid 1983. Analysis of the direction of nonresponse bias showed that there may be an underestimation of the proportion of companies unhappy with SSAP 16.

Archer and Steele tried to identify the factors influencing a company's attitude towards compliance. The evidence suggested a fairly strong relationship between a company's size and its enthusiasm for SSAP 16, with smaller companies being less willing to comply. It was also found that the degree of technological stability was not a significant factor in influencing compliance. The researchers tried to identify the reasons for respondents' change in attitude towards compliance. They found the lack of "robustness" of CCA data as the major factor leading to a reduction in the popularity of SSAP 16. This stemmed from the persistent need to make arbitary and subjective choices between alternative methods of calculating CCA figures which undermines the credibility and meaningfulness of the information disclosed.

The study also assessed company officials' perception of the benefits of CCA data to external users of financial reports. Findings showed that, on average, those who reported a positive attitude towards compliance (happy or lukewarm) rated their CC accounts more suitable than HC accounts for the following purposes: judging dividend paying ability; measuring economic performance; and, estimating a company's capacity to support wage claims. Those who reported negative attitudes (complying from obligation or not complying), on average rated their CC accounts inferior to their HC accounts for all financial reporting purposes. But, for traditional stewardship purposes, and for purposes of assessing liquidity and solvency, even the CCA enthusiast group rated HC accounts as more suitable. It was observed also that although company officials in different organisations had different perceptions of SSAP 16, many of them believed that external users of financial reports did not attach much significance to their CC accounts.

Consideration was also given to examining the extent to which CCA methods are used in management accounts. The evidence showed that very few companies (8%) produced CCA based management accounting information. This result is important, as it may indicate a reluctance to CCA for financial reporting. Greater commitment to CCA methods for internal reporting purposes could only improve individuals' perceptions of the potential benefits of the approach and perhaps reduce their scepticism about the reliability of the data disclosed. It appears that the major problem preventing the acceptance of SSAP 16 is that the methods used to circumvent the technical difficiulities are considered to be insufficiently rigorous by preparers of financial reports.

The foregoing studies provide evidence that a large number of users and preparers of financial reports have misgivings about the utility of inflation accounting data due to the numerous measurement problems encountered in their preparation. Thus, the acceptance of inflation accounting data will depend on users' and preparers' confidence in how well this data is measured. The next section considers the importance of reliability and relevance in determining the utility of inflation accounting data to users. Studies which examine the potential for measurement error in deriving this data are also reviewed.

5.3 PROBLEMS OF MEASUREMENT ERRORS IN COMPUTING INFLATION ACCOUNTING DATA

Chapter 2 (see 2.2, pp. 20-22) states that the objective of financial reporting is to provide information that is useful to users in their economic decision making. It identified (see 2.3, pp. 22-24) the qualitative characteristics which financial reports should possess to help them achieve their objective. 2 of these characteristics - relevance and reliability - were viewed as being particularly important. Studies by Stanga (1980), and McCaslin and Stanga (1983) have shown that these 2 characteristics are postively correlated. In the latter study, McCaslin and Stanga concluded that relevance may be determined in part by how much reliability the information is perceived to possess. They suggested that, if information is not "sufficiently" reliable, then it will not be relevant for any decision. This view was also expressed by Ijiri and Jaedicke (1966) in an early conceptual study.

Recognition of the importance of reliability in determining the relevance of inflation accounting data led researchers to investigate the impact of measurement errors on the utility of this data. The evidence from some of these studies is now reviewed.

In a UK study, Carsberg (1984) examined the reliability of special CCA measures. The approach taken in the study was to obtain information on the technical difficulties of implementing SSAP 16, by interviewing the preparers of financial reports and a number of auditors. The information was obtained from large accountancy companies and the study concentrated on identifying the problems encountered and the actions taken to overcome them in the following areas:

deriving the CC of an asset affected by technological change;

deriving the recoverable amount of an asset and deciding when this is the appropriate basis of valuation; and,

deriving the CC of specialised assets.

Both preparers and auditors of financial reports expressed concern about the utility of measurements of the recoverable amounts of assets and of replacement costs for assets affected by technological change. They believed that by applying the concepts set out in SSAP 16 these measurements were excessively subjective, or, if they relied on mechanical indexing, the accounts failed to reflect economic reality. In the case of specialised industries, they argued that extreme difficulties existed in valuing specialised assets and that a capital maintenance concept based on maintaining operating capability was inappropriate. The evidence led Carsberg to conclude that the reliability of assets valued in accordance with SSAP 16 was highly questionable, and that the inappropriateness of the standard for some industries could cause antagonism towards it.

In another UK study, Page (1984b) undertook 2 projects designed to investigate the adequacy of data typically available for making "routine" CC measurements in companies. One project considered the procedures used in preparing CC accounts, and whether these procedures were considered adequate by the companies and their auditors. The other project investigated the problems encountered by auditors in reporting on companies' CC accounts.

The approach adopted in the first project was to select 16 clients of 3 firms of accountants and to prepare case studies on the approach taken by each client in the preparation of CCA data. The studies showed 3 different attitudes prevailing towards CCA reporting. 4 companies were classified as having a positive attitude, 5 a neutral attitude and 7 a negative attitude. Page then considered the problems encountered by these companies in deriving the CC of assets.

Despite the heavy reliance on external indices, the evidence suggested that, for assets located in the UK, companies were reasonably happy with the procedures used to derive their current costs. However, for company assets located abroad, the measurement of their replacement cost was a problem. There was a tendency to use general price indices and companies were not really satisified with the results.

Also, there were indications that companies with a negative attitude towards SSAP 16 derived their CC measures with the minimum of effort and expense. This may explain why these companies tended to consider their CC measures as uncertain and subjective. In this respect, negative attitudes towards CCA within companies may be self reinforcing.

The second part of the project showed that the auditor's view of the CCA data was influenced by clients' commitment to and opinion of the CCA disclosures. In interpreting the results of this study, consideration should be given to the small sample studied. However the findings support the conclusions reached by Carsberg (1984).

Moving to the US, a study by Swanson and Shriver (1987) examined the impact of measurement errors on the utility of SFAS 33 disclosures. Based on a review of the procedures adopted by companies to derive the CC of assets, they concluded that measurement errors do exist. These errors are caused largely by inadequate adjustments for tecnological changes and the apparent encouragement given in SFAS 33 to the use of indices. Swanson and Shriver believed, in general, that these errors resulted in an overstatement of the cost of plant and equipment and that their impact was likely to be more substantial for companies employing older assets, particularly assets in the high technology industries. They strongly suggested that the existence of these measurement errors could have impaired the validity of previous inflation accounting studies and hence these studies were unable to determine accurately the extent to which CC data has benefit.

Given the heavy reliance on external indices to derive the replacement value of fixed assets, Shriver (1987) examined the possibility of measurement errors in the index most frequently used in the US to derive the replacement cost of machinery and equipment. His examination revealed that measurement errors did exist in the index and that the extent of these errors varied with the age and type of asset.

In a New Zealand study, Duncan and Moores (1988) used a very different approach to evaluate the relevance and reliability of CCA information. Their objective was to measure the relevance and reliability of CCA data by assessing the extent to which CCA leads to "better" decisions as compared to relying solely on HCA data. For this study, decisions were seen as "better" if they were superior in terms of a decision criterion (i.e. maximisation of return on investment) and if they resulted in greater prediction accuracy.

An experimental design approach was used to achieve this objective. 120 final year undergraduate accounting students were selected as surrogate investors and they were required to analyse the data provided on 2 similar companies for investment decision making for the 3 years 1979, 1980 and 1981. The CCA income was substantially different from the HCA income for both these companies. The students were divided into 3 treatment groups as follows: those who received only HC accounts, those who received only CC accounts and those who received both sets of accounts.

There were 2 parts to the experimental task. The first involved deciding which company was the preferable investment on the basis of their predicted return on investment. The second part involved ranking the perceived reliability of the financial accounts presented to each group of students. The findings of the experminent were that CCA data were found to provide more relevant information. This was because the treatment groups receiving such data made different and "better" decisions than those receiving only HCA data.

The results of this study are very different from the previous studies which considered the reliability of inflation accounting data. This may be attributed to the different approach used. The use of an expermental design automatically limits the results and conclusions to the subjects, treatments and environment of the study. Furthermore, the selection of 2 companies for which there was a substantial difference between the CC income and the HC income would *a priori* increase the possibilty of the CCA information being relevant. A further problem may be that the student subjects may not be acceptable surrogates for real investors. Firstly, given the existence of a student/teacher relationship, the students may have felt that the information was more reliable than if they themselves had randomly selected the companies. Secondly, the motivational issues would be very different between the students and real investors. The implicit reward structure, satisfaction in completing the task, may not have provided sufficient motivation for the students to perform the task carefully. However, this latter affect is likely to be randomised across each group of students.

The studies reviewed have shown that users and preparers of accounts are concerned about the reliability of inflation accounting data. It is the objective of this study to adopt an approach which recognises that investors' willingness to use inflation accounting data may be influenced by their perception of the reliability of this data (see 7.4.3, pp. 227-228).

5.4 SUMMARY

This chapter considered whether the low information content/ or explanatory power of inflation accounting data can be attributed to users' and preparers' attitudes to this data and/or measurement problems associated with this basis of valuation. The evidence revealed that users' and preparers' perceptions of the utility of inflation accounting data are fairly negative. Generally, this negative perception could be attributed to their lack of confidence in this data.

Studies which examined the reliability of the inflation accounting measures showed that the reliability of these measures was questionable and that this sapped confidence in the whole system of inflation accounting. The review also indicated that confidence in the reliability of the inflation accounting data was dependent on preparers' attitudes towards disclosing this data. This factor is taken into consideration when designing the research methodolgy to be employed in the present study.

The next chapter assesses the implications of the methodological weaknesses of earlier inflation accounting studies. It identifies and critically examines the approach which is used in this study.

CHAPTER 6

CASE FOR A VALUATION APPROACH

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6.1 INTRODUCTION

This chapter critically evaluates the methodologies used in previous market based accounting research studies to assess the utility of inflation accounting data. This evaluation is presented in the context of those studies which focused on inflation accounting data. However, the criticisms raised apply to most market based accounting research studies. In addition, the chapter presents the case for the use of a valuation approach in assessing the utility of inflation accounting data. In particular, the following are considered:

- problems associated with information content studies (6.2);
- the valuation approach (6.3); and,
- the valuation approach and inflation accounting data (6.4).

6.2 PROBLEMS ASSOCIATED WITH INFORMATION CONTENT STUDIES

Much of the early research (see 4.2, pp. 99-118) on inflation accounting data used the information perspective to investigate the utility of this data to the securities market. These studies focused on identifying a market reaction to the disclosure of inflation accounting data. Most of these studies failed to detect a market reaction to the disclosures. However, this type of analysis alone cannot be relied upon to assess the utility of this data as it suffers from methodological deficiencies which are now considered.

6.2.1 Selecting the Test Period

In the case of information content studies, the determination of the exact timing of the event is of key importance. Peasnell, Skerratt and Ward (1987) claim that

> "the power of tests to identify a market reaction depends much more on the accuracy with which event dates can be determined." (p. 4).

In a series of simulations, Brown and Warner (1980) showed that failure to pinpoint the exact timing of an event can result in severe loss of statistical power when return analysis is used. When reviewing the studies in Chapter 4, it was noted that many of the studies failed to identify the exact timing of the disclosure of the inflation accounting data and this may explain their failure to detect a market response to these disclosures.

In addition, Reed Parker (1967) observed that

> "knowledge affecting common stock prices is not perfectly disseminated at any one time but that it comes more as a steady flow than as intermittent jogs such as reporting dates of accounting data." (p. 17).

For this reason, Reed Parker believed that the "analysis of cause and effect" is complicated and detection of a market response to accounting data may be impossible.

In support of Reed Parker, Lustgarten (1982) found that the effects of the ARS 190 disclosures were observed 8 or 9 months before the filing date. This suggests that the inflation accounting data disclosed in financial reports is not "new" information. However, it may still be used by investors in their decision making. For example, Hines (1982) found that shareholders do use financial reports in their decision making, even though these reports generally contain little that is "new" and so their release will not cause a price response. In a comprehensive survey of financial analysts, institutional investors and individual investors in the USA, UK, and New Zealand, Chang, Most and Brain (1983) similarly found that financial reports were a very important source of information to each of these groups in all 3 countries. Cready and

Mynatt (1991) found that although there was no price response to the disclosure of the financial report, there was evidence to suggest that small investors used the information in the report to adjust their portfolio position. Other studies which failed to detect a price response to the release of financial reports include Foster Jenkins and Vickrey (1986), Mynatt (1988), and Bernard and Stober (1989).

Thus, as financial reports are likely to convey very little information that is new to the capital market, Hines (1982) suggested

> "that short-term stock market reaction is not an adequate indication of the usefulness of accounting information to investors." (p. 309).

If the speed with which inflation accounting information is anticipated by the market varies across securities, this causes a further problem. In this situation the optimal time interval for each company in the sample may be different. Freeman (1987) found evidence which suggested that share prices of large companies began to anticipate reported earnings much earlier than small companies' share prices.

However, in defence of the information content studies, it should be noted that many of the studies used CARs to detect a price response to inflation accounting data. This approach recognises that inflation accounting data becomes available to the market over a period of time. Despite this, most of these studies concluded that inflation accounting data did not possess information content. Furthermore, many of the studies tested the sensitivity of their results to the length of the test period and found that altering the length of the test period did not affect their initial findings.

An issue related to selecting the test period concerns the magnitude of the effect of the inflation accounting disclosures. It is possible that the effect may be small relative to the variability of companies' share prices. Recognising this problem, Soroosh Joo (1982), Beaver and Landsman (1983, p. 75) and Atiase and Tse (1986) suggested that residual analysis may be inappropriate. The problem is further complicated by the existence of confounding events and for this reason Keane (1983) asserted that

> "it is a near impossible task to relate the price movements of individual securities with specific events or information data. There are potentially too many events affecting the value of a company at any given point in time to be confident that an observed price movement is in response to a specific item of information." (p. 142).

The next section considers the problems associated with the technique used to control for confounding events.

6.2.2 Matched Pair Design

This technique was employed by several of the studies in Chapter 4, e.g., Arbel and Jaggi (1978), Beaver Christie and Griffin, (1980), Gheyara and Boatsman (1980), RO (1980, 1981), Noreen and Sepe (1981), Appleyard and Strong (1984), and Murdoch (1986). The main reason for adopting this approach is to control for the problem of confounding events.

In each of the aforementioned studies, the samples of companies were divided into 2 groups: reporting companies (companies disclosing inflation accounting data); nonreporting companies (companies not disclosing inflation accounting data) and matched on the basis of a profile of characteristics which was considered important in determining a share's return. It was hypothesised that the expected return of each company in a pair should be equal. Any differences in actual return could be attributed to the disclosure of the inflation accounting data.

However, in reality this ideal case is unlikely to exist. For some mandatory accounting standards (e.g. ARS 190, SFAS 33, and SSAP 16), the criterion for disclosure itself may be a significant discriminating variable. Foster (1980), Beaver, Christie and Griffin (1980) recognised the importance of this point in relation to ARS 190 (it also applies to the other standards on inflation accounting). Foster commented that, as only large companies were required to comply with ARS 190,

> "a firm profile analysis, between disclosing and nondisclosing firms, using these variables would likely not yield any new insights; by construction, the two groups are different. To argue that these differences do not damage the internal validity of a pre-test post-test control group design, one would need to argue that these variables (and those closely related to them, e.g. market capitalization) do not affect security returns." (p. 44).

Thus, if share returns and volumes vary systematically with company size, then the matched pair design will not allow for any direct conclusions regarding the effect of inflation accounting data. Research evidence suggests that this may be the case, e.g., Atiase (1985), Freeman (1987) and Ro (1988) found that company size and information content were inversely related. Banz (1981) reported that small companies tended to have higher abnormal returns than larger companies. These studies suggest that a significant size effect exists and several alternative hypotheses have been offered to explain this effect (see Dyckman and Morse, 1986, pp. 36-39).

Given this evidence, Freeman (1981) argued that without direct controls for size, any results from tests using the matched pair design approach are indeterminate. However, most of the inflation accounting studies which employed the matched pair design considered the problem of the size effect on their results and, for this reason they also analysed the differential returns of reporting companies. Limitations associated with this approach are considered in 6.2.3 (pp. 187-188).

A second problem associated with the matched pair design is that the disclosure of inflation accounting data may have implications for the nonreporting companies. Lustgarten (1982, p. 137) referred to this as the "spill over effect". Earlier research by Firth (1976) and Foster (1981) found that the disclosure of accounting information by some companies had implications for similar companies. If this is true, then the matched pair design, by construction, is biased against detecting a differential market response to inflation accounting data.

A third reason why the matched pair design approach may be inappropriate is that companies' share returns within a group may not be affected in a similar way. The approach assumes that the share returns of companies in the same group are affected similarily by the inflation accounting disclosures and that share returns of companies outside that group are affected differently. If this situation does not exist, then it is possible that the differential effects on share returns within a group will tend to offset one another and so the power of the test to detect an informational affect is reduced. Evidence from studies by Page

(1984a), Lobo and Song (1989) and Hopwood and Schaefer (1989) suggested that companies' share returns are affected differently by inflation accounting data.

The problem of correctly grouping companies is compounded by the absence of a developed theory which links inflation accounting data to share prices. The lack of an articulated theory and the difficulties it imposes in interpreting the results of inflation accounting studies is considered by Foster (1980), Beaver Christie and Griffin (1980), Watts and Zimmerman (1980), Hines (1984), and Brayshaw and Miro (1985).

6.2.3 Model Specification

Information content studies not only require a theory which predicts the market's response to inflation accounting data, but also knowledge of investors' expectations of this information, as an efficient market will only react to unrealised expectations. This knowledge is required for tests which involve partitioning the sample of companies. The importance of correctly formulating the expectational model is recognised by Lev and Ohlson (1982) and Beaver Christie and Griffin (1980). The latter claim that

> "to the extent that the expectations model is poorly specified, partitioning by the difference between replacement cost and historical cost contains a "garbling" of the difference between the actual and the

expected replacement cost disclosure. Consequently, the association between the signal and the security return would be understated by the empirical study." (p. 132).

A number of researchers, e.g., Arbel and Jaggi (1978), Beaver, Christie and Griffin (1980), Grossman, Kratchman and Welker (1980), and Appleyard and Strong (1984) assumed a naive expectational model, and partitioned the data based on the difference between inflation accounting data and HC data. In other cases, Value Line replacement forecasts or researchers' own forecasts were used as a proxy for the market's expectation of the inflation accounting data, e.g., Ro (1980), Beaver, Christie and Griffin (1980), and Appleyard and Strong (1984).

Haw and Lustgarten (1988) stated that the failure of earlier studies to find statistically significant coefficients for the inflation accounting variables may be attributed to the use of misspecified expectational models. However, given the absence of a developed theory which allows us to determine investors' expectations, the impact of this omission on the results of these studies is indeterminable.

Apart from partitioning the data on the basis of the magnitude of the difference between the actual inflation accounting data and HC data (or forecasted inflation accounting data), other studies, e.g., Gheyara and Boatsman (1980), Friedman Buchman and Melicher (1980), Ro (1981), Peasnell Skerratt and Ward (1987), examined the differential return behaviour among reporting companies. As previously mentioned in 6.2.2 (p. 185), this avoids the problem of controlling for the size effects associated with matched pair design. In the forementioned studies, companies were partitioned based on whether they ranked above or below a selected inflation accounting variable. A major problem associated with this approach is that the partitions employed have limited theoretical underpinning. Lustgarten (1982) warned that, by using a dichotomous partitioning variable, researchers can ignore potentially important information contained in the partitioning variable. He commented that

> "it is quite possible, for example, that there was some threshold of unanticipated replacement cost below which the market did not react. If this threshold were far from the median value, then partitioning the sample at the median could lead to insignificant statistical tests when partitioning the sample at the threshold would produce significant results." (p. 134).

In fact, in his study, Lustgarten observed some evidence of a threshold effect.

Model specification is not only required for determining investors' expectations of inflation accounting data, but also for determining share returns (or abnormal returns). Most information content studies employed some form of the market model or CAPM to detect a price reaction to inflation accounting data. Here the impact of market wide influences on a share's return is isolated by using the share's beta to adjust for market effects. This increases the probability that the effects of information unique to a particular company can be detected as this information is impounded in the error term (i.e. residual) associated with the model.

A critical assumption of these models is the stability of beta. Studies by Blume (1971), Sharpe and Cooper (1972), Jacob (1971), and Cunningham (1973) examined the stability of betas over time for both portfolios and individual securities. The research showed that individual security betas were more unstable than portfolio betas. This led Dyckman, Downes, and Magee (1975, p. 63) to conclude that, as accounting information is security specific, the difficulties of evaluating the information content of accounting data is more complex than is suggested in most of the existing research. The instability of beta at the company level may explain why some of the earlier studies failed to detect a price reaction to CCA information. Also, it may explain the conflicting results from the studies reviewed in 4.3 (pp. 119-123) which examined the association between inflation accounting betas and the market beta.

The instability of beta may not be the only problem associated with the use of the market model. Soroosh Joo (1982) argued that the model may be an oversimplified model of price formation. Using weekly data, he found that only 25 percent of the changes in an individual share's return was explained by changes in the market factor (R_m). Similar results were given in Beaver's (1968a) study which employed weekly data and Roll's (1988) study which employed weekly and monthly data. This implies that other important variables are excluded from the market model, and that their impact is impounded in the error term. In relation to SFAS 33, this lead Soroosh Joo (1982) to conclude that the

> "omission of these factors makes it more difficult to detect any price effects of the release of the supplementary data required by the Statement. In general, the low explanatory power of Rmt for changes in *R*it is a major deficiency in the general market model to detect the price effects of different sets of information." (p. 66).

However, the literature does not offer a consensus on which variables are omitted. King (1966) found that the industry variable had a direct relationship with share returns. Kraus and Litzenberger (1976) added a measure of skewness to the general market model and found this improved the explanatory power of their model. In an early study, Douglas (1969) found a positive relationship between residual variance and share returns. Subsequent studies by Fama and MacBeth (1973) found no significant relationship between the unsystematic risk and a share's return, while Levy (1978) and Friend, Westerfield and Granito (1978) found a positive relationship. When he controlled for different levels of beta, Foster (1978) found that the relationship between the residual variance and share returns was not significant. So, to date any attempts made to determine the additional factors critical to a share's return have proved inconclusive. Studies which apply the Arbitrage Pricing Model to explain cross sectional variability in security returns have also been unsuccessful in identifing the additional relevant explanatory variables.

The implication for inflation accounting studies of using the general market model or the CAPM to derive returns is that the omitted variables may invalidate the results.

The methodologies reviewed so far have been associated with those studies which tested the market's reaction to the disclosure of inflation accounting data. The deficiencies of these methodologies led researchers to investigate the power of inflation accounting data to explain security returns/prices. As this form of research is used in this study, the next section examines the valuation approach from a conceptual perspective. 6.4 then discussess the implications of this approach in evaluating the utility of inflation accounting data to investors.

6.3 THE VALUATION APPROACH

6.3.1 Introduction

Lev and Ohlson (1982), Atiase and Tse (1986) have recommended the use of a valuation approach, in addition to the information content studies to assess the utility of accounting data to investors. This approach and its potential contribution to financial reporting are now considered.

6.3.2 Valuation Approach and Accounting Data

In the valuation approach, researchers attempt to find a relationship between companies' prices and accounting variables. 2.2 (pp 20-22) established that the objective of financial reporting is to provide decision relevant information to users. Thus, any evidence of a link between share prices and accounting data provides an insight to the utility of that data to investors.

Investors are interested in information which helps them decide whether they should buy, hold or sell investments (ASB, 1991). This decision is based on the expected return and risk associated with the cash flows generated by the investment (see 3.5, pp. 58-60). Thus, the potential for financial reports to assist investors depends on how well they convey information on a company's ability to generate cash flows. The extent to which financial reports reflect value relevant information was discussed in 2.5.3 (pp. 28-30).

Atiase and Tse (1986) protrayed the link between accounting data and share prices as follows:

```
Accounting and         (Predicted :Predicted)             Current
other available        (Accounting:Dividends) discounted  Share
information at ------>(Variables :          )------------>Prices
time t                 (           :          )
```

Lev and Ohson (1982) described this mapping from fundamental variables into share prices as "the reduced-form characterization of a dividends-capitalization prediction" (p. 309). Lev and Ohlson (1982) suggested that valuation analysis could be used to identify which set of accounting variables "manifest itself on a valuation level" (p. 309). In an earlier article, May and Sundem (1976) suggested that the development of descriptive models of equilibrium prices with accounting numbers among the explanatory variables is a primary area of research. 3.12 (pp. 82-92) presented the findings of empirical studies which used valuation models in accounting research. These studies identified earnings, dividends, size and growth rates of assets and earnings as being significant explanatory variables.

Lev and Ohlson (1982) also argued that, if the purpose of accounting is to facilitate decision making, then accounting research must be defined to include any research efforts which help identify the optimal information set for some defined class of decision makers. Earlier, Beaver, Kettler and Scholes (1970) recognised the importance of this form of analysis to investment decision making and stated that

> "we cannot hope to construct an accounting system or evaluate the current system in terms of a decision-making criterion without a knowledge of the interaction between the accounting data and the market price variables." (p. 654).

However, there are problems associated with the valuation approach and these are considered in the next section.

6.3.3 Problems Associated with the Valuation Approach

Gonedes and Dopuch (1974) in a review of empirical research in accounting identified 2 main problem areas in the valuation approach.

The first is the lack of theory and the *ad hoc* nature of the valuation models. Brennan (1991) suggested that the lack of an adequate theoretical framework for specifying the structure of the relationship between share prices and specific accounting variables weakens much of the literature attempting to relate accounting data to share prices. For this reason, Atiase and Tse (1986) suggested that "there is still room for improvement in the theoretical foundations and the empirical specification of valuation models" (p. 21).

A review of valuation model development from a conceptual perspective is presented in Atiase and Tse (1986). They commented that virtually all valuation models rely on some notion of dividend discounting and that the main differences in the approaches is in the derivation of the dividend stream and the incorporation of risk in the analysis. For a review of the main valuation models see Atiase and Tse (1986), and Brennan (1991).

Recently, there has been some progress in the development of theoretical models linking accounting variables to share prices (see Brennan, 1991). One of these models is exploited in the empirical stage of this study (see 7.2, pp. 214-218 and Chapter 8 where the theoretical framework for the relationship between share prices and specific accounting variables is addressed again).

The second problem area pointed out by Gonedes and Dopuch (1974), in the valuation approach concerns econometrical issues. These include multicollinearity, heteroscedasticity, omitted variables and the measurement of independent variables (these issues and their implications to inflation accounting studies are discussed in 6.4.2 (pp. 205-210).

The effect of these econometrical issues is substantial for those studies attempting to derive a valuation model which can be used to predict share prices. However, it has been suggested that the implications of these issues may not be as great for those studies which investigate whether a particular set of variables provide IEP for share prices relative to another set of variables (see Brennan, 1991, footnote).

Despite the problems associated with the valuation approach Lev and Ohlson (1982) and Atiase and Tse (1986) asserted that this form of analysis offers a potentially useful perspective that is different from and complementary to that provided by information content studies. The contribution that the valuation approach derives in part from methological and econometrical differences between this approach and that of the information content studies. Beaver and Landsman (1983) stated as the limitations of the information content studies' approach and the valuation approach are not perfectly correlated, information from both tests can be greater than that provided by either one approach. The benefits of using the valuation approach to evaluate the utility of inflation accounting data are discussed in 6.4.1 (pp. 200-205).

When discussing the potential contribution of the valuation approach to accounting research, Lev and Ohlson (1982) recommended a valuation approach which concentrates on explaining relative share prices. The arguments for selecting relative share prices over share returns are now considered.

6.3.4 Advantages of Focusing on Relative Share Prices

3.12.1 (pp. 83-92) reviewed the early research studies which investigated the ability of accounting numbers to explain share returns. The review showed that little insight was provided into the share pricing mechanism. In a review of returns based studies in 3 major accounting research journals for the period 1980-88, Lev (1989) found that earnings only explained up to 10% of the cross sectional variation in share returns. This finding was robust with respect to the test period used. Researchers who used this approach to assess the explanatory power of inflation accounting data, also found little insight was provided into the determinants of share prices. In general, no more than 10 to 20 percent of the variation in share returns was explained by the independent variables in these studies. This suggests that many important determinants of share returns have been omitted from the regression models. This omission of relevant explanatory variables results in parameter estimators of the variables in the model being biased, if the omitted variables are correlated with the variables in the model (see Stewart, 1984, p. 126). Brennan (1991) also commented that, omitted variables may explain the instability of regression coefficients in valuation studies. (Note in a recent study, Strong and Walker (1992) found that by allowing for cross sectional variation in regression parameters, including an earnings yield variable, and by partitioning earnings, their model explained 42% of the variation in abnormal returns and 55% of the variation in raw returns.)

Given the poor performance in general of models focusing on share returns, Lev and Ohlson (1982) suggested consideration should be given to alternative methods of relating share price characteristics to accounting signals. They stated that

> "if the relevance of accounting information to investors is at issue, surely the extent to which this information accounts for (explains) the values of stocks, rather than just triggers a change in these values, should be a major concern." (p. 305)

Similarly, Davidson (1968) commented that

> "a definition of information content that demands observable change and presumably immediately observable change seems too restrictive." (p. 95).

These arguments support the use of share prices over share returns in valuation models. The results from studies which concentrated on explaining share prices have been more promising than those which focused on share returns. The review in 3.12.2 revealed that the models in the former studies explained at least 50 per cent of the variation in share prices. However, only 4 of the inflation accounting studies (Beaver and Landsman, 1983; Page, 1984a; Darnell and Skerratt, 1989; Bernard and Ruland, 1991) reviewed in Chapter 4 used this approach. Again, the explanatory power of these models was generally over 50%. Bearing in mind the above discussion, a valuation approach concentrating on relative share prices is used in the present study.

The next section discusses the contribution which the valuation approach can make to the debate on inflation accounting.

6.4 SHARE VALUATION APPROACH AND INFLATION ACCOUNTING DATA

As share prices represent the end result of an important decision making process, evidence of a link between share prices and inflation accounting data may provide an insight to the decision utility of this data.

Lev and Ohlson (1982) regard the valuation approach as being of particular importance to the debate on the utility of inflation accounting data to investors. The approach has the potential to overcome many of the methodological limitations associated with information content studies. These methodological advantages are now examined.

6.4.1 Methodological Advantages of the Valuation Approach

For information content studies, selecting the exact timing of the event is critical to the analysis (see 6.2.1, pp. 179-180). Atiase and Tse (1986) commented that this issue is not as crucial under the valuation approach, for as long as the information item (inflation accounting data) remains relevant, prices should continue to reflect the data once assimilation has occurred. Therefore, for valuation analysis it is only necessary to ensure that the prices examined relate to a period that is clearly after the information has been impounded in share prices.

With information content studies there is also the problem that the researcher has a choice of several price observations (e.g., daily, weekly, monthly) on which to base the analysis. This problem is avoided in valuation studies.

Determining the length of the test period can also cause problems in information content studies (see 6.2.1, pp. 180-181). It was shown that the period may be too short to detect a price reaction or conversely, too long, causing the impact of the information item on share prices to be swamped by the impact of other information items. The valuation approach avoids these problems. Atiase and Tse (1986), Beaver and Landsman (1983) recognised that as inflation accounting data is likely to have a cumulative effect on share prices which will be reflected in their level, this effect can be easily detected by using a valuation approach.

Another advantage of the valuation approach, suggested by Lev and Ohlson (1982), is that it does not require an expectational specification of the information item. The importance of an expectational model to information content studies was considered earlier in this chapter in 6.2.3 (pp. 186-188). The review showed that a misspecified model may explain why some studies failed to detect a market response to the inflation accounting data.

A number of the information content studies also used some form of a market model to derive abnormal returns, to detect a price reaction to the inflation accounting data. Again, this provides for the opportunity for model misspecification, which increases the difficulties of detecting a market response. This problem is avoided when a share valuation approach is employed.

The valuation approach may be of particular importance to accounting policy makers in helping them assess the consequences of their decisions. Today, more and more attention is being focused on the economic consequence and/or effectiveness of alternative accounting procedures. In this respect, valuation analysis may be preferable to information content studies as, using the results of the latter studies, it may not be possible to distinguish between the following explanations for the lack of a market reaction to inflation accounting data, first, the information is not pertinent to share valuation, or second, the information is relevant but it has already been reflected in share prices. Clearly, these 2 explanations have significantly different implications for accounting policy makers. If inflation accounting data are irrelevant, its mandated disclosure should not be required. On the other hand, if the data is already impounded in share prices, the relevant issue becomes that of comparing the savings in social costs from substituting mandated disclosure of inflation accounting data for the private search effort of this data. Valuation analysis has the ability to distinguish between the above explanations (see Lev and Ohlson, 1982; Atiase and Tse, 1986).

Valuation analysis not only offers the opportunity to evaluate what information should be disclosed but it may be used also to select between alternative accounting valuation bases (e.g., inflation accounting or HCA). Beaver and Dukes (1972) commented that

> "the association (between the earnings numbers from alternative procedures) and the behavior of security prices will indicate which method the market perceives to be the most related to the information used in setting equilibruim prices." (p. 321).

They then suggested that the "association criterion"

> "...provides a simplified method for preference ordering of alternative measurement methods." (p. 321).

However, care is required in applying the valuation approach to the assessment of the relative desirability of alternative accounting procedures. This form of research does provide the opportunity of evaluating what accounting numbers are pertinent to valuing companies, but it does not provide evidence on which alternatives are socially desirable. It would be wrong to look at the results of valuation studies in isolation when deciding between alternative accounting procedures. To address the desirability issue, Gonedes and Dopuch (1974) strongly argued that data is needed on the cost of alternative information production systems and on the social preferences for alternative accounting procedures. In a recent review of MBAR, Walker (1992) stated that the factors which should be taken into account when assessing financial reporting alternatives are as follows:

the extent to which the alternative reporting system satisfies the stewardship function;

the effect of the alternative system on the usefulness of financial reports as a basis for the enforcement of accounting based contracts;

the commerical sensitivity of the proposed new reporting system; and, the effect of the alternative reporting system on the confidence of investors in the fairness of the stock market.

Gonedes and Dopuch (1974) stated given the current institutional setting, where financial information is freely provided, it is impossible to use share prices to indicate the social desirability of accounting information. However, Gonedes and Dopuch still believed that this form of research can contribute to the decisions of accounting policy makers and suggested that share prices can

> "be used to assess the effects of these information production decisions. . . . Since assertions about effects are important parts of the justifications offered for recommendations and prescriptions, we can assess the strength of these justifications by evaluating the theoretical or empirical support for the assertion about effects. . . . In short, assessments of the effects of alternative accounting procedures and regulations can be useful to accounting policymaking bodies in making their decisions and to their constituencies in evaluating decisions." (pp. 78-80).

In addition, given the profession's failure to successfully develop a conceptual framework for financial reporting, valuation analysis can make a contribution to the resolution of financial reporting issues, as it provides policy makers with one approach, at least, to evaluate the consequences of their decisions.

The foregoing discussion suggests that valuation analysis is of considerable importance both from a policy point of view, and in establishing the variables pertinent to a share's value. Section 4.4 (pp. 123-152) presented the findings from those studies which used this approach to assess the utility of inflation accounting data to the securities market. The next section examines the attendant methodological problems in these studies.

6.4.2 Methodological Problems Associated with the Valuation Approach

Generally, researchers used regression analysis to derive valuation models which tested both the explanatory power and the IEP of inflation accounting data. One of the major problems associated with these regression models is the extent to which multicollinearity distorts the results of the valuation model.

Severe mullticollinearity makes it extremely difficult to untangle the relative influences of individual independent variables. Also, coefficient estimates become highly sample dependent and point estimates may vary greatly with the addition or deletion of a few observations.

Many of the studies reviewed in 4.4 (pp. 123-152) addressed the issue of multicollinearity. Beaver, Griffin and Landsman (BGL) (1982), Beaver and Landsman (BL) (1983), and Page (1984a) employed a two stage regression approach to deal with the effects of collinearity between the independent variables. However, Christie, Kennelly, King and Schaefer (CKKS) (1984) argued that this procedure does not provide any additional insights to those provided by a single multiple regression, viz.,

> "no partitions of independent or dependent variables, orthogonal or otherwise, can provide insights into the relative influences of collinear variables." (p. 206)

CKKS showed that the coefficients of the transformed variables in the two stage equations were equal to the coefficients obtained from the single multiple regression equation. This occurs because the multiple regression approach implicitly involves an orthogonalization procedure, which is explicit in the two stage approaches. (Beaver (1987) acknowledged this in a later article.)

Hence, the two staged approach may simply be viewed as more cumbersome and likely to result in more computational errors. As the two stage procedure fails to prevent the statistical biases caused by the collinearity problem, CKKS suggested that the results of the BGL (1982) study may be distorted by multicollinearity.

To establish the extent of the collinearity problem in the BGL (1982) study, CKKS applied the Klein (1962) technique to the BGL study. This technique claims that collinearity may be degrading the estimates when a pairwise correlation exceeds the square root of the coefficient of determination. In the BGL study, the pairwise correlation between the replacement cost variable and the HC variable was .84, whereas the square root of the coefficient of determination was .37. This led CKKS to conclude that

> "BGL may be finding apparently insignificant coefficients on the replacement cost variable because their variability are collinear, rather than because the replacement cost variable is irrelevant." (p. 213).

In response to these criticisms, BGL argued that it was never their intention to overcome the collinearity problem, but, to determine the IEP of the supplementary ASR 190 data, which they believed can be appropriately achieved through the use of the two stage approach.

However, in a later study, Beaver (1987) identified a problem associated with using the two stage approach, when the dependent variable is the residual share return. In this instance, the use of a sequential approach can lead to downward biased estimates of the IEP of the variable introduced at the second stage.

Due to the failure of the two staged approach to improve on single multiple regression analysis, Lustgarten (1982), Page (1984a), Skerratt and Thompson (1984), Peasnell, Skerratt and Ward (1987), and Bernard and Ruland (1991) used the latter approach to derive their valuation models. In these studies, the researchers focused on the t value associated with the regression coefficients to determine the significance of the explanatory variable. However, the problem of multicollinearity has caused other researchers, e.g., Murdoch (1986), Bublitz, Frecka and McKeown (1985), to question the reliability of the conclusions from some of the forementioned studies.

Given the distortions caused by multicollinearity, researchers (e.g., BL 1983; Bublitz, Frecka and Mc Keown 1985; and Murdoch 1986) concentrated on the overall explanatory power of the regression model, as in this instance multicollinearity causes no special problems (see Stewart, 1984, p. 135). Using an F test, these studies considered whether the addition of inflation accounting variables to a regression equation including HC variables led to a significant increase in R^2 or the adjusted R^2. A major limitation of this form of analysis is the problems caused by the presence of cross sectional dependence in the residuals. This problem caused BGL (1982) and BL (1983) to dismiss their findings from their F tests. The problem of cross sectional dependence also led Lustgarten (1982) to doubt the significance of his results on the relevance of his replacement cost variable.

Cross sectional dependence in share returns/share price data is likely to exist when the share returns/prices are sampled from common time periods. It arises when a systematic relationship in the independent variable is not captured by the independent variables included in the regression model. The presence of cross sectional dependence may lead to biased estimates of standard errors and hence incorrect inferences. Furthermore, the coefficient of multiple determination is overstated, thus t and F tests are no longer strictly applicable. Bernard (1987) commented that previous literature provides mixed predictions on the seriousness of the bias that can arise when cross sectional dependence in the data is ignored in market based accounting studies. To clarify this issue, he attempted to assess the extent and impact of this bias in accounting studies. In his analysis, he focused on a study similar to the BL (1983) study. His findings led him to conclude that

> "for studies involving cross-sectional OLS regressions of stock return metrics against firm-specific variables (e.g., Beaver and Landsman (1983)), it appears that the use of OLS might lead to serious bias in standard errors, depending on certain properties of the regressors, and the sample size." (p. 3).

Bernard's evidence suggested that the problems of inference were more likely when the return interval is long and the sample size is large. In view of these findings, he suggested that in the BL

(1983) study that

> "elimination of bias of such magnitude could potentially reverse the conclusions of Beaver and Landsman. Specifically, it might not be possible to reject the hypothesis of no incremental information content not only for current cost income but for historical cost income as well; the two income measures might be nearly perfect substitutes." (p. 36).

This conclusion is supported by Murdoch's (1986) study in which he employed an approach which was designed to reduce the impact of cross sectional dependence.

Despite the problems associated with the valuation approach, researchers (e.g., Lev and Ohlson, 1982; Atiase and Tse, 1986; Brennan, 1991) strongly believe that further research is clearly needed. It is this approach which is adopted in this study. The next chapter describes the particular valuation model used.

6.5 SUMMARY

This chapter began by examining the problems associated with information content studies. The major problems identified include: selecting the appropriate test period and test data; controlling for confounding events; and deriving an expectational model for inflation accounting data and share returns. These problems may have impaired the detection of a market reaction to the release of inflation accounting data.

The chapter then considered the case for the use of a valuation approach to assess the utility of inflation accounting data to investors. The contribution which this approach can make to the debate on inflation accounting was examined. However, 2 problems associated with valuation models were identified, first, the lack of a theoretical framework for specifying the relationship between share prices and specific accounting variables, and second, econometrical issues. This study employs a recently developed theoretical model to assess the utility of inflation accounting data to investors (see 7.2, pp. 214-218 and Chapter 8). The most prominent econometrical issues include: multicollinearity; heteroscedasticity; the appropriate specification of the valuation model; the measurement of independent variables; and omitted variables. As these problems differ from those associated with information content studies, evidence from both sets of studies can provide complementary insights on the same issue.

The arguments were presented supporting the use of share prices as the dependent variable in valuation studies. The analysis revealed that the explanatory power of the latter models is far greater than those models using share returns as the dependent variable. However to date, few studies have adopted this approach to assess the utility of inflation accounting data.

In view of the small number of valuation studies and their potential to contribute to the inflation accounting debate, the current study adopts this approach. The research design incorporates features which build on earlier research findings. These are detailed in the next chapter, together with the valuation model used in the study.

CHAPTER 7

MODEL BUILDING AND DATA COLLECTION

CHAPTER 7

MODEL BUILDING AND DATA COLLECTION

7.1 INTRODUCTION

Having presented the case for adopting a valuation approach to test the utility of inflation accounting data to investors, this chapter describes the model used in this study and the data collection procedures. The chapter contains:

a description of the model used in the study (7.2);

details on the application of Ohlson's model and definitions of the variables selected (7.3);

the steps taken to derive the sample population (7.4); and,

details on the sample period (7.5).

7.2 THE VALUATION MODEL

An objective of this study is to provide additional evidence on the IEP of inflation accounting data in relation to share prices. The previous chapter presents the theoretical justification (see 6.3, pp. 191-194) and advantages (see 6.4.1, pp. 200-205) of using a valuation approach to achieving this objective. It also stated that a problem associated with this approach is the lack of theoretically developed valuation models (see Atiase and Tse, 1986; Brennan, 1991). However, a theoretical model which appears appropriate for this study has recently been developed by Ohlson (1989).

Ohlson's model incorporates measures from both the income statement and the balance sheet. In recent times, researchers, e.g., Brennan and Schwartz (1982a, 1982b), Ohlson (1989), Ou and Penman (1989), have recognised that a valuation model incorporating both income and balance sheet measures may possess greater explanatory power than a model which focuses exclusively on the income statement or the balance sheet. Brennan (1991) argued that, as unexpected retained earnings increases the net assets available to generate future earnings and pay dividends, the relationship between a firm's book value and future cash flows cannot be ignored. He claimed that

> "in order to have a valuation model in which accounting earnings play a role, it is necessary to consider the balance sheet as well as the income statement," (p. 75).

Ohlson begins by stating that in a world of certainty the market equilibrium value of a company is equal to the present value of future expected dividends. However, he recognises that, in the real world of uncertainty, it is not possible to determine the present value of future expected dividends. Given this, Ohlson constructs a model which is applicable in an uncertain world which uses current period earnings, dividends and book values to predict future expected dividends. To construct his model, he relies on an equilibrium analysis of accounting based asset valuation in a multiperiod setting. This equilibrium is referred to as the clean surplus relation and is expressed in Table 7.1.

TABLE 7.1

CLEAN SURPLUS RELATION

$$X_t = Y_t - Y_{t-1} + D_t$$

where

X_t = earnings realised between dates t-1 and t

Y_t = book value (or owner's equity) at date t

D_t = dividends, net of capital contributions between dates t-1 and t.

To derive the clean surplus relation, Ohlson invokes 2 propositions proposed by Modigliani and Miller (1958, and 1961). The first is dividend payment irrelevance, i.e., an increase in current dividends is exactly offset by a decrease in the firm's current market value. The second states that expected future earnings depend on current dividend payments, i.e., increases in current dividends reduce expected future earnings.

Earnings and book value are shown to be value relevant as they are related to future expected dividends. The book value of equity represents assets that have the ability to generate future earnings. As dividends reduce book values, they reduce future earnings of the company. In this context, capital contributions increase book values which results in an increase in future expected earnings so new capital can be viewed as negative dividends.

Ohlson shows that, under certainty, a model based on earnings or dividends (cash flow model) and a model based on book values (stock model) are essentially equivalent representations of a share's value. However, when the analysis is extended to uncertainty a cash flow model and a stock model are viewed as 2 extreme valuation models. The uncertainty feature makes each model distinct, as they capture different aspects of valuation, depending on the underlying earnings process. The cash flow model describes an earnings process with no transitory elements, while the book value model describes a purely transitory process. In the uncertain setting, the earnings process has both transitory and nontransitory elements. In these circumstances, Ohlson argues that all 3 variables (earnings, dividends, book values) are relevant in the valuation of a company and he uses the clean surplus relation to draw all 3 variables together.

Ohlson assumes that there is a linear mapping between the 3 variables and the value of the company. The linearity assumption is based on his proof of a stochastic evolution of the information variables. The basic valuation function associated with the linear information dynamics is given in Table 7.2.

TABLE 7.2

LINEAR VALUATION FUNCTION

$$P_t = B_1X_t + B_2Y_t + B_3D_t$$

where

P_t = price of the security at date t

X_t = earnings realised between dates t-1 and t

Y_t = book value (or owner's equity) at date t

D_t = dividends, net of capital contributions between date t-1 and t.

B = regression coefficient

This model is not resticted to the above 3 variables. Other variables are value relevant if they are useful in predicting either future expected earnings or future expected book values. Thus, the model allows for the addition of other value relevant variables and, in this context, this study includes variables derived from data disclosed in compliance with SSAP 16. The next section discussess this application of Ohlson's model and defines the variables selected.

7.3 APPLICATION OF OHLSON'S MODEL AND DEFINITIONS OF THE VARIABLES

Applying Ohlson's model to this study, the following basic model is derived:

Company Value f(Book Value + Earnings + Dividends + Error Term)

To test for the utility of the inflation accounting data, an IEP approach is employed. This approach is taken, as the vast majority of companies disclosed this data in a supplementary statement. The approach has also been adopted by Bublitz, Frecka and McKeown (1985), Darnell and Skerratt (1989), and Bernard and Ruland (1991), and these studies showed that inflation accounting data added to the explanation of share prices given by HCA data. Furthermore, both the FASB (1979) and the ASC (1980) in their pronouncements on inflation accounting viewed this data as being supplementary to HCA data. Adopting an IEP approach results in Ohlson's model being formulated as set out in Table 7.3.

TABLE 7.3

VALUATION MODEL

CV_t = $B_1 CLSEHC_t + B_2 CCADJBV_t + B_3 EARNHC_t + B_4 CCADJE_t + B_5 DIV_t + e_t$

where

CV_t = Share Price * Number of Ordinary Shares Outstanding at period t (Company Value).

$CLSEHC_t$ = HC Closing Book Value of Shareholders' Equity, (i.e. closing ordinary share capital plus reserves(*) at period t).

$CLSECC_t$ = CC Closing Book Value of Shareholders' Equity, (i.e. closing ordinary share capital plus reserves(*) at period t).

$CCADJBV_t$ = $CLSECC_t - CLSEHC_t$

$OPSEHC_t$ = HC Opening Book Value of Shareholders' Equity, (i.e. opening ordinary share capital plus reserves(*) at period t-1).

$EARNHC_t$ = $CLSEHC_t - OPSEHC_t$ + Dividends less New Capital introduced in period t.

$OPSECC_t$ = CC Opening Book Value of Shareholders' Equity, (i.e. opening ordinary share capital plus reserves(*) at period t-1).

$EARNCC_t$ = $CLSECC_t - OPSECC_t$ + Dividends less New Capital introduced in period t.

$CCADJE_t$ = $EARNCC_t - EARNHC_t$

DIV_t = Dividends for the Ordinary Shareholders for period t, less for new capital introduced in the period t.

B = Regression coefficient

(Note * reserves are defined net of intangible assets)

The independent variables are computed from the data available on the Datastream database. Appendix 7.A gives details of the data extracted from the database.

The model given in Table 7.3 uses the company's market value as the dependent variable. To derive this value the share prices used were the closing prices on the day the financial reports were considered to be publicly available. The public disclosure date was assumed to be the date that the reports were received by the Extel Group. This date was extracted from the Extel Analysts' Service Cards. Identification of the exact date of public disclosure of the financial reports is not critical to this study. The critical factor was to ensure that the share prices used in the model were after the release of the financial reports.

7.3.1 The Inflation Accounting Variables

An advantage of formulating the model in the above framework is that it allows for the significance of unrealised holdings gains to be tested - the variable CCADJE measures unrealised holding gains of the period, and CCADJBV measures cumulative unrealised holding gains.

Baillie (1987) defines a holding gain as:

> "the increment arising from holding an asset during a period when the price increases" (p. 18)

Proponents of CCA point out that unrealised holding gains represent actual economic phenomena occurring in the current period, and therefore should be recognised (see Kam, 1990, p.434). Unrealised holding gains are not equivalent to a reclassification of HC profit but are an addition to this profit.

Separate disclosure of holding gains gives an indication of a critical part of a firm's commerical activities, namely, the quality of its buying performance. Edwards and Bell (1961, p. 73) strongly supported the disclosure of holding gains. They believed that a proper evaluation of past decisions requires dividing total profits between profit from operating activities and gains (or losses) from holding assets or liabilities while their prices changed.

One way that management tries to enhance the firm's market position is by holding a certain composition of assets and liabilities. Hendriksen (1982, p. 229) and Kam (1990, p. 415) stated that users want to know if these holding activities are successful. As conventional HCA income consists of a mixture of current operating profit and realised holding gains, it is impossible to determine the success of managements' holding activities.

Edwards and Bell (1961, p. 115) referred to unrealised holding gains as realisable cost savings. They believed this saving should be separately identified and included in income, as it represented an opportunity gain accruing to the firm, arising from purchasing an asset whose price subsquently rises.

According to Edwards and Bell (1961, p. 224), the dichotomy of income into operating income and holding gains would improve inter period and inter company comparisons of productive efficiency. Revsine and Weygangt (1974) jusified the dichotomisation of operating and holding gains on the basis that these components have different patterns of repeatability.

In contrast, in an assessment of the income dichotomisation case, Praskash and Sunder (1979) argued that separate disclosure of operating and holding gains offers no benefits. They believed that, in the majority of situations, holding and operating decisions are interdependent and that the dichotomisation of income is meaningless. However, the extent of any interdependencies is an empirical issue.

Details on holding gains may be of particular relevance to investors if they reflect future earning power. Revsine (1973, p.88) suggested that the inclusion of holding gains as income may be justified on the grounds that changes in asset market values reflect changes in future cash flows which are expected to be generated from the use of that asset. This is based on the assumption that an asset's market value is determined by discounting at some appropriate rate, future operating cash flows expected to be generated from using the asset. Therefore, increases or decreases in an asset's market value represent implicit changes in the asset's operating cash flow expectations. This implies an asset's market value is equivalent to its economic value.

As economic income embodies changes in the service potential of assets, it is obviously an indication of future cash flows (see Revsine, 1973, p. 93), and, thus, the measure of value most relevant to investors. Proponents (see Alexander, 1962) of replacement cost accounting argue that replacement cost income is a more accurate approximation of economic income than HCA.

Revsine (1973, p. 96) defined economic income as the difference between present (discounted) value of the expected net cash flows of a company between two points in time, excluding additional investments by and distributions to owners. He divided this income into 2 components, first, distributable cash flows - expected income, and, second, unexpected income. These components are defined as:

Expected income = market rate of return * opening value of net assets;

Unexpected income = sporadic increase in present value of net assets due to changes in expectations regarding the level of future cash flows.

Expected income measures the cash flows the company is capable of generating into the indefinite future, whereas unexpected income measures the changes in cash flows due to environmental factors not anticipated at the start of the period.

Revsine (1973, pp. 99-104) demonstrated how, in a perfectly competitive economy, replacement cost income is virtually identical to economic income. The current operating income is equal to the distributable cash flow component or expected income, and holding gains are directly related to unexpected income.

When perfect competition does not exist replacement cost income is an approximation of economic income. How good an approximation it is, depends on the relationship between the prices of assets and their corresponding future cash flows. Revsine (1973, p.107) referred to this as the covariance between asset prices and operating flow potential. At the aggregate level, he (p.108) asserted that a positive covariance between asset prices and cash flows was likely to exist and to the extent that a positive covariance exists, unrealised holding gains can be justifiably treated as income.

However, at the company level, Revsine recognised that there was no necessity for such a positive covariance. He believed that as asset prices increased the related operating cash flows could either increase, decrease or remain constant. Revsine suggested that

> "from one perspective it might actually appear that the firm's position has worsened after the price rise. That is, all subsequent replacements of the asset after the price rise will necessitate a greater outflow than similar replacement before the price rise." (p. 88).

Thus, firms may differ in their ability to respond to asset price changes. Where firms can successfully pass on price increases, holding gains may reflect increased future operating cash flows. In contrast, firms which cannot pass on input price increases will suffer a decrease in their future operating cash flows.

Revsine (1973, p. 188) suggested that empirical research is needed to discover the usefulness of replacement cost income in predicting future earnings flows. Hopefully, the model used in this study will provide some insight to this issue, by focusing on the utility of unrealised holding gains in relation to company values.

An issue related to the separation of operating and holding gains is whether these gains should be reported as income or capital maintenance adjustments. The previous discussion suggests that Edwards and Bell (1961) and Revsine (1973) supported treating these gains as income. However, the approach taken in SSAP 16 is to regard the holding gains as capital maintenance adjustments. Although this issue is not directly considered in the present study, an examination of the direction of the relationship between Company Value and holding gains may offer some insight to the discussion.

The sample selection procedures are described in the next section.

7.4 SELECTING THE SAMPLE

The study is based on a sample of 289 UK quoted industrial companies covering the period 1980 to 1983 inclusive. A list of the companies included in the sample is given in Appendix 7.B The sample size and the sample period are a function of the nature and objectives of the study and are discussed below.

7.4.1 Compilation of the Draft List of UK Quoted Companies

All UK industrial quoted companies were selected from The Times 1000 for the year 1982/83. This yielded 530 companies.

7.4.2 Verification that the Companies on the Draft List are included in the Database

The Datastream database was searched to establish if there was information available for each of the companies on the draft list. It was discovered that 14 companies were not on the database and these were removed from the sample, leaving 516 companies.

7.4.3 Classification of Companies into 3 GROUPS

The 516 companies were classified into 3 groups as described in Table 7.4.

TABLE 7.4

DEFINITION OF COMPANY GROUPS

GROUP	TYPE OF COMPANY
1	<u>Supportive Companies</u>: Companies which disclosed inflation accounting data prior to the mandatory disclosure period.
2	<u>Reluctant Companies</u>: Companies which disclosed inflation accounting data at or after the start of the mandatory disclosure period.
3	<u>Non Supportive Companies</u>: Companies which never disclosed inflation accounting data.

The division of the sample of companies into the above groups arises from 1 of the objectives of this study (see 1.4, p. 11). This objective derives from accounting policy makers belief that the disclosure of inflation accounting data would involve a learning process on the part of preparers (see 1.2, p. 6) and the findings of Archer and Steele (1984), Page (1984b), and Carsberg (1984). The forementioned studies showed that companies holding a positive attitude towards compliance took greater care in deriving the inflation accounting adjustments and that the management and the auditors of these companies had greater confidence in these adjustments. Given this evidence, it is possible that a difference may exist in the explanatory power of the inflation accounting adjustments for the Supportive and Reluctant Companies.

The database did not provide details on inflation accounting data prior to the mandatory disclosure period. To complete the classification, the steps set out below were undertaken.

(1) Newcastle University supplied microfiches containing financial reports for 268 companies in the sample. These microfiches were examined to determine a company's policy towards the disclosure of inflation accounting data in the premandatory period.

(2) A questionnaire was sent to the Financial Controllers of the remaining 248 companies requesting details on the companies' disclosure policy in respect of inflation accounting data. A follow up letter, together, with a second copy of the questionnaire was sent two months later. (Copies of both letters and the questionnaire are shown in Appendix 7.C). A total of 163 usuable replies was received, leaving the details outstanding for 85 companies.

(3) Microfiches were acquired from Companies House, London, for the remaining 85 companies. Again, the microfiches were examined to determine a company's disclosure policy in relation to inflation accounting data in the premandatory period.

Having obtained the required information for the sample of 516 companies, it was analysed to ascertain the status of each company with respect to the 3 groups described above. This yielded the classification presented in Table 7.5.

TABLE 7.5

COMPANY CLASSIFICATION

Group	Companies No.	Companies %
1	239	46
2	257	50
3	20	4
	516	100

7.4.4 Examining the Exhaustivenes of the Share Price Information in Relation to Groups 1 and 2

An examination of the database provided evidence of share price information for 177 of the 239 companies in group 1 and for 181 of the 257 companies in group 2. This provided an overall sample of 358 companies. The remaining companies in each group were either now suspended or had been taken over and the share price information was no longer available.

7.4.5 Exhaustiveness of the CCA Information Disclosed

It was discovered from the database that compliance with SSAP 16 for the first 3 years of mandatory disclosure was as set out in Table 7.6.

TABLE 7.6

COMPLIANCE WITH SSAP 16

Group	Complete Compliance		Partial Compliance		Total	
	No.	%	No.	%	No.	%
Supportive	150	42	27	7	177	49
Reluctant	139	39	42	12	181	51
	289	81	69	19	358	100

Note: Complete Compliance: includes companies which disclosed inflation accounting data for the first 3 years of mandatory disclosure.

Partial Compliance: includes companies which disclosed inflation accounting data for only 1 or 2 years of the first 3 years of mandatory disclosure.

Of the overall sample of 358 companies, 289 (81%) complied with SSAP 16 for the first 3 years of the mandatory period, while 69 (19%) companies complied with the standard for only some of those years. For the purposes of the present study, the analysis is confined to the former group of companies. Appendix 7.D shows the sample of companies classified by industry.

7.5 SAMPLE PERIOD

HC and CC accounting data were extracted for the first 3 years of mandatory disclosure of SSAP 16 information. This results in the sample companies having varying accounting year ends. Lobo and Song (1989) commented that selecting companies with different reporting dates should reduce the impact of cross sectional dependence, thereby reducing the bias in estimating standard errors. Details on the distribution of the reporting dates (for the final period) are presented in Appendix 7.E.

The availability of the SSAP 16 data on the database allows for Ohlson's model to be derived only for the second and third year of mandatory disclosure. The analysis is performed for 2 periods, as it is an objective of this study to attempt to discover whether or not a learning lag exists in relation to inflation accounting data. The possible existence of a learning lag was offered by a number of the studies in Chapter 4, to explain the market's failure to utilise inflation accounting data. Also, the FASB (1979, SFAS, para 14) and ASC (see Carsberg, 1984, p. 1) recognised that the measurement and use of inflation accounting data would require a substantial learning process on the part of preparers and users. The analysis is curtailed to 2 periods, as the number of companies complying with SSAP 16 in subsequent years dropped substantially. 40% (57%) of the Supportive (Reluctant) Companies did not comply with the Standard in the fourth mandatory period.

7.6 SUMMARY

This chapter described the valuation model which is used in this study, together with the sample selection and data collection procedures. The valuation model relates share prices to specific accounting variables. Both HC and inflation accounting variables are included in the model. The inflation accounting data was derived using the information disclosed by companies complying with SSAP 16 during its first 3 years of mandatory status.

The form of the model used assesses the IEP of 2 inflation accounting variables - cumulative unrealised holding gains and unrealised holding gains arising in the period. A review of the replacement cost literature provides a theoretical justification for the possible relevance of this data to investors.

A sample of 289 UK listed companies were identified. The sample companies were divided into 2 groups based on their policy towards the disclosure of inflation accounting data in the premandatory period. These groups were described as the Supportive Companies and the Reluctant Companies. The analysis will be performed for 2 test periods, the second and third year of mandatory compliance with SSAP 16. The following chapter presents details of the models derived, and an interpretation of the results.

CHAPTER 8

EMPIRICAL RESULTS

CHAPTER 8

EMPIRICAL RESULTS

8.1 INTRODUCTION

This chapter investigates empirically the utility of inflation accounting data to investors, by examining the IEP of this data in relation to share prices of UK listed companies. The chapter also examines empirically whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data. A further objective of the chapter is to discover whether or not a learning lag exists in relation to inflation accounting data. The valuation model described in the previous chapter is used to achieve the forementioned objectives. Specifically, this chapter is concerned with:

> describing the specification of linear models which attempt to explain share prices in terms of accounting variables (8.2);

the problems arising because of violations of the statistical assumptions underlying the model building, the steps taken to deal with these violations and the extent of their success (8.3); and,

presenting and interpreting the results from the models, especially insights to -

(1) the IEP of inflation accounting data,

(2) whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data, and

(3) whether or not a learning lag exists in relation to inflation accounting data (8.4 - 8.7).

8.2 SPECIFICATION OF VALUATION MODEL

The linear model building sought to explain cross sectional annual share prices in terms of HC and inflation accounting data for each of the first 3 years of mandatory compliance with SSAP 16. Beaver and Landsman (1983, p. 55) suggested the use of a cross sectional approach to assess the utility of inflation accounting data for the reasons outlined below.

Previous research has found a significant, positive cross sectional correlation between share prices and HCA data.

The time series approach is not feasible for inflation accounting data because of the limited number of observations per company. (This is particularly true of SSAP 16 data.)

There is likely to be increased "confidence" in the estimated regression coefficients, because there is greater variation in the independent variables. Beaver and Landsman suggested that the cross sectional variation in earnings changes is likely to be much greater than the average variability in earnings changes over time for a given company.

The approach assumes that the regression coefficients are constant in a given year, but may vary across years. Prior research suggests that there is considerable variation over time, but analogous evidence on the variation across firms is not available. (However, recent evidence by Easton and Zmijewski, 1989; Board and Walker, 1990; Colling and Kothari, 1989; and Strong and Walker, 1992; documents the presence of significant cross sectional variation.)

Multiple linear regression (MLR) was applied to the data to derive cross sectional valuation models. Green (1978, pp. 50-76) provides a detailed review of MLR, an overview now follows. Its objective is to explain the variation in the dependent variable (e.g., company value) in terms of a linear function of a set of independent variables (e.g., accounting variables).

The regression coefficients are estimated using the observed values of the dependent and independent variables. For the purposes of this study, the estimates were made using the least squares criterion. Koutsoyiannis (1977) described the rationale of this technique as follows:

> "It is intuitively obvious that the smaller the deviation from the line of regression, the better the fit of the line to the scatter of observations. Consequently from all possible lines we choose the one for which the deviation from the points is the smallest possible. The least squares criterion requires that the regression line be drawn in such a way as to minimise the sum of squares of the observations from it." (p. 61).

To derive the regression models, the forced entry method of variable selection was used. A description of this approach is given in SPSSx manual (1988, p. 851). This selection procedure allows all independent variables to enter the model, thereby making it easier to analyse, interpret and compare the findings from the valuation models.

The validity of the above procedure depends on the extent to which the assumptions of the regression model are satisified. The critical assumptions underlying the model, as discussed in Neter, Wasserman and Kutner (1985, p. 111), and Studenmund and Cassidy (1987, p. 61) are:

(1) the observed values of the independent variables are measured without error;

(2) the error term is normally distributed;

(3) the dependent variable is a linear function of the constant and the independent variable;

(4) the variance in the dependent variable is constant for all values of the independent variable, i.e., homoscedasicity exists;

(5) the error terms are independent, i.e., no serial correlation;

(6) important variables appear explicitly in the model; and,

(7) the independent variables do not show a high linear correlation, i.e., multicollinearity does not exist.

The extent to which these assumptions hold and the measures taken to avoid gross violations, are considered in 8.3 below.

8.3 BUILDING THE VALUATION MODELS

This section presents details of the models derived and the steps taken to assess their statistical validity. The procedures resulted in the derivation of 25 models and 17 were identified as being suitable for detailed analysis. Given the extent of the procedures used to derive a statistically valid model, this study, effectively became a mini case study in the empirical application of Ohlson's model. A discussion of the implications of the study for the application of Ohlson's model is deferred to Chapter 9 (see 9.4, pp. 333-335).

8.3.1 Basic Model

Chapter 7 described in detail the model used in this study. The model is presented again in Table 8.1.

TABLE 8.1

VALUATION MODEL

CV_t = $B_1 CLSEHC_t + B_2 CCADJBV_t + B_3 EARNHC_t + B_4 CCADJE_t + B_5 DIV_t + e_t$

where

CV_t = Share Price * Number of Ordinary Shares Outstanding at period t (Company Value).

$CLSEHC_t$ = Historical Cost Closing Book Value of Shareholders' Equity, (i.e. closing ordinary share capital plus reserves(*) at period t).

$CLSECC_t$ = Current Cost Closing Book Value of Shareholders' Equity, (i.e. closing ordinary share capital plus reserves(*) at period t).

$CCADJBV_t$ = $CLSECC_t - CLSEHC_t$

$OPSEHC_t$ = Historical Cost Opening Book Value of Shareholders' Equity, (i.e. opening ordinary share capital plus reserves(*) at period t-1).

$EARNHC_t$ = $CLSEHC_t - OPSEHC_t$ + Dividends less New Capital introduced in period t.

$OPSECC_t$ = Current Cost Opening Book Value of Shareholders' Equity, (i.e. opening ordinary share capital plus reserves(*) at period t-1).

$EARNCC_t$ = $CLSECC_t - OPSECC_t$ + Dividends less New Capital introduced in period t.

$CCADJE_t$ = $EARNCC_t - EARNHC_t$

DIV_t = Dividends for the Ordinary Shareholders for period t, less for new capital introduced in the period t.

B = Regression Coefficient

(Note * reserves are defined net of intangible assets)

The above form of the model is referred to as the basic model.

The statistical analysis began by including dummy variables in this basic model. This resulted in the formation given in Table 8.2.

TABLE 8.2

BASIC MODEL FORMATTED TO INCLUDE DUMMY VARIABLES

$$y_i = a + b_1x_{1i} + b_2x_{2i} + b_3x_{3i} + b_4x_{4i} + b_5x_{5i} + b_6x_{6i} + b_7x_{1i}x_{6i} + b_8x_{2i}x_{6i} + b_9x_{3i}x_{6i} + b_{10}x_{4i}x_{6i} + b_{11}x_{5i}x_{6i} + e_t$$

where

y_i = Company Value$_i$

x_{1i} = CLSEHC$_i$

x_{2i} = CCADJBV$_i$

x_{3i} = EARNHC$_i$

x_{4i} = CCADJE$_i$

x_{5i} = DIV$_i$

x_{6i} = Dummy Variables, 1 for Supportive Companies and 0 for Reluctant Companies

This procedure is recommended by Stewart (1984, pp. 138-143), Neter Wasserman and Kutner (1985, pp. 335-339), and Studenmund and Cassidy (1987, pp. 158-161) to test for the equality of regression models for different sample groups. In the above model, if the coefficients of the intercept dummy variable (x_{6i}) and the slope dummy variables are significantly different from zero this indicates that separate models should be derived for each sample group. The above model was derived for all companies for the second and third year of mandatory compliance with SSAP 16 (in future these periods will be referred to as periods 1 and 2 respectively). The models derived are presented below in Table 8.3 (for all regression results, the constant and coefficients are rounded to 2 decimal places).

An F test was used to test the significance of the coefficients of the intercept dummy variable and the slope dummy variables. Where the probability associated with the F statistic is small, the hypothesis that the dummy coefficients are not significantly different from zero may be rejected. Table 8.4 shows the F values associated with the variables in the basic models for period 1 and 2.

Table 8.4 reveals that, for period 1, the slope coefficients of the Dividend, and the Current Cost Adjusted Book Value variables are statistically significant. In period 2, the slope coefficients of Closing Historical Cost Shareholders' Equity, Current Cost Adjusted Book Value, and Dividends are significant. Therefore, separate models for the Supportive and Reluctant Companies were derived for both periods and are presented in Table 8.5.

TABLE 8.3

REGRESSION RESULTS INCLUDING DUMMY VARIABLES: BASIC MODELS

Period 1

$$y = 27708.24 - 4.56x_5x_6 + 19394.73x_6 + .73x_2 - .62x_4 + 4.2x_5$$
$$- .31x_3 + .43x_1x_6 + 1.21x_4x_6 + .56x_1 + .89x_3x_6 - 1.51x_2x_6$$

Period 2

$$y = 48085.94 - 15.06x_5x_6 - 15286.97x_6 - .06x_3 - 1.14x_4 + 1.33x_3x_6$$
$$+ .48x_2 + .32x_1 + 13.54x_5 + 1.31x_4x_6 + .90x_1x_6 - 1.24x_2x_6$$

where

y = Company Value

x_1 = CLSEHC

x_2 = CCADJBV

x_3 = EARNHC

x_4 = CCADJE

x_5 = DIV

x_6 = Dummy Variables, 1 for Supportive Companies, and 0 for Reluctant Companies

TABLE 8.4

F-VALUES: BASIC MODELS INCLUDING DUMMY VARIABLES

	F VALUE	SIGNIFICANCE OF F VALUE
Period 1		
D	.621	.4312
DCLSEHC	2.472	.1170
DCCADJBV	10.932	.0011
DEARNHC	.543	.4619
DCCADJE	1.364	.2438
DDIV	5.623	.0184
Period 2		
D	.244	.6220
DCLSEHC	14.693	.0002
DCCADJBV	6.455	.0116
DEARNHC	1.869	.1727
DCCADJE	1.462	.2277
DDIV	24.334	< .00005

where D = Dummy Variables, 1 for Supportive Companies, and 0 for Reluctant Companies

TABLE 8.5

REGRESSION RESULTS: BASIC MODELS

SUPPORTIVE COMPANIES

Period 1

$$y = 47102.97 - .35x_5 - .78x_2 + .59x_4 + .99x_1 + .58x_3$$

Period 2

$$y = 32816.97 - 1.52x_5 + 1.27x_3 + .17x_4 - .76x_2 + 1.22x_1$$

RELUCTANT COMPANIES

Period 1

$$y = 27708.24 + 4.2x_5 - .62x_4 + .56x_1 + .73x_2 - .31x_3$$

Period 2

$$y = 48085.94 + 13.54x_5 - 1.14x_4 - .06x_3 + .48x_2 + .32x_1$$

where

y = Company value

x_1 = CLSEHC

x_2 = CCADJBV

x_3 = EARNHC

x_4 = CCADJE

x_5 = DIV

As previously stated, the success of the above models depends on the extent to which the assumptions of the regression model are satisified. The following steps were taken to establish if there were gross violations of the regression assumptions.

The validity of the assumption that the data have been correctly measured cannot be verified directly. As every effort was made to avoid measurement errors in collecting and collating the data, it would be reasonable to suppose that there is no gross violation of this assumption.

The normality assumption was tested by plotting the observed cumulative distribution of the residuals (i.e., the difference between observed values and the values predicted by the model) against the distribution expected under the assumption of normality - a straight line. Substantial departures from a straight line are grounds for suspecting that the distribution is not normal. The residual plots for the Supportive (Reluctant) Companies are shown in Appendices 8.A.1 (8.B.1). An examination of these plots suggests that the values of the dependent variable are not normally distributed.

A Kolmogorov-Smirnov (K-S) one sample test was applied to the residuals to confirm the visual analysis. Support for the use of the K-S test is given by Siegel (1956), and Ezzamel Mar-Molinero and Beecher (1987). Observations are treated separately in the test. Thus, information loss resulting from aggregation of categories (as with a chi-square test) is avoided. The test involves comparing the cumulative distribution function for the observed variable with the cumulative normal distribution. The latter represents what would be expected under Ho. The test focuses on the greatest absolute divergence between the observed distribution and the normal distribution. The maximum deviation is called D, i.e., the K-S statistic. The lower the K-S statistic the closer the distribution is to a normal distribution. By examining the sample distribution of D, it is possible to determine the probability of the observed divergence occurring if the observations are drawn from a random sample with a normal distribution. At the 1% level of significance we do not reject Ho if D has a value of 1.63 or less. Table 8.6 shows the K-S statistic for the residuals.

The results of the K-S tests provides statistical evidence that the distribution of the residuals are not normal.

TABLE 8.6

K-S STATISTIC: BASIC MODELS

	K-S STATISTIC	(PROB.)
SUPPORTIVE COMPANIES		
Period 1	3.273	(0.000)
Period 2	3.026	(0.000)
RELUCTANT COMPANIES		
Period 1	3.349	(0.000)
Period 2	3.641	(0.000)

The validity of assumptions (3) to (6) (see p. 238) were examined by plotting the standardised residuals against the predicted values of the dependent variable (see Neter, Wasserman and Kutner, 1985, pp. 111-122; Draper and Smith, 1981, pp. 141-162; Norusis, 1983, pp. 146-149). For each model these plots are shown in Appendix 8.C.1 (8.D.1) for the Supportive (Reluctant) Companies. A random distribution of the residuals indicates that the assumptions are met. An examination of the plots provides evidence of an observable pattern, implying that assumptions (3) to (6) are violated.

For assumption (7) Neter, Wasserman and Kutner (1985, p. 391) suggest the use of variance inflation factors (VIF) to detect the presence of severe multicollinearity. These factors measure how much the variances of the estimated regression coefficients are inflated as compared to independent variables which are not linearly related. A VIF of 1, indicates a variable is not linearly related to the other independent variables. The largest VIF among the independent variables is often used as an indicator of the severity of multicollinearity. Neter, Wasserman and Kutner suggest that a VIF in excess of 10 implies that multicollinearity may be unduly influencing the regression model.

TABLE 8.7

VARIANCE INFLATION FACTORS: BASIC MODELS

SUPPORTIVE COMPANIES	PERIOD 1	PERIOD 2
	VIF	VIF
CLSEHC	24.035	18.328
CCADJBV	21.730	13.449
EARNHC	25.735	2.857
CCADJE	4.870	4.212
DIV	4.136	5.036
RELUCTANT COMPANIES		
CLSEHC	13.816	8.046
CCADJBV	7.643	6.360
EARNHC	12.938	5.492
CCADJE	2.782	1.661
DIV	1.822	3.270

Table 8.7 provides evidence of severe multicollinearity in both periods for the Supportive Companies and in period 1 for the Reluctant Companies. This is not surprising as the 3 variables,

earnings, book value, and dividends are related in the financial statements through the clean surplus relation which Ohlson derives as an equilibrium condition of his model. Sougiannis (1990) also found evidence of multicollinearity in his study, when he used Ohlson's model to test for the relevance of research and development expenditure in explaining company values.

Appendix 8.E.1 presents the correlation coefficients for each of the variables for both periods for the Supportive and Reluctant Companies. An examination of the simple correlations shows that many of the intercorrelations are very high. For both groups and in both periods, the correlation between some of the independent variables is greater than the multiple correlation coefficient (Klein (1962) test for multicollinearity). The severity of the multicollinearity may explain the switch in the sign of the coefficients of a number of the variables when they are included in the multivariate model. This occurred in each model in both periods, which makes it very difficult to identify the influence of the individual variables in each of the models.

As the previous models suffered from severe multicollinearity, consideration was given to remedial action, which is now outlined.

8.3.2 First Difference Models

Deriving models using first differences of the variables, is one solution suggested by Studenmund and Cassidy (1987, p. 195) for severe multicollinearity. In the present study, this was defined as the value of the variable at the end of the third mandatory period less its value at the end of the second mandatory period.

Before deriving the model based on first differences, again consideration was given to whether separate models should be derived for the Supportive and Reluctant Companies. As before this was achieved by including dummy variables in the first differences model.

When deriving the model based on first differences the constant (intercept) term should be excluded from the regression equation if Ohlson's model is assumed to be stationary over time (see also, Maddala, 1977, p. 192). Ohlson asserts that his model is stationary over time if the model is perfectly defined in terms of book value, earnings and dividends. However, he acknowledges that his model can be extended to allow for other valuation relevant information and he makes no comments about the stability of this other information over time. Furthermore, Neter, Wasserman and Kutner (1985, pp. 163-164), and Studenmund and Cassidy (1987, pp. 163-164) stated that, even if the theory specifically supports the ommission of the constant term, it is more prudent to include the constant in the regression equation. Neter, Wasserman and Kutner (1985) stated that

> "even when it is known that the regression function must go through the origin, the function might not be linear or the variance of the error terms might not be constant. Often one cannot be sure in advance that the regression function goes through the origin, and it is then safe practice to use the general model. If the regression does go through the origin, *b*o will differ from 0 only by a small sampling error, and unless the sample size is very small, use of the model has no disadvantages of any consequence. If the regression does not go through the origin, use of the general model will avoid potentially serious difficulties resulting from forcing the regression through the origin when this is not appropriate." (pp. 163-164)

As a result of the above discussion, the model based on first differences was derived with and without a constant term in the regression equation. Details of both models are set out in Table 8.8.

TABLE 8.8

FIRST DIFFERENCE MODELS INCLUDING DUMMY VARIABLES

ALL COMPANIES (with constant)

$$y = 17654.37 - 1.84x_6x_5 + 603.18x_6 + 1.3x_1 - .07x_4 + .95x_6x_1 - .54x_3 - 1.26x_6x_2 + 1.56x_5 + .95x_6x_4 - .85x_6x_3 + .16x_2$$

ALL COMPANIES (without constant)

$$y = - 1.97x_6x_5 + 18257.55x_6 + 1.46x_1 - .02x_4 + .79x_6x_1 - .75x_3 - 1.06x_6x_2 + 1.69x_5 + .89x_6x_4 - .64x_6x_3 - .03x_2$$

where

y = Company value

x_1 = CLSEHC

x_2 = CCADJBV

x_3 = EARNHC

x_4 = CCADJE

x_5 = DIV

x_6 = Dummy Variables, 1 for Supportive Companies, and 0 for Reluctant Companies

An examination of the above models reveals that separate models should be derived for the 2 groups of companies. The model which includes the constant shows significant slope coefficients for (changes in) Dividends, Historical Cost Shareholders' Equity, Current Cost Adjusted Book Value and Current Cost Adjusted Earnings. The model which excludes the constant term shows significant slope coefficients for (changes in) Dividends, Historical Cost Shareholders' Equity, Current Cost Adjusted Earnings and the Dummy Variable. Separate models were derived for the 2 groups using first differences which included and excluded the constant term. The results of the regression analysis are presented in Table 8.9.

For both groups, of companies the coefficient of the constant term is significant. This suggests that the mean effect of the variables captured by the constant term is not stationary over time. Studenmund and Cassidy (1987, p. 164) warn that surpressing the constant term when it is significant can potentially bias the estimated coefficients and inflate their t values. Table 8.10 sets out details of the t value for each of the variables in each of the models.

TABLE 8.9

REGRESSION RESULTS: FIRST DIFFERENCE MODELS

<u>SUPPORTIVE COMPANIES (with constant)</u>

$$y = 18257.55 - .28x_5 + 2.25x_1 + .88x_4 - 1.38x_3 - 1.1x_2$$

<u>SUPPORTIVE COMPANIES (without constant)</u>

$$y = - .23x_5 + 2.44x_1 + .95x_4 - 1.38x_3 - 1.18x_2$$

<u>RELUCTANT COMPANIES (with constant)</u>

$$y = 17654.37 + 1.56x_5 + 1.30x_1 + .16x_2 - .07x_4 - .53x_3$$

<u>RELUCTANT COMPANIES (without constant)</u>

$$y = 1.69x_5 - .75x_3 - .03x_2 - .02x_4 + 1.46x_1$$

where

y = Company value

x_1 = CLSEHC

x_2 = CCADJBV

x_3 = EARNHC

x_4 = CCADJE

x_5 = DIV

TABLE 8.10

T-VALUE: FIRST DIFFERENCE MODELS

SUPPORTIVE COMPANIES

MODEL (INCLUDES CONSTANT) Variable	t-value	MODEL (EXCLUDES CONSTANT) Variable	t-value
CLSEHC	9.855	CLSEHC	11.379
CCADJBV	-4.317	CCADJBV	-4.645
EARNHC	-9.172	EARNHC	-9.079
CCADJE	3.865	CCADJE	4.204
DIV	-.816	DIV	-.671
CONSTANT	2.147		

RELUCTANT COMPANIES

MODEL (INCLUDES CONSTANT)		MODEL (EXCLUDES CONSTANT)	
CLSEHC	6.594	CLSEHC	7.489
CCADJBV	.380	CCADJBV	-.079
EARNHC	-1.441	EARNHC	-1.998
CCADJE	-.249	CCADJE	-.066
DIV	3.203	DIV	3.406
CONSTANT	2.864		

The Table illustrates that there is an increase in the t value of significant explanatory variables when the model is forced to pass through the origin. However, the significant explanatory variables are the same in both forms of the model for the 2 groups.

Therefore, subsequent analysis is based on the model which excluded the constant term as this is the theoretically correct formation of Ohlson's model if we assume his model is perfectly defined in terms of book value, earnings and dividends.

As the objective of using first differences is to eliminate as far as possible the problems of severe multicollinearity, the extent to which this is achieved is considered next.

Table 8.11 shows the VIFs for each variable in the Supportive Companies' models.

TABLE 8.11

VARIANCE INFLATION FACTORS: FIRST DIFFERENCE MODEL, SUPPORTIVE COS.

SUPPORTIVE COMPANIES	VIF
CLSEHC	1.739
CCADJBV	10.670
EARNHC	4.534
CCADJE	8.414
DIV	5.784

The VIFs for (changes in) Dividends, Current Cost Adjusted Earnings and Current Cost Adjusted Book Value are quite high. Also, Appendix 8.E.2 shows that there is a high intercorrelation between a few of these variables. 2 intercorrelations exceed .8686, the Multiple R value for the model. This may explain the switch in the signs of the coefficient of (changes in) Dividends, and Current Cost Adjusted Earnings when these variables were included in the multivariate model.

The VIFs of the variables in the Reluctant Companies' model are presented in Table 8.12.

TABLE 8.12

VARIANCE INFLATION FACTORS: FIRST DIFFERENCE MODEL, RELUCTANT COS

RELUCTANT COMPANIES	VIF
CLSEHC	2.779
CCADJBV	2.948
EARNHC	2.712
CCADJE	2.370
DIV	1.105

Table 8.12 suggests that severe multicollinearity no longer exists. Appendix 8.E.2 shows that the correlation coefficicents between the variables in the Reluctant Companies appeared reasonable. None of the intercorrelations exceed .72025, the value of Multiple R for the model.

The models were then examined to determine the extent to which the other regression assumptions were satisifed.

Appendix 8.A.2 (8.B.2) presents the plots of the observed cumulative distribution of the residuals against the normal cumulative distribution for the first difference models for the Supportive (Reluctant) Companies. The plots indicate a lack of fit of the set of variables to multivariate normality, although, for the Supportive Companies, there is a slight improvement over the plots of the basic models.

The results of the visual examination were confirmed by the findings from the K-S test (see Table 8.13).

TABLE 8.13

K-S STATISTICS: FIRST DIFFERENCE MODELS

	K-S STATISTIC	(PROB.)
SUPPORTIVE COS.	2.456	(0.000)
RELUCTANT COS.	3.367	(0.000)

To test assumptions (3) to (6) (see p. 238) the standardised residuals were plotted against the predicted values of the dependent variable. The plots for each model are shown in Appendix 8.C.2 (8.D.2) for the Supportive (Reluctant) Companies. There is evidence of an observable pattern, implying the assumptions are not met.

As stated earlier, the purpose of using the first difference model is to derive a statistically sound model. Although, there is less evidence of multicollinearity (especially in the case of the Reluctant Companies), the previous discussion suggests that some of the other assumptions of the regression model are still being violated. The next section considers further adjustments made to the basic and first difference models in an effort to improve their statistical validity.

8.3.3 Deflated Valuation Models

A common approach taken in an attempt to improve the behaviour of the regression residuals is to scale the variables. The effect of deflation is to give more emphasis to observations with small variances and less emphasis to observations with large variances. In regression computations, this has the effect of making the transformed variances more equal in size.

There is little or no theory concerning the choice of scaling variable (see Christie, 1987) and no statistical procedures available to identify the form of heteroscedasticity where more than one variable determines the heteroscedasticity (see Johnston, 1984, p. 301). Lustgarten (1982), Beaver and Landsman (1983, p. 78), Page (1984a) and Darnell and Skerratt (1989) scaled by variables such as assets, number of shares, sales and shareholders' equity. These studies found that the significance of the inflation accounting variables varied with the deflator employed. Also, some of the studies that employed deflators, e.g., Lustgarten (1982) and Darnell and Skerratt (1989) failed to substantially improve the behaviour of the residuals.

Despite the limitations of deflation, it is frequently used in accounting studies and so this study examined its potential to improve the statistical validity of the previous models. First, the Glejser (1969) test for heteroscedasticity was performed. Glejser proposed that the absolute values of the least squares residuals should be regressed on a variable which is thought to be associated with the residuals' variance. A problem with the test is identifying the relevant variable and its functional form. Furthermore, where the residuals have been generated by a mixed heteroscedastic pattern, the Glejser test generally does not capture this factor.

The present study selected the variables - Sales, and Closing Historical Cost Shareholders' Equity (CLSEHC) - as possible factors causing heteroscedasticity. These variables were chosen as they had been used in previous inflation accounting studies and they were likely to vary with company sizes. Many authors suggest (e.g., Studenmund and Cassidy, 1987, p. 255) that differences in company sizes can cause heteroscedasticity.

Regression equations were derived using the absolute value of the residuals from the basic models and the first difference models as the dependent variables and Sales or CLSEHC as the independent variables. For the first difference models, the independent variables Sales and CLSEHC were defined as the first difference in these variables. The form of the Glejser equations were:

$$|e_i| = a + bx_i + w_i$$

where

e_i = the estimated residuals from the basic models or the first difference models

x_i = Sales, or CLSEHC, or Sales, or CLSEHC

w_i = error term

With the above functional form, the significance of both the intercept *a* and the slope *b* must be tested (see Pindyck and Rubinfeld, 1981, p. 151). If *b* is significantly different from zero, this provides evidence of heteroscedasticity. If *b* is significant but *a* is not, we can assume that $Var(e_i) = b^2x^2{}_i$, and that each variable should be deflated by x_i. If both *a* and *b* are significantly different from zero, it is appropriate to deflate each variable by $a + bx_i$, rather than x_i. The derived equations are presented in Appendix 8.F. Tables 8.14 and 8.15 show the significance of the constant and the slope coefficient in each of Glejser's regression equations.

TABLE 8.14

F-VALUE: GLEJSER EQUATIONS, BASIC MODELS

SUPPORTIVE COMPANIES

	DEFLATOR	VARIABLE	F VALUE	SIGNIFICANCE OF F VALUE
PERIOD 1	SALES	CONSTANT	41.770	< .00005
		SALES	6.765	.0102
	CLSEHC	CONSTANT	40.359	< .00005
		CLSEHC	9.588	.0023
PERIOD 2	SALES	CONSTANT	28.095	< .00005
		SALES	7.605	.0066
	CLSEHC	CONSTANT	25.459	< .00005
		CLSEHC	10.984	.0012

RELUCTANT COMPANIES

	DEFLATOR	VARIABLE	F VALUE	SIGNIFICANCE OF F VALUE
PERIOD 1	SALES	CONSTANT	21.609	< .00005
		SALES	38.856	< .00005
	CLSEHC	CONSTANT	17.371	.0001
		CLSEHC	50.380	< .00005
PERIOD 2	SALES	CONSTANT	45.812	< .00005
		SALES	23.528	< .00005
	CLSEHC	CONSTANT	40.655	< .00005
		CLSEHC	29.272	< .00005

TABLE 8.15

F-VALUE: GLEJSER EQUATIONS, FIRST DIFFERENCE MODELS

SUPPORTIVE COMPANIES

DEFLATOR	VARIABLE	F VALUE	SIGNIFICANCE OF F VALUE
SALES	CONSTANT	36.619	< .00005
	SALES	1.394	.2397
CLSEHC	CONSTANT	24.444	< .00005
	CLSEHC	29.304	< .00005

RELUCTANT COMPANIES

DEFLATOR	VARIABLE	F VALUE	SIGNIFICANCE OF F VALUE
SALES	CONSTANT	25.164	< .00005
	SALES	17.478	.0001
CLSEHC	CONSTANT	27.399	< .00005
	CLSEHC	8.623	.0039

Table 8.14 (basic models) shows that in each equation both the independent variable and the constant are significant. Table 8.15 (first difference models) shows that the constant is significant in all equations and the independent variable is significant in 3 of the 4 equations, being insignificant for the Supportive Companies when Sales is the deflator.

The value of the deflators was then computed using the equations derived from the Glejser test. The form of the deflated model varied with the deflator being used. When Sales was the deflator, the model was formulated as follows:

$$CV_i/D = B_0/D + B_1CLSEHC_i/D + B_2CCADJBV_i/D + B_3EARNHC_i/D + B_4CCADJE_i/D + B_5DIV_i/D + e_i/D$$

where

D = sales, which is computed using the equation derived by Glejser's test (see Appendix 8.F).

This model formation was used, as Sales was not an explanatory variable in the original equation (see Studenmund and Cassidy, 1987, p. 259; Stewart, 1984, p. 157). The model has no constant term, so the regession equation was forced through the origin.

When CLSEHC was used as the deflator, the model included a constant term and was formulated as follows:

$$CV_i/D = B_0/D + B_1 + B_2CCADJBV_i/D + B_3EARNHC_i/D + B_4CCADJE_i/D + B_5DIV_i/D + e_i/D$$

where

D = CLSEHC, which is computed using the equation derived by Glejser's test.

Using the above deflated forms of the models the equations in Tables 8.16, 8.17 and 8.18 were derived:

TABLE 8.16

DEFLATED BASIC MODELS, DEFLATOR = SALES

SUPPORTIVE COMPANIES

Period 1

$$y = 42848.15x_6 + 1.18x_4 - .77x_2 - .39x_5 + 2.74x_3 + .75x_1$$

Period 2

$$y = 28830.78x_6 + .39x_4 - .88x_5 + 4.4x_3 - .47x_2 + .83x_1$$

RELUCTANT COMPANIES

Period 1

$$y = 7582.18x_6 + .72x_4 + 3.06x_5 + 3.35x_3 + .18x_2 + .42x_1$$

Period 2

$$y = 14299.05x_6 + 1.71x_4 + 6.01x_5 + .2x_2 + 2.54x_3 + .64x_1$$

where

y = Company value/Deflator

x_1 = CLSEHC/Deflator

x_2 = CCADJBV/Deflator

x_3 = EARNHC/Deflator

x_4 = CCADJE/Deflator

x_5 = DIV/Deflator

x_6 = 1/Deflator

TABLE 8.17

DEFLATED BASIC MODELS, DEFLATOR = CLSEHC

SUPPORTIVE COMPANIES

Period 1

$$y = .87 - .01x_5 + 4.84x_3 + .34x_4 - .26x_2$$

Period 2

$$y = .70 - 1.11x_5 - .4x_4 + 6.13x_3 + .47x_2$$

RELUCTANT COMPANIES

Period 1

$$y = .29 + 2.01x_5 + .01x_4 + 5.11x_3 + .53x_2$$

Period 2

$$y = .38 + 6.38x_5 + .76x_4 + 3.88x_3 + .88x_2$$

where

y = Company value/Deflator

x_2 = CCADJBV/Deflator

x_3 = EARNHC/Deflator

x_4 = CCADJE/Deflator

x_5 = DIV/Deflator

TABLE 8.18

DEFLATED FIRST DIFFERENCE MODELS

<u>RELUCTANT COMPANIES</u>: DEFLATOR = SALES

$$y = 8015.12x_6 - .34x_3 + 1.41x_5 - .3x_4 + 1.58x_1 + .8x_2$$

<u>SUPPORTIVE COMPANIES</u>: DEFLATOR = CLSEHC

$$y = .80 + .12x_5 + .01x_4 - 1.12x_3 - .11x_2$$

<u>RELUCTANT COMPANIES</u>: DEFLATOR = CLSEHC

$$y = .90 + .97x_5 - .18x_4 + 1.13x_2 + .3x_3$$

where

y = Company value/Deflator

x_1 = CLSEHC/Deflator

x_2 = CCADJBV/Deflator

x_3 = EARNHC/Deflator

x_4 = CCADJE/Deflator

x_5 = DIV/Deflator

x_6 = 1/Deflator, where the deflator is Sales

The deflated models were examined to determine how well they satisifed the assumptions of the regresssion model (see p. 238). The plots of the observed cumulative distribution of the residuals against the distribution expected under the assumption of normality for the Supportive (Reluctant) Companies are presented in Appendix 8.A.3 (8.B.3).

For the Supportive Companies the evidence indicated that the plots of the deflated models are closer to a normal distribution than the plots of the undeflated models. However, the improvement is small and the best plot is for the first difference model deflated by CLSEHC.

In the case of the Reluctant Companies, there appears to be no noticeable improvement in the plots of the deflated models over the plots of the basic models when Sales was used as the deflator. However, when the deflator was CLSEHC, the plots of the basic models are substantially improved. For both deflators, the plots of the deflated first differences models are closer to a normal distribution than the respective plot of the undeflated model.

Assumptions (3) to (6) (see p. 238) were again tested by examining the plots of the standardised residuals against the predicted values of the dependent variables. These plots are presented in Appendix 8.C.3 (8.D.3) for the Supportive (Reluctant) Companies. Overall, there is evidence of an observable pattern in the plots suggesting that the assumptions are violated. However, for the Supportive and Reluctant Companies the plots for the first difference model deflated by CLSEHC appear to be random.

K-S tests were performed to help interpret the results from the visual analysis of the residual plots (see Table 8.19). Details of the K-S statistics from the earlier models are also presented to facilitate comparisons.

TABLE 8.19

K-S STATISTICS

	K-S STATISTIC	(PROB.)
<u>SUPPORTIVE COMPANIES</u>		
Period 1		
Basic Model	3.273	(0.000)
Deflated Basic Model (Deflator = Sales)	2.860	(0.000)
Deflated Basic Model (Deflator = CLSEHC)	3.231	(0.000)
Period 2		
Basic Model	3.026	(0.000)
Deflated Basic Model (Deflator = Sales)	3.057	(0.000)
Deflated Basic Model (Deflator = CLSEHC)	2.834	(0.000)
First Difference Model	2.456	(0.000)
First Difference Model (Deflator = CLSEHC)	2.157	(0.000)
<u>RELUCTANT COMPANIES</u>		
Period 1		
Basic Model	3.349	(0.000)
Deflated Basic Model (Deflator = Sales)	2.887	(0.000)
Deflated Basic Model (Deflator = CLSEHC)	2.191	(0.000)
Period 2		
Basic Model	3.641	(0.000)
Deflated Basic Model (Deflator = Sales)	2.862	(0.000)
Deflated Basic Model (Deflator = CLSEHC)	2.902	(0.000)
First Difference Model	3.367	(0.000)
First Difference Model (Deflator = Sales)	2.715	(0.000)
First Difference Model (Deflator = CLSEHC)	3.126	(0.000)

Both the visual examination of the residual plots and the K-S statistics suggest that the residuals are not normally distributed.

The VIFs associated with each of the variables in the deflated models were examined to determine if the independent variables are highly correlated. Details of VIFs are shown below in Tables 8.20 and 8.21.

TABLE 8.20

VARIANCE INFLATION FACTORS: DEFLATED MODELS, SUPPORTIVE COMPANIES

	Period 1 VIF	Period 2 VIF
Deflated Basic Model (Deflator = Sales)		
CLSEHC	7.079	6.262
CCADJBV	5.358	5.051
EARNHC	5.656	2.468
CCADJE	1.320	1.545
DIV	1.488	1.391
SALES	1.320	1.316
Deflated Basic Model (Deflator = CLSEHC)		
CCADJBV	3.424	1.934
EARNHC	3.279	1.384
CCADJE	1.248	1.310
DIV	1.305	1.294

Deflated First Difference Model (Deflator = CLSEHC)	Period 1 to Period 2 VIF
CCADJBV	12.494
EARNHC	5.507
CCADJE	9.281
DIV	6.245

TABLE 8.21

VARIANCE INFLATION FACTORS: DEFLATED MODELS, RELUCTANT COMPANIES

	Period 1 VIF	Period 2 VIF
RELUCTANT COMPANIES		
Deflated Basic Model (Deflator = Sales)		
CLSEHC	7.558	4.101
CCADJBV	3.854	3.004
EARNHC	4.615	2.762
CCADJE	1.479	1.654
DIV	1.194	1.539
SALES	1.355	1.326
Deflated Basic Model (Deflator = CLSEHC)		
CCADJBV	2.755	2.242
EARNHC	1.455	1.499
CCADJE	2.257	1.985
DIV	1.134	1.420

	Period 1 to Period 2 VIF
Deflated First Difference Model (Deflator = Sales)	
CLSEHC	2.869
CCADJBV	3.218
EARNHC	2.979
CCADJE	2.575
DIV	1.061
SALES	1.189
Deflated First Difference Model (Deflator = CLSEHC)	
CCADJBV	1.442
EARNHC	2.195
CCADJE	2.126
DIV	1.519

The VIFs reveal that there is only 1 model in which the VIF is greater than 10. This occurs in the first difference model for the

Supportive Companies when CLSEHC was the deflator. Appendix 8.E.3 presents details of the correlation coefficient between each of the variables for the above models.

Table 8.22, which shows the average VIF for each model for the Supportive and Reluctant Companies, clearly confirms the reduction in the multicollinearity problem. (The models have been given abbreviated titles for ease of reference, these titles are defined in Appendix 8.G.)

TABLE 8.22

AVERAGE VARIANCE INFLATION FACTORS

MODEL	SUPPORTIVE COMPANIES	RELUCTANT COMPANIES
BMP1	16.10	7.81
BMP2	8.78	4.96
D1BMP2	3.01	2.40
D2BMP1	2.31	1.90
D2BMP2	1.48	1.79
FD	6.23	2.38
D1FD		2.32
D2FD	8.38	1.82

Despite the reduction in the severity of the multicollinearity problem in the deflated models, other violations of the regression assumptions are still present. In a recent article, Barth, Beaver and Stinson (1991) suggested that estimation in per share form may be a more appropriate adjustment for heteroscedasticity than book value deflation. Given this view, the basic model for periods 1 and 2 for the Supportive Group was derived using a per share form of the model. Although, there is less evidence of heteroscedasticity the models showed evidence of severe multicollinearity. Details of VIFs for each of the models are given in Appendix 8.H. In view of the level of multicollinearity in these models, further analysis of the models in per share form would appear to be unhelpful.

Generally, violations of the regression assumptions (e.g., nonlinearity, multicollinearity, heteroscedasticity) are dealt with by applying transformation to the variables in the model (see Neter, Wasserman and Kutner, 1985, pp. 132-133). Given that this approach assumes that the original relationship between the accounting data and share prices is nonlinear, it is in direct conflict with Ohlson's model, which is derived from a linear mapping from accounting data to share prices. Thus, in the context of the present study, transformation is not an acceptable solution. In a final attempt to improve the statistical validity of Ohlson's basic model, a further classification of the companies was undertaken.

8.3.4 Valuation Models for each Beta Category

The Supportive and Reluctant Companies were classified into similar risk categories. The systematic risk (beta) associated with each company was used to classify the companies. Each company's beta was extracted from the Datastream database. Appendix 8.I shows the distribution of beta for the Supportive and Reluctant Companies. For both groups, the distributions approximate a normal distribution, as shown by the K-S test in Appendix 8.I. Using the range from each distribution, the sample of companies in each group was divided into 5 risk categories. Details of the beta range and the number of companies in each category are given in Table 8.23.

TABLE 8.23

COMPANIES CLASSIFIED BY BETA

	SUPPORTIVE COMPANIES		RELUCTANT COMPANIES	
	Beta Range	No. of Cos.	Beta Range	No. of Cos.
CATEGORY				
1	<.511	7	<.528	9
2	.511-.725	13	.528-.707	21
3	.726-.940	50	.708-.888	48
4	.941-1.155	60	.889-1.069	42
5	>1.155	20	>.1.069	19

Table 8.23 shows that the number of companies in categories 1, 2 and 5 is too small for meaningful regression analysis. So, the basic model was derived for categories 3 and 4 (above), using data from the first period. An examination of the 4 models reveals evidence of severe multicollinearity and heteroscedasticity. Appendix 8.J presents details of VIF's associated with each of these models and the standardised residual plots are given in Appendix 8.K. As this approach failed to provide improved statistical models, no further analysis of these models was undertaken.

Given the issues raised in relation to the empirical application of Ohlson's model in its basic form, alternative specifications of the model were investigated in an attempt to derive a better specified model. Details of the specific results are presented in Appendix 8.L. Overall the outcome of these investigations provided no significant additional conclusions nor was it possible to derive a consistently better specified model.

Table 8.24 presents a summary of the models derived for the Supportive and Reluctant Companies which relied on the basic form of Ohlson's model. It identifies which models are analysed in detail in the remainder of this chapter. Excluded models are identified and the reasons why a model is excluded are given.

TABLE 8.24

SUMMARY OF SUPPORTIVE AND RELUCTANT COMPANIES' MODELS

	Included/ Excluded	Reason why a Model is Included/ Excluded
Supportive Companies		
BMP1	Included	Basic theoretical model
BMP2	Included	Basic theoretical model
FD (with constant)	Excluded	Theoretically unsound
FD	Included	Less evidence of multicollinearity
D1BMP1	Included	Severe multicollinearity eliminated
D1BMP2	Included	Severe multicollinearity eliminated
D2BMP1	Included	Severe multicollinearity eliminated
D2BMP2	Included	Severe multicollinearity eliminated
D2FD	Included	Improved scatterplot
PSBMP1	Excluded	Severe multicollinearity
PSBMP2	Excluded	Severe multicollinearity
B3BMP1	Excluded	Severe multicollinearity
B4BMP1	Excluded	Severe multicollinearity
Reluctant Companies		
BMP1	Included	Basic theoretical model
BMP2	Included	Basic theoretical model
FD (with constant)	Excluded	Theoretically reasons
FD	Included	Severe multicollinearity eliminated
D1BMP1	Included	Severe multicollinearity eliminated
D1BMP2	Included	Severe multicollinearity eliminated
D2BMP1	Included	Severe multicollinearity eliminated
D2BMP2	Included	Severe multicollinearity eliminated
D1FD	Included	Severe multicollinearity eliminated
D2FD	Included	Severe multicollinearity eliminated
B3BMP1	Excluded	Severe Multicollinearity
B4BMP1	Excluded	Disimproved scatterplot

Note
Definitions of abbreviated titles are given in Appendix 8.G

A summary of the extent to which the analysed models satisfy the assumptions of the regression model is given in Table 8.25.

TABLE 8.25

EXTENT TO WHICH THE ANALYSED MODELS SATISFY THE REGRESSION ASSUMPTIONS

	REGRESSION ASSUMPTIONS (p. 238)		
	(2)	(3)-(6)	(7)
<u>Supportive Companies</u>			
BMP1	V	V	V
BMP2	V	V	V
FD	V	V	V
D1BMP1	V	V	S
D1BMP2	V	V	S
D2BMP1	V	V	S
D2BMP2	V	V	S
D2FD	V	S	V
<u>Reluctant Companies</u>			
BMP1	V	V	V
BMP2	V	V	S
FD	V	V	S
D1BMP1	V	V	S
D1BMP2	V	V	S
D2BMP1	V	V	S
D2BMP2	V	V	S
D1FD	V	V	S
D2FD	V	S	S

where

V = regression assumption/s is/are violated.

S = appears to be no gross violation/s of the regression assumption/s.

Given the problems encountered in deriving a statistically valid model before presenting and interpreting the results, the next section dicusses the implications of the regression assumptions being violated.

8.3.5 Implications of Violations of the Regression Assumptions

Table 8.25 shows that the assumption that the error term is normal is breached in all the models analysed. However, with large sample sizes, the Central Limit Theorem tends to justify the assumption of normality for the error term. Thus, in this study it is possible that the nonnormality of the error term can be attributed to misspecification of the model, and/or heteroscedasticity rather than nonnormality (see Norusis, 1983, p. 149).

Table 8.25 shows for the majority of the models assumptions (3) to (6) are violated. As the plot of the standardised residuals against the predicted value of the dependent variable was used to test all of the forementioned assumptions it is difficult to determine precisely which assumption/s is/are violated. In the case of the linearity assumption the underlying theory (i.e. Ohlson's (1989) model) specified this functional form. The problem associated with using the incorrect functional form is that an explanatory variable may appear to be insignificant or have an unexpected sign (see Studenmund and Cassidy, 1987, p. 144).

Again, based on the evidence in Table 8.25, it is likely that, for a large number of the models, heteroscedasticity exists (i.e. assumption 4 is violated). Studenmund and Cassidy (1987, p. 245) commented that this problem is particularly pertinent in cross sectional studies. When using ordinary least squares (OLS) to derive a regression model, heterosecdasticity gives rise to the following consequences:

it does not cause bias in the OLS coefficients estimates; but,

it causes OLS to underestimate standard errors of the estimated coefficients, leading to overestimated t values.

The possibility that the error terms are serially correlated (i.e. assumption (5) is violated), generally occurs in time series studies (see Studenmund and Cassidy (1987, p. 209). However, with cross sectional data, the error terms may be affected by general economic conditions which cause the error terms to be correlated. In essence, the latter point can be viewed as an omitted variable which is now considered.

The analysed models may suffer from an omitted variable problem (i.e. assumption (6) is violated). The omission of an important variable causes bias in the estimates of the coefficients of the variables included in the equation, to the extent that the omitted variable is corelated with included variables. If included variables are positively correlated with an omitted variable, this causes upward bias in the estimated coefficients. A negative correlation reverses the direction of the bias.

As multicollinearity remains a problem for some of the models analysed, its consequences are now considered. Studenmund and Cassidy's (1987, pp. 184-187) overview of these consequences is summarised below.

> The estimates of the regression coefficients remain unbiased.
>
> The variances of the estimated regression coefficients increase. As a result, the estimated coefficients, while still unbiased, now come from distributions with much larger variances. This is the major consequence of multicollinearity which makes it very difficult to identify precisely the separate effects of highly correlated variables.
>
> The computed t values tend to be distorted. As the variances are increased, this causes the standard errors to be increased which leads to a fall in the t values. Furthermore, as the increased variances causes the estimated coefficients to be further from the true parameter value this "pushes" a portion of the

distributions of the estimated coefficients towards zero, making it more likely that the t values will be insignificant or have an unexpected sign. This "pushing" can be in both directions, so multicollinearity can also lead to higher than expected estimated coefficients and thus, higher t values. The latter effect is usually overshadowed by the increased standard errors.

The estimated coefficients are very sensitive to changes in the explanatory variables and the sample observations.

The overall fit of the equation, as measured by R^2 or the F test will be largely unaffected.

The estimation of the coefficients and standard errors of orthogonal variables in the model will be unaffected.

The previous discussion shows that the implications of the regression assumptions being violated are varied. This makes any interpretation of the results very difficult, as it is not possible to determine which violation is dominant.

The next section gives a detailed presentation of the results.

8.4 RESULTS FROM MODELS

When examining the results, the varying implications of violations of the regression assumptions (as discussed in 8.3.5, pp. 279-282) on the results must be kept in mind.

The commonly used measure of goodness of fit of a linear model is R^2 (see Neter, Wasserman and Kutner, 1985, p. 241). The R^2 is the proportion of the variation in the dependent variable explained by the set of independent variables. If all the observations fall on the regression line, R^2 is 1. If there is no linear relationship between the dependent and independent variables, R^2 is 0 (see Neter, Wasserman and Kutner, 1985, pp. 96-97).

An F test is used to test the significance of R^2. When the regression assumptions are met, the ratio of the mean square regression to the mean square residual is distributed as an F statistic with p and n-p-1 degrees of freedom (where p = number of variables in the regression equation and n = the number of observations). Where the probability associated with the F statistic is small, the hypothesis that the relationship proposed is caused by chance may be rejected. Details of R^2 and the associated F statistic for each of the models for the 2 groups of companies are presented in Table 8.26 (figures have been rounded to 3 decimal places).

TABLE 8.26

SIGNIFICANCE OF R^2

SUPPORTIVE COMPANIES

MODEL	R^2	F-VALUE	SIGNIFICANCE OF F-VALUE
BMP1	.828	138.183	< .00005
BMP2	.839	149.670	< .00005
D1BMP1	.684	51.902	< .00005
D1BMP2	.707	57.965	< .00005
D2BMP1	.416	25.807	< .00005
D2BMP2	.465	31.512	< .00005
FD	.755	89.108	< .00005
D2FD	.692	81.597	< .00005

RELUCTANT COMPANIES

MODEL	R^2	F-VALUE	SIGNIFICANCE OF F-VALUE
BMP1	.696	60.769	< .00005
BMP2	.735	73.676	< .00005
D1BMP1	.736	61.885	< .00005
D1BMP2	.695	50.614	< .00005
D2BMP1	.612	52.837	< .00005
D2BMP2	.570	44.390	< .00005
FD	.519	28.889	< .00005
D1FD	.375	13.309	< .00005
D2FD	.097	3.589	.0082

For the Supportive Companies, Table 8.26 reveals that the value of R^2 is high. The probability that the relationship was caused by chance is less than .00005. For 6 of the 8 models, over 50% of the variation in the dependent variable is explained by the models. This percentage falls to between 41.6% and 46.5% for the basic model deflated by CLSEHC for periods 1 and 2. The loss in explanatory power may be attributed to the absence of CLSEHC from the model. It is possible that CLSEHC is a significant explanatory variable and, in fact, the evidence in Table 8.28 supports this possibility.

In the case of the Reluctant Companies, the explanatory power of 7 of the 9 models is high with over 50% of the variation in the dependent variable explained in these models. The explanatory power of the deflated first differences models is significantly lower. When Sales is used to deflate the first difference model, the value of R^2 is 37.5%. Although this is low, the explanatory power of the model is still significant. However, when CLSEHC is used as the deflator, the overall explanatory power of the model is only 9.7%. The latter model's poor performance may be caused by the instability of the regression coefficients over time (see Chapter 9, p. 334).

8.5 EXAMINING THE RELATIVE IMPORTANCE OF THE INDEPENDENT VARIABLES

Again, when considering the relative importance of the independent variables, the impact of violations of the regression assumptions (as discussed in 8.3.5, p. 238) on the findings must be considered.

8.5.1 Approach

Application of the enter procedures ensures that all independent variables enter the regression model. The F value is used to determine the significance of the contribution of an individual variable to the explained proportion of variation in the dependent variable. Table 8.27 shows the F value associated with each independent variable in the Supportive and Reluctant Companies' models.

The relative importance of the relationship between each independent variable and the dependent variable can be ascertained by examining the standardised regression coefficient (i.e., the - beta coefficient - see Norusis, 1983, p. 156). Beta coefficients are computed as follows:

$$\text{Beta} = B_i \cdot \frac{S_{xi}}{S_y}$$

where

B_i = The regression coefficient of the i th independent variable.

S_{xi} = The standard deviation of the i th independent variable.

S_y = The standard deviation of the dependent variable.

TABLE 8.27

F VALUE ASSOCIATED WITH THE INDEPENDENT VARIABLES

Models

Supportive Companies

Variables	BMP1	BMP2	D1BMP1	D1BMP2	D2BMP1	D2BMP2	FD	D1FD	D2FD
CLSEHC	71.086**	88.470**	34.213**	30.827**			129.474**		
CCADJBV	17.257**	14.346**	12.983**	3.524	1.314	5.456*	21.576**		.129
EARNHC	.834	3.424	12.561**	29.048**	42.744**	66.616**	82.429**		49.136**
CCADJE	1.521	.318	3.097	.854	.234	.749	17.678**		.002
DIV	.073	1.238	.069	.441	.000	.626	.450		.109
1/DEFLATOR			6.180*	1.948					

Reluctant Companies

Variables	BMP1	BMP2	D1BMP1	D1BMP2	D2BMP1	D2BMP2	FD	D1FD	D2FD
CLSEHC	8.872**	4.332*	6.858**	17.220**			56.086**	30.225**	
CCADJBV	5.173*	1.983	.488	.404	7.446**	12.674**	.006	3.902	6.892**
EARNHC	.144	.010	19.820**	14.239**	81.320**	36.689**	3.991	1.145	1.026
CCADJE	.742	2.109	1.641	4.302*	.000	.734	.004	1.402	.530
DIV	12.659**	41.126**	9.239**	14.535**	4.020*	15.325**	11.597**	7.887**	7.816**
1/DEFLATOR			1.670	1.881				3.802	

Note

* denotes variables which are significant at the 5% level of significance, and

** denotes variables which are significant at the 1% level of significance

Provided the independent variables are relatively orthogonal, beta indicates how many standard deviations of movement in the dependent variable will be occasioned by a one standard deviation movement in x_i, and it is possible to compare the relative importance of each independent variable in the model as measured by its influence on the dependent variable. The ranking by the beta analysis is verified by reference to the part and partial correlation analysis. The rankings by these measures for each of the models for both groups of companies are set out in Table 8.28.

Table 8.28 shows inconsistencies between the 3 ranking measures. This is not surprising as the evidence reviewed earlier in the chapter on the VIFs (see Tables 8.7, 8.11, 8.12, 8.20 & 8.21) indicated a high level of intercorrelation between many of the independent variables. Despite this situation, some evidence on the importance of the independent variables may be observed from examining Table 8.28.

8.5.2 Historical Cost Closing Book Value of Shareholders' Equity (CLSEHC)

For the Supportive Companies, CLSEHC is significant for all models which include this variable. The F value associated with the variable is very high and the variable is significant at the 1% level in all the models (see Table 8.27). The importance of the variable is confirmed by the rankings in Table 8.28. For 4 of the

TABLE 8.28

EXAMINING THE RELATIVE IMPORTANCE OF THE INDEPENDENT VARIABLES

Models

Supportive Companies

Variables	BMP1	BMP2	D1BMP1	D1BMP2	D2BMP1	D2BMP2	FD	D1FD	D2FD	AVERAGE RANKING
	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C
CLSEHC	1 1 1	1 1 1	1 1 1	1 1 1			3 1 1			1.13
CCADJBV	2 2 2	2 2 2	3 2 2	3 3 3	2 2 2	2 2 2	2 3 3		2 2 2	2.25
EARNHC	3 4 4	3 3 3	2 3 3	2 2 2	1 1 1	1 1 1	1 2 2		1 1 1	2.00
CCADJE	4 3 3	5 5 5	5 5 5	5 5 5	3 3 3	3 3 3	4 4 4		4 4 4	4.04
DIV	5 5 5	4 4 4	6 6 6	6 6 6	4 4 4	4 4 4	5 5 5		3 3 3	4.62
1/DEFLATOR			4 4 4	4 4 4						

Reluctant Companies

Variables	BMP1	BMP2	D1MP1	D1BMP2	D2MP1	D2BMP2	FD	D1FD	D2FD	AVERAGE RANKING
	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C
CLSEHC	1 2 2	2 2 2	2 3 3	1 1 1			1 1 1	1 1 1		1.55
CCADJBV	2 3 3	3 4 4	6 6 6	6 6 6	2 2 2	2 3 3	4 4 4	2 3 3	2 2 2	3.52
EARNHC	5 5 5	5 5 5	1 1 1	2 3 3	1 1 1	1 1 1	3 3 3	6 6 6	3 3 3	3.07
CCADJE	4 4 4	4 3 3	4 5 5	4 4 4	4 4 4	4 4 4	5 5 5	5 5 5	4 4 4	4.22
DIV	3 1 1	1 1 1	3 2 2	3 2 2	3 3 3	3 2 2	2 2 2	3 2 2	1 1 1	2.00
1/DEFLATOR			5 4 4	5 5 5				4 4 4		

A = Ranking by beta coefficient
B = Ranking by part correlation coefficient
C = Ranking by partial correlation coefficient

5 models the variable is ranked 1 by the 3 ranking measures. For the first difference model it was ranked 3 when beta was used and 1 when the part and partial correlation coefficients were used. The average ranking of 1.13 suggests that this is the most important explanatory variable.

CLSEHC is also statistically significant in all models in which it was included for the Reluctant Companies. It is significant at the 1% level for 5 of the 6 models and at the 5% level for 6th model (see Table 8.27). For 3 of the models, it is ranked 1 by the 3 ranking measures. In the other 3 models the rankings are less consistent, varying from 1 to 3, with an average ranking of 1.55. Again, this suggests that CLSEHC is the most important explanatory variable.

8.5.3 Current Cost Adjustment to Closing Historical Cost Book Value of Shareholders' Equity (CCADJBV)

CCADJBV is significant in 5 of the 8 models for the Supportive Companies. Table 8.27 shows that in 4 of the models it is significant at the 1% level. The variable is ranked highly by the 3 ranking measures (see Table 8.28). The ranking is either 2 or 3 in each of the models, with an average ranking of 2.25.

For the Reluctant Companies, CCADJBV is significant in 4 of the 9 models (see Table 8.27). It was significant at the 1% level in 3 of these models. The ranking analysis in Table 8.28 shows that the ranking ranges from 2 to 6. This evidence suggests that the explanatory power of this variable is lower for the Reluctant Companies than the Supportive Companies. A supporting fact is that the variable has the second lowest ranking with an average ranking of 3.52.

8.5.4 Increase in Historical Cost Book Value of Shareholders' Equity + Dividends - New Capital (EARNHC)

For the Supportive Companies, EARNHC is significant at the 1% level for 6 out of the 8 models (see Table 8.27). Table 8.28 shows that the ranking of the variable ranges from 1 to 4. The average ranking of 2 shows that the variable on average is ranked second. For the Reluctant Companies, EARNHC is a significant explanatory variable at the 1% level in 4 of the 9 models (see Table 8.27). This implies that the variable may not be as significant for the Reluctant Companies as the Supportive Companies. Overall the variable is ranked third, with an average ranking of 3.07.

8.5.5 Current Cost Adjustment to EARNHC (CCADJE)

For the 2 groups of companies, the explanatory power of CCADJE is significant in only 1 model. It is significant at the 1% level for the Supportive Companies in first difference model, and at the 5% level for the Reluctant Companies in the basic model deflated by sales in period 2 (see Table 8.27). For both groups the ranking associated with this variable ranges from 3 to 5. For the Supportive Companies, the average ranking of 4.04 shows that the variable has the second lowest ranking and for the Reluctant Companies it has the lowest ranking, with an average ranking of 4.22.

8.5.6 Dividends (DIV)

For all Supportive Companies' models, the explanatory power of DIV is insignificant (see Table 8.27). The ranking for this variable ranges from 3 to 6 and the average ranking of 4.62 shows the variable ranked last. In contrast, DIV is significant in each of the Reluctant Companies' models (see Table 8.27). In 8 of the 9 models it is significant at the 1% level. The rankings for the variable ranges from 1 to 3 and the average ranking of 2.00 shows that the variable has the second highest ranking (see Table 8.28).

8.5.7 Summary

The previous analysis suggests that both asset values and earnings are significant in explaining Company Value. Using the average ranking, closing HC shareholders' equity (CLSEHC) is ranked first for both groups, and HC earnings (EARNHC) is second for the Supportive Companies with dividends (DIV) second for the Reluctant Companies. This suggests that a company's value is explained by HC variables rather than the inflation accounting variables. CC adjustments are significant in a few models, but they appear to be of secondary importance relative to the HC variables. Also, for Supportive and Reluctant Companies, the CC adjustment to shareholders' equity (CCADJBV) is of greater significance than the adjustment to earnings (CCADJE). For both groups, the variable CCADJE is significant in only 1 model.

The analysis also suggests that the inflation accounting variables have greater explanatory power for Supportive Companies than Reluctant Companies. This is indicated by the inflation accounting variables being ranked 1 place higher for the Supportive Companies than for the Reluctant Companies. Also, CCADJBV is significant in 5 out of 8 models for the Supportive Companies and in only 4 out of 9 models for the Reluctant Companies.

The results of model building and their implications are further considered in the next section. In addition the relationship of these findings to the results of other studies is considered.

8.6 INTERPRETING THE RESULTS

8.6.1 Introduction

Once more, when interpreting the results, the discussion in 8.3.5 (pp. 279-282) on the implications of violations of the regression assumptions must be borne in mind.

The previous section identified the key variables in each of the models. Particular attention is now paid to considering the reasonableness of the direction of the relationship between the independent variables and the dependent variables. Table 8.29 presents details of the coefficient attributed to each variable in each model.

TABLE 8.29

RELATIONSHIP BETWEEN THE DEPENDENT AND INDEPENDENT VARIABLES

SUPPORTIVE COMPANIES

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
BMP1	.989**	-.776**	.583	.592	-.353
BMP2	1.221**	-.756**	1.273	.166	-1.519
D1BMP1	.753**	-.767**	2.744**	1.178	-.389
D1BMP2	.826**	-.467	4.398**	.388	-.877
D2BMP1		-.254	4.840**	.337	-.006
D2BMP2		.473*	6.130**	-.394	-1.106
FD	2.438**	-1.180**	-1.383**	.951**	-.232
D2FD		-.111	-1.117**	.011	.118

RELUCTANT COMPANIES

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
BMP1	.564**	.733*	-.309	-.617	4.202**
BMP2	.322*	.480	-.058	-1.143	13.536**
D1BMP1	.422**	.178	3.353**	.718	3.064**
D1BMP2	.635**	.199	2.535**	1.706*	6.008**
D2BMP1		.529**	5.110**	.010	2.007*
D2BMP2		.877**	3.875**	.763	6.383**
FD	1.459**	-.034	-.745	-.019	1.690**
D1FD	1.584**	.803	-.344	-.300	1.408**
D2FD		1.125**	.296	-.182	.972**

Note * denotes variables which are significant at the 5% level of significance, and
** denotes variables which are significant at the 1% level of significance.

The analysis now focuses on each independent variable and on the models in which the variables were significant.

8.6.2 CLSEHC

The previous section identified CLSEHC as the most significant explanatory variable for both groups of companies. The variable is significant in each model. Thus, the major explanatory variable for a company's value is consistent across the 2 groups of companies. Table 8.29 reveals a positive relationship for both groups between this variable and the dependent variable in each model. This is supported by the simple correlation coefficient given in Appendix 8.E for each of the models. Thus, the higher the value of CLSEHC the higher the Company Value. This appears reasonable. Ohlson (1989) described book value as an anchor in the valuation of a company. The finding in this study cannot be compared directly with other valuation studies as the variable CLSEHC has not been widely used in other studies.

8.6.3 CCADJBV

8.6.3.1 Supportive Companies

CCADJBV which measures cumulative unrealised holding gains is significant in 5 of the 8 models (see Table 8.29). A negative relationship between this variable and the dependent variable is observed in 4 of the models and a positive relationship in the 5th model. To assess the reasonableness of this result, the findings from the individual models are considered.

The basic models for both periods show a negative relationship between CCADJBV and Company Value. However, an examination of Appendix 8.E.1 reveals that the simple correlation coefficient is positive. The switch in the sign may be caused by severe multicollinearity in both of these models. Table 8.7 shows that the VIFs associated with CCADJBV is over 10 in both models.

The basic model deflated by Sales in period 1 also reveals a negative relationship between CCADJBV and the dependent variable. Again, this may be caused by multicollinearity as the sign switched when the variable was included in the multivariate model. However, the degree of multicollinearity in this model is not as high as in the undeflated basic models. Table 8.20 shows that 7.079 is the maximum VIF associated with any variable in the model, and the VIF for CCADJBV is 5.358. So, it is possible that the true relationship is negative.

The model based on first differences also shows a negative relationship between (changes in) CCADJBV and Company Value. Again, the results of this model may be distorted by severe multicollinearity. Table 8.11 reveals the VIF associated with CCADJBV is 10.67 in this model. However, the sign of the relationship remains unchanged when CCADJBV is included in the multiple regression model.

The basic model deflated by CLSEHC in period 2 is the only model which shows a significant positive correlation between CCADJBV and the Company Value. In the case of this model there is no evidence of a multicollinearity problem (see Table 8.20) and Appendix 8.E.4 which shows that the simple correlation coefficient is positive.

The 4 models showing a negative relationship included the variable CLSEHC. It was observed earlier that this variable is significant in all models and captures the HC value of a company's net assets. Appendix 8.E reveals that with the exception of the first difference model, there is a very high correlation between the variables CCADJBV and CLSEHC. Thus, it is possible that the incremental influence of CCADJBV on Company Value is negative. The reasonableness of this possibility is now considered.

The discussion in Chapter 7 (see 7.3.1, pp. 220-226) on holding gains revealed that a negative relationship between input price changes and operating cash flows may exist for some firms. Where firms are not in a position to pass on price increases, holding gains are regarded in a negative light. Evidence of this situation was observed by Hopwood and Schaefer (1989) (see Chapter 4. pp. 146-147). Thus, the findings in the present study suggest that Supportive Companies may have been unable to pass on price increases, so a negative relationship may be valid.

The model which shows a positive association between CCADJBV and Company Value excluded the variable CLSEHC. Here CCADJBV may be measuring not just cumulative unrealised holding gains but also reflecting the value of the company's net assets. As the relationship is positive, this suggests that the latter influence is the stronger in the valuation model.

8.6.3.2 Reluctant Companies

The analysis of CCADJBV shows that the variable is significant in 4 of the 9 models and it has a positive coefficient in all 4 models (see Table 8.29). Furthermore, multicollinearity appears to be a problem for only 1 of these models (i.e., BMP1, see Table 8.7). 3 of the 4 models (i.e., D2BMP1, D2BMP2, D2FD) exclude CLSEHC. In addition, an examination of the simple correlation coefficient in Appendix 8.E for each of the models shows a positive association between CCADJBV and Company Value.

Based on earlier comments, a positive relationship is reasonable. It is also possible that the Reluctant Companies may have viewed cumulative unrealised holding gains in a positive light. The discussion in Chapter 7 (see 7.3.1 pp. 220-226) showed that where companies can respond positively to price increases, holding gains may reflect increased future operating cash flows. In this situation, a positive association between unrealised holding gains and Company Value is reasonable.

In the case of both the Supportive and Reluctant Companies, it is not possible to determine the extent to which a company's ability to respond to price changes explains the direction of the relationship between CCADJBV and Company Value, as this study did not isolate a company's ability to respond to price changes. The importance of undertaking such a step in future research studies is discussed in Chapter 9 (see 9.5, pp. 336-337).

8.6.4 EARNHC

8.6.4.1 Supportive Companies

For the Supportive Companies, EARNHC is significant in 6 of the 8 models (see Table 8.27) and overall it is ranked second (see Table 8.28). The variable is significant in the deflated basic models for both periods. These 4 models show a positive association between EARNHC and the dependent variable, this agrees with the simple correlation coefficients presented in Appendices 8.E.3 and 8.E.4. Numerous other research studies (see Chapters 3 and 4) provide evidence of a positive association between accounting earnings and company values. These studies are based on the premise that accounting earnings are useful in predicting cash flows (see Watts and Zimmerman, 1986, pp. 65-66).

EARNHC (i.e., change in) is a significant variable also in the first difference model and the first difference model deflated by CLSEHC. In both these models the (change in) EARNHC coefficient is negative. The negative relationship may be caused by multicollinearity as the VIF associated with 1 variable in each model is over 10 (see Tables 8.11 & 8.20), and VIF associated with EARNHC is 4.534 (FD) and 5.507 (D2FD). However, an examination of the simple correlation between (change in) EARNHC and Company Value reveals a negative relationship for both models (see Appendices 8.E.2 and 8.E.5). It does not appear economically reasonable that a (change in) EARNHC is negatively associated with a (change in) Company Value. However, it is possible that it may be caused by the instability of Ohlson's (1989) model over time (see Chapter 9, 9.4, pp. 334-335).

8.6.4.2 Reluctant Companies

EARNHC is significant in 4 of the 9 models analysed and overall, it is ranked third (see Tables 8.29 and 8.28). It appears that EARNHC is less significant for the Reluctant Companies than the Supportive Companies. The variable is statistically important in the deflated basic models for both periods and the coefficient is positive in each of the models. As previously noted, a positive relationship accords with the results from previous empirical studies. Also, an examination of the VIFs (see Table 8.21) associated with the 4 deflated basic models suggests that the results are not distorted by severe multicollinearity and the simple correlation coefficients given in Appenices 8.E.3 and 8.E.4 are positive.

8.6.5 CCADJE

8.6.5.1 Supportive Companies

Table 8.29 shows that CCADJE which measured unrealised holding gains of the current period was statistically significant in the first difference model and the sign of the relationship is positive. However, an examination of the simple correlation coefficient (see Appendix 8.E.2) reveals a negative relationship. In this case the switch in sign may be caused by severe multicollinearity, as Table 8.11 shows high VIFs associated with some of the variables in the model and a VIF of 8.414 for CCADJE. Therefore, it is not possible to interpret the findings in meaningful way in respect of CCADJE. A negative relationship would be consistent with the earlier evidence for the Supportive Companies relating to cumulative unrealised holding gains (see 8.6.3.1. pp. 296-299).

8.6.5.2 Reluctant Companies

CCADJE is significant in the basic model deflated by sales for period 2. This model shows no evidence of severe multicollinearity (see Table 8.21) and a positive association is observed between the dependent and independent variable. Appendix 8.E.3 also shows that the simple correlation coefficient is positive. This accords with the evidence discussed previously for Reluctant Companies relating to cumulative unrealised holding gains (see 8.6.3.2, pp. 299-300).

8.6.6 DIV

In accordance with Ohlson (1989), the DIV variable is defined as dividends for ordinary shareholders net of capital contributions.

Viewing DIV from Ohlson's (1989) perspective, a negative relationship between DIV and Company Value would be expected. According to Ohlson, the prediction of future earnings depends partially on current dividends. He comments that book values relate directly to current dividends, as dividend payments reduce current book values. In this context, an increase in current dividends would reduce future earnings as the earnings base of the company would be reduced. Therefore, a negative relationship between DIV and Company Value is predicted. Following Ohlson's reasoning, new capital increases book values, which results in an increase in the company's earnings potential and so new capital (negative dividends) would be positively correlated with Company Value.

However, other research studies e.g., Aharony and Itzhak (1980), Asquith and Mullins (1983), Brickley (1983), and Dielman and Oppenheimer (1984), which focused on the relationship between cash dividends and share returns, found a positive association between the variables. Tisshaw (1982), in his valuation study, found a positive association between dividends and share values. These findings can be explained by investors viewing dividends as a return on their investment. In addition, Tisshaw (1982, p.159) asserted that investors have a preference for immediate income due to their desire to reduce uncertainty. Furthermore, Foster (1986, p. 388) commented that a positive association is consistent with the capital market using dividend releases as a positive signal from management about the future earnings prospects of the company.

The latter comments suggest that increases in cash dividends would be viewed favourably by the capital market. This conflicts with Ohlson's views.

An examination of Table 8.29 shows that for the Supportive Companies, the DIV variable is insignificant in all models and it is ranked last (see Table 8.28).

In the case of the Reluctant Companies, DIV is a significant variable in all models (see Table 8.29) and Table 8.28 shows that, overall, it ranks second. All the models show a positive relationship between DIV and Company Value. An examination of the simple correlation coefficient (see Appendx 8.E) supports this positive relationship.

The earlier analysis of Table 8.28 indicates that EARNHC is less significant to the Reluctant Companies than to the Supportive Companies. Therefore, for the former group of companies, it is possible that, empirically, DIV is capturing an income effect normally associated with the earnings variable. In this instance a positive relationship between DIV and Company Value would not be unreasonable.

8.6.7 Joint Influence Of CCADJBV and CCADJE

The previous analysis considered whether CCADJBV and CCADJE had significant explanatory power as individual variables. It is possible that jointly they may have incremental explanatory power. To test this, the models showing insignificant coefficients for both inflation accounting variables were re-examined. For each of these models, new regression equations were derived which excluded the inflation accounting variables (Reduced Model). The R^2 associated with each of the reduced models was compared with the R^2 of the corresponding original models (Full Model). An F test was performed to determine if there was a significant difference in the R^2s. Details of the differences and the associated F test are presented in Table 8.30 (figures are rounded to 3 decimal places).

TABLE 8.30

COMPARISION OF THE R^2 OF THE FULL MODELS AND THE REDUCED MODELS

SUPPORTIVE COMPANIES

MODEL	FULL MODEL R^2	REDUCED MODEL R^2	CHANGE IN R^2	CHANGE IN F	SIGN. OF F CHANGE
D1BMP2	.707	.700	-.007	1.772	.174
D2BMP1	.416	.410	-.006	.698	.499
D2FD	.692	.691	-.001	.245	.783

RELUCTANT COMPANIES

MODEL	FULL MODEL R^2	REDUCED MODEL R^2	CHANGE IN R^2	CHANGE IN F	SIGN. OF F CHANGE
BMP2	.735	.730	-.005	1.300	.276
D1BMP1	.736	.727	-.009	2.231	.111
FD	.519	.519	-.000	.013	.987
D1FD	.375	.357	-.018	1.971	.143

An examination of Table 8.30 reveals that jointly the inflation accounting variables do not appear to possess IEP.

The next section examines the implications of the evidence discussed in 8.5 and 8.6 for the utility of inflation accounting data to investors.

8.7 IMPLICATIONS OF MODELS FOR THE UTILITY OF INFLATION ACCOUNTING DATA

Any discussion on the implications of the previous models' findings for the utility of inflation accounting data, must keep in mind that these models suffered from econometrical problems. For example, multicollinearity may have caused some variables to appear insignificant or have an unexpected sign, while heteroscedasticity may have lead to the t values of some variables being overstated (see 8.3.5, pp. 279-282). Table 8.25 revealed for all but 1 model, there was evidence that more than 1 regression assumption was breached. This makes it difficult to draw any firm conclusions on the utility of inflation accounting data. Despite this difficulty, given the number of models examined, it is hoped that the analysis will provide insight to the utility of inflation accounting data.

For 13 of the 17 models analysed, the models explain over 50% of the variation in the dependent variable. This suggests that the independent variables included in Ohlson's model reflect characteristics which investors consider relevant in company valuation. The Historical Cost Value of Closing Shareholders'

Equity is the most significant explanatory variable, followed by Historical Cost Earnings for the Supportive Companies and Dividends for the Reluctant Companies. Thus, for both groups a stocks and flow measure are value relevant. This implies that both balance sheet items and income statement variables are useful in assessing future cash flows, this concurs with the views of Brennan and Schwartz (1982a, 1982b), Ohlson (1989), Ou and Penman (1989) and Brennan (1991).

This study sought to provide evidence on the IEP of inflation accounting data (see 1.4, p. 10). The balance of evidence from the models analysed, suggests that the inflation accounting variables studied, have IEP. In particular, the variable measuring cumulative unrealised holding gains (CCADJBV) is significant in 9 (53%) of the 17 models analysed. This supports the view that information on holding gains is relevant to investors' information needs.

The variable (CCADJE) measuring unrealised holding gains of the period is significant in only 2 (12%) of the models. The poorer performance of current unrealised holding gains may be caused by considerable "noise" in the measurement of current unrealised holding gains. The effect of measurement errors may be diminished over cumulative periods, thereby making cumulative unrealised holding gains a more reliable measure. For example, in a single period, under/over estimation of the effects of price changes may prevent the estimates from being used, while over a number of periods, less than perfect correlation between the estimation errors over time, would lead to the estimation errors being randomised, and therefore, the utility of the cumulative measures could be improved.

Another objective of the study was to determine whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data (see 1.4, pp. 11). This was achieved by dividing the sample of companies into 2 groups, i.e., companies which voluntarily disclosed inflation accounting data prior to the mandatory period (Supportive Companies) and companies which commenced disclosure in the first mandatory period (Reluctant Companies). The analysis showed that separate models were required for the 2 groups of companies. There is some evidence showing a difference in the importance of the inflation accounting disclosures between the 2 groups. CCADJBV is significant in 5 (62.5%) of the 8 models for the Supportive Companies, but only in 4 (44%) of the 9 models for the Reluctant Companies (see Table 8.30). Also, CCADJBV is ranked 1 place higher for the Supportive Companies than the Reluctant Companies. CCADJE is significant in only 1 model for both groups of companies, it also received a higher ranking for the Supportive Companies than the Reluctant Companies.

The earlier analysis showed (see Table 8.22) that multicollinearity is less evident in the Reluctant Companies' models. Table 8.31 shows the VIFs associated with the inflation accounting variables in each of the models analysed.

TABLE 8.31

COMPARISION OF THE VIF FOR THE CCADJBV AND CCADJE VARIABLES

	SUPPORTIVE COMPANIES	RELUCTANT COMPANIES
CCADJBV		
MODEL	VIF	VIF
BMP1	21.730**	7.643*
BMP2	13.449**	6.360
D1BMP1	7.079**	3.854
D1BMP2	6.262	3.004
D2BMP1	3.424	2.755**
D2BMP2	1.934*	2.242**
FD	10.670**	2.948
D1FD		3.218
D2FD	12.494	1.442**
CCADJBE		
MODEL	VIF	VIF
BMP1	4.870	2.782
BMP2	4.212	1.661
D1BMP1	1.320	1.479
D1BMP2	1.545	1.654*
D2BMP1	1.248	2.257
D2BMP2	1.310	1.985
FD	8.414**	2.370
D1FD		2.575
D2FD	9.281	2.126

Note * denotes values which are significant at the 5% level of significance, and
** denotes values which are significant at the 1% level of significance.

Table 8.31 reveals in 3 Supportive Companies' models VIFs in excess of 10 for CCADJBV, despite this, the variable is significant at the 1% level in the 3 models. In the case of the Reluctant Companies the VIF is below 10 in all models. Thus, for the Reluctant Companies, the evidence suggests that the inflation accounting variables were less likely to be redundant, giving them a better opportunity to provide IEP. Despite this, the findings suggest that the inflation accounting data appears to be of greater significance to the Supportive Companies.

Table 8.32 shows for the majority of the models, the F values of the inflation accounting variables are greater for the Supportive Companies than for the Reluctant Companies. This suggests that the inflation accounting variables are more important in explaining the share prices of the Supportive Companies. The conclusions of Archer and Steele (1984), Page (1984b) and Carsberg (1984) are supported by this finding, i.e., commitment towards disclosure appears to result in more reliable disclosures which are then used by investors.

TABLE 8.32

COMPARISION OF THE F VALUES FOR THE CCADJBV AND CCADJE VARIABLES

	SUPPORTIVE COMPANIES	RELUCTANT COMPANIES
CCADJBV		
MODEL	F-VALUE	F-VALUE
BMP1	17.257**	5.173*
BMP2	14.346**	1.983
D1BMP1	12.983**	.488
D1BMP2	3.524	.404
D2BMP1	1.314	7.446**
D2BMP2	5.456*	12.674**
FD	21.576**	.006
D1FD		3.902
D2FD	.129	6.892**
AVERAGE F-VALUE	9.573	4.330
CCADJBE		
MODEL	F-VALUE	F-VALUE
BMP1	1.521	.742
BMP2	.318	2.109
D1BMP1	3.097	1.641
D1BMP2	.854	4.302*
D2BMP1	.234	.000
D2BMP2	.749	.734
FD	17.678**	.004
D1FD		1.402
D2FD	.002	.530
AVERAGE F-VALUE	3.057	1.274

Note * denotes values which are significant at the 5% level of significance, and
** denotes values which are significant at the 1% level of significance.

The direction of the relationship between the inflation accounting variables and Company Value is different for the 2 groups of companies. In general, for the Supportive Companies a negative relationship exists. In their studies, Beaver and Landsman (1983), Hopwood and Schaefer (1989) and Bernard and Ruland (1991) also found evidence of a significant negative relationship between share values and the inflation accounting variables. This result is consistent with the Supportive Companies viewing holding gains in a negative light, as they may have been unable to pass on price increases. In addition, it implies that these companies should not include these gains in current income. Revsine (1973) asserted that

> "the term income should be reserved for those instances in which an augmentation of operating flow potential has occurred." (p. 115).

This reasoning supports treating the holding gains as a capital maintenance adjustment.

If the Supportive Companies were unable to respond positively to price changes, this may account for their willingness to voluntarily disclose inflation accounting data. The companies may have hoped that, by disclosing the impact of inflation on their performance, they could justify the need for price increases (.e.g., where price controls applied), protect themselves against increased wage claims, and create an awareness of their excess burden of tax.

For the Reluctant Companies, the CCA variables are positively correlated with Company Value. Other studies by Beaver and Landsman (1983), Page (1984a) and Bernard and Ruland (1991) found evidence of a significant positive association between share values and inflation accounting variables. This suggests that these companies may have been able to respond to price increases and so the holding gains reflected good news. Within Revsine's (1973) framework, holding gains arising in the period could be included in the current income statement. Furthermore, these companies may have been reluctant to disclose the effect of inflation on their results in case it would lead to increased tax charges and increased wage and dividend demands.

The implications for future research into the utility of inflation accounting data of a differential price response among companies to inflation is discussed in Chapter 9 (see 9.5, pp. 337-338).

A further objective of this study is to discover whether or not a learning lag exists in relation to inflation accounting data (see 1.4, pp. 11). When developing a standard on inflation accounting both the FASB (1978) and the ASC (see Carsberg, 1984, p. 1) recognised the possible existence of a learning process on the part of preparers and users. A number of researchers (Arbel and Jagge, 1978; Soroosh Joo, 1982; Beaver and Landsman, 1983; and Appleyard and Strong, 1984) cited the existence of a learning lag as a possible reason for the poor results on the utility of inflation accounting data. From the analysis in this study there is no evidence supporting an improvement in the explanatory power of the inflation accounting variables in period 2. Both groups show 1 instance when an inflation accounting variable is significant in the second period only, and 1 instance when an inflation accounting variable is significant in the first period only (see Table 8.32).

8.8 SUMMARY

This chapter presented the findings from the empiricial tests used to examine the utility of inflation accounting data to investors, by examining the ability of this data to explain share prices of UK listed companies. A valuation model was employed to detect this explanatory power. Various forms (25 models) of the basic model were derived in an effort to develop a statistically valid model. A detailed analysis was carried out on 17 of these models. (Appendix 8.L presents the results from additional investigations using alternative specifications of Ohlson's basic model).

The results showed that the model captures value relevant information. The HC disclosures were observed to be particularly significant in explaining Company Value and there is evidence supporting the IEP of the inflation accounting data.

The analysis revealed an underlying difference in the significance of the inflation accounting data for the Supportive and Reluctant Companies. The findings suggested that the inflation accounting variables have a greater level of significance for the Supportive Companies than the Reluctant Companies.

The tests did not reveal any evidence of a learning lag. It is possible that 2 test periods may have been too short a time span in which to capture a learning effect. However, in the case of the Supportive Companies, even though inflation accounting data had been available prior to the test periods, there was still no evidence of a learning effect.

The conclusions of this chapter are subject to the limitations associated with the Ohlson's valuation model. Developing a statistically valid model proved to be a major problem. The implications of the model's limitations are discussed in the next chapter (see 9.4, pp. 333-335).

CHAPTER 9

CONCLUSIONS, IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

CHAPTER 9

CONCLUSIONS, IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

9.1 INTRODUCTION

This study investigated the utility of inflation accounting data to investors, by examining the ability of this data to explain share prices of UK listed companies. This chapter examines the extent to which the objectives of the study have been achieved. The principal research findings are presented together with their implications for the utility of inflation accounting data and directions for future research. When discussing the implications of the study's findings, the approach used and the impact of the limitations of the study are considered. Specifically, the final chapter reviews:

- the objectives of the study and how they were achieved (9.2);

- the major empirical findings of the study and their implications for the utility of inflation accounting data (9.3);

the implications of the limitations of Ohlson's model (9.4); and,

the overall conclusions and possible directions for future research (9.5).

9.2 THE STUDY'S OBJECTIVES AND HOW THEY WERE ACHIEVED

9.2.1 First Objective - To examine the conceptual framework within which the utility to investors, of accounting data in general and inflation accounting data in particular, might be evaluated.

The examination of the utility of accounting data to investors from a conceptual perspective was undertaken in Chapters 2 and 3.

Chapter 2 presented the framework within which the reporting of accounting data to investors fits. It argued that the major objective of financial reporting is the provision of decision relevant information to users. The attributes which financial reports should possess to achieve this objective were described. Investors were identified as the primary users of financial reports. The effectiveness of conventional HCA in providing decision relevant information to investors was explored. It examined the limitations of the HCA model in periods of unstable prices and presented the normative arguments in support of inflation accounting. The literature on inflation accounting was reviewed and the proposals made in the UK and US reporting environments were described.

To evaluate the effectiveness of financial reports in providing decision relevant information to investors, an understanding of investors' informational needs is required. Chapter 3 showed that investors require information which helps them decide, whether to buy, hold, or sell an investment. This decision is based on an investment's return and risk. It was demonstrated that an investment's return and risk is determined by the distribution of its cash flows. Therefore, within the investment framework, the utility of accounting data to investors can be evaluated by reference to its ability to predict cash flows.

Chapter 3 also described developments in capital market theory which have facilitated the evaluation of accounting data from an investor's perspective. In particular, it presented evidence which showed that the capital market is semistrong efficient, that is, current share prices fully reflect all relevant publicly available information and adjust rapidly to new information. This evidence provides a setting which allowed for the utility of accounting data to investors to be assessed.

In addition, Chapter 3 explored the basis for expecting a link between share prices/returns and accounting data in an efficient capital market. A number of empirical studies were then reviewed which showed a relationship between HCA data and share returns/prices. The evidence from these studies supported the utility of HCA accounting data to investors.

However, the high inflation rates of the 1970s cast serious doubts over the ability of conventional accounting practices to meet investors' informational needs. This culminated in the voluntary and mandated disclosure of inflation accounting data. This led researchers to explore the utility of inflation accounting data to investors (see 9.2.2 below).

9.2.2 Second Objective - To critically assess those studies which evaluated the utility of inflation accounting data to the securities market.

The review of the inflation accounting studies in Chapter 4 referred to some of the problems associated with the individual studies. However, an overall evaluation of the techniques employed in these studies was presented in Chapter 6.

Initially, researchers tested the information content of the inflation data by trying to observe a market reaction to this data. Most of information content studies failed to find a statistically significant reaction. However, a critical appraisal of these studies, showed that many of them suffered from the following methodological difficulties: selecting the appropriate test period and test data; controlling for confounding events; and deriving expectational models for the inflation accounting variables and share returns.

Given the methodological problems associated with information content studies, some researchers used a valuation approach to evaluate the explanatory power and IEP of inflation accounting data. It was hoped that this complementary approach would provide further insights to the utility of inflation accounting data. The analysis showed when share returns were used as the dependent variable the explanatory power of the valuations models were very low and there was very little evidence supporting the utility of inflation accounting data. Given the poor results of the former models, a small number of studies developed valuation models incorporating inflation accounting variables to explain relative share prices. The explanatory power of these models was higher than the former models. Furthermore, some of the latter studies found that the inflation accounting variables possessed IEP.

However, the valuation studies also suffered from methodological problems. These problems included: selecting the appropriate specification of the valuation model; deriving an expectational model for share returns, and econometric problems.

As there are marked differences between the problems associated with information content studies and those associated with the valuation studies, insights from both studies can be of greater benefit than that provided by either approach alone. The 2 sets of studies offer a potentially useful perspective that is different from and complementary to that provided by the other.

9.2.3 Third Objective - To provide additional empirical evidence on the incremental explanatory power (IEP) of inflation accounting data in relation to the share prices of UK listed companies.

Based on the critical evaluation of the techniques employed in the inflation accounting studies, a case was made for further research using a valuation approach to achieve the study's third objective. The valuation model used was based on Ohlson's (1989) model which includes both balance sheet and income statement variables. This model formation was used, as recent research by Brennan and Schwartz (1982a, 1982b), Ohlson (1989), and Ou and Penman (1989) suggested that the explanatory power of a model incorporating flows (income statement) and stocks (balance sheet) measures may be greater than a model which relies exclusively on measures from 1 source.

Using a cross sectional approach, the model was derived to provide evidence on the IEP of inflation accounting data in relation to the share prices of UK listed companies. The model incorporated HCA variables and 2 inflation accounting variables - cumulative unrealised holding gains and unrealised holding gains arising in the period. The IEP of the inflation accounting variables was determined by examining the significance of these variables in the regression model.

Great efforts were made to derive a statistically valid model. The steps taken included testing whether separate models should be derived for the 2 groups of companies, formulating the model using first differences, deflating the model, and deriving the model after classifying the companies into similar risk groups. This resulted in the derivation of 25 models and the findings from 17 of these models were analysed in Chapter 8. Although these models still suffered from econometric problems, it was hoped that, by focusing on the results from a number of models, an opinion could be formed on the significance of the accounting variables. The empirical findings of the study on the IEP of inflation accounting data are set out in 9.3.2 (pp. 327-330).

Additional models were also derived using alternative specifications of Ohlson's basic model (see Appendix 8.L). The results from these models neither added to the findings reported in Chapter 8 nor result in consistently better specified models.

9.2.4 Fourth Objective - To determine whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data.

Accounting policy makers (see FASB, 1979; ASC, 1980) believed that the disclosure of inflation accounting data would involve a learning process on the part of preparers. Given this belief this study investigated whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data. Chapter 5 reviewed empirical studies which examined users' and preparers' attitudes to inflation accounting data and/or the measurement problems associated with inflation accounting. This review suggested that companies' policies towards disclosing inflation accounting data may affect the reliability of this data. The evidence suggested that a positive policy towards disclosure leads to more reliable inflation accounting measures, while a reluctance to disclose the data is likely to be associated with less reliable measures.

To determine if company policy towards the disclosure of inflation accounting data is associated with the explanatory power of this data the sample of companies was split into 2 groups. Companies which disclosed inflation accounting data in the premandatory period (labelled Supportive Companies) and companies which commenced disclosing inflation accounting data in the first mandatory period (labelled Reluctant Companies).

Separate models were derived for the 2 groups of companies. Differences in the explanatory power of the inflation accounting variables were determined by comparing the significance of these variables in the each group's model. The empirical findings of the study in relation to whether or not company policy towards the disclosure of inflation accounting data in the premandatory period is associated with the explanatory power of this data are set out in 9.3.3 (p. 330).

9.2.5 Fifth Objective - To discover whether or not a learning lag exists in relation to inflation accounting data.

Again, accounting policy makers (e.g., FASB 1979, ASC, 1980) recognised that inflation accounting would involve a substantial learning process on the part of preparers and users. In addition, many of the inflation accounting studies reviewed in Chapter 4 (e.g., Beaver and Landsman, 1983, Appleyard and Strong, 1984) cited the possible existence of a learning lag as the reason for the lack of evidence supporting the utility of inflation accounting data. To test for evidence of a learning effect the valuation model was derived for 2 periods for the Supportive and Reluctant

Companies. The empirical findings of the study regarding whether or not a learning lag exists in relation to inflation accounting data are presented in 9.3.4 (p. 331).

Having set out the objectives of the study and how these were achieved the next section presents a summary of the findings from the empirical analysis. It considers the implications of these findings for the utility of inflation accounting data, while keeping in mind the study's limitations.

9.3 RESEARCH FINDINGS AND THEIR IMPLICATIONS

9.3.1 Introduction

Given the difficulties encountered in deriving a statistically valid model, it was decided to focus on the findings from 17 models. Although, these models still suffered from econometric problems, it was hoped, by examining the results from a number of models, that overall, an opinion could be formed on the significance of the accounting variables.

9.3.2 Evidence on the Explanatory Power of the Accounting Variables

The analysis revealed that separate models were required for the Supportive and Reluctant Companies. This suggests an underlying difference in the determinants of share prices for each group.

Of the 17 models selected, 8 related to the Supportive Companies and 9 to the Reluctant Companies. A statistically significant relationship existed between Company Value and the accounting variables for all of the Supportive Companies' models and 8 of the Reluctant Companies' models.

Over 50% of the variation in the dependent variable was explained by 6 of the Supportive Companies' models and 7 of the Reluctant Companies' models. This evidence appears to indicate that, for both groups of companies, the model captures accounting variables which are used by investors in setting share prices.

The analysis showed that, for both groups, the Historical Cost Value of Shareholders' Equity is the most value relevant variable, followed by a historical cost measure of income. This supports the relevance of both balance sheet and income statement measures in determining share values.

In addition, evidence was found supporting the IEP of the inflation accounting data. The variable measuring cumulative unrealised holding gains was significant in 5 models for the Supportive Companies and in 4 models for the Reluctant Companies. This supports the assertion that the variable cumulative unrealised holding gains is important to investor decision making.

Evidence supporting the IEP of unrealised holding gains for the current period is very weak. For both groups of companies, the variable is significant in only 1 model. It is possible that measurement errors may significantly distort the assessment of this variable when the measurement is for 1 period, while these errors may be randomised when cumulative unrealised holding gains are being measured.

Another finding emerging from the analysis is that the direction of the relationship between the inflation accounting variables and Company Value was not consistent across the 2 groups. In general, a negative relationship was observed for the Supportive Companies. This may be explained by these companies being unable to respond positively to price increases. In this situation, price rises reflect future input costs which must be borne by the companies and which are likely to result in decreased future operating cash flows, which would have a negative impact on share prices.

Therefore, for these companies, there is a strong case for treating unrealised holding gains as capital maintenance adjustments and excluding them from income.

For the Reluctant Companies, the results showed a positive correlation between the inflation accounting variables and Company Value. This evidence suggests that, for these Companies, price increases reflect future increases in operating cash flows, which would have a positive impact on share prices. In this instance, the holding gains could justifiably be included in income.

The finding that the direction of the relationship between the inflation accounting variables and Company Value varied across the 2 groups has implications for research designs which seeks to assess the utility of inflation accounting data. If a cross sectional approach is used, it should be applied to companies with a homogeneous response to price changes. Otherwise, any differential responses to the inflation accounting data within a group will tend to offset one another, thereby reducing the power of the cross sectional model to detect an IEP for the inflation accounting data.

In the context of this study, as data were not gathered to allow the sample companies to be split on the basis of their ability to respond to price changes, it is likely that both groups of companies contain companies with differential price responses. If this is the case, then the ability of the models to detect evidence supporting the IEP of the inflation accounting variables may have been diminished. Furthermore, the extent to which this has occurred may have varied across the 2 groups of companies. Therefore, any inferences regarding the utility of inflation data for the 2 groups are potentially subject to this limitation of the study.

9.3.3 Findings Relating to a Company's Policy Towards the Disclosure of Inflation Accounting Data

The results showed that a company's policy towards disclosing inflation accounting data may be associated with the explanatory power of this data. There is some evidence suggesting that the significance of the inflation accounting disclosures is greater for the Supportive Companies than for the Reluctant Companies. CCADJBV was found to be significant in 5 (62.5%) of the 8 models for the Supportive Companies, but only in 4 (44%) of the 9 models for the Reluctant Companies. Furthermore, CCADJBV and CCADJE received a higher ranking for the Supportive Companies than the Reluctant Companies. The forementioned evidence implies that commitment towards disclosure appears to result in more reliable estimates which are then used by investors.

9.3.4 Evidence of a Learning Effect

There is no evidence of a learning effect for either group of companies. This may be explained by the use of a relatively short test period. The study was limited to 2 test periods as the number of companies disclosing inflation accounting data thereafter, dropped significantly (see 7.5, p. 232). On the other hand, it must be recognised that the Supportive Companies disclosed inflation accounting data in the premandatory period. However, it is likely, that they only disclosed the data for a few years prior to the mandatory period. It is also, possible that the disclosures may have been significantly different from the disclosures required under SSAP 16.

9.3.5 Impact of the Study's Limitations

In interpreting the above findings, in relation to the utility of inflation accounting data, it should be noted that the limitations of the study prevent generalisations. First, the analysis was limited to large UK industrial companies required to comply with SSAP 16. Thus, generalisations to companies that differ economically from those used in the present study may be inappropriate.

Second, the study was only concerned with assessing the utility of inflation accounting data to investors. Although, there is evidence supporting the utility of this data to investors this does not test the relevance of the data to other users. As users of financial reports are a heterogeneous group, possessing potentially different abilities and decision models, it is possible that the inflation accounting data may be of greater/lesser importance to these other user groups.

Third, as the analysis is confined to 2 test periods the findings must be qualified in this respect. It is still feasible that over a longer time period, preparers and users would become more familiar with inflation accounting data and this would lead to greater utilisation of the data.

Fourth, this study confined itself to testing the explanatory power of unrealised holding gains. Other inflation accounting variables may have explanatory power (e.g., current cost operating profit). So, when evaluating the utility of inflation accounting data, the fact that this study was limited to unrealised holding gains should be borne in mind.

Finally, in interpreting this study's findings, the implications of the econometrical problems encountered in empirically applying Ohlson's model must be considered. As it was very difficult to pinpoint the impact of the econometrical problems measures, it was decided to analyse the results from 17 models. It was hoped by observing consistency in the models' findings that conclusions could be drawn on the utility of inflation accounting data.

9.4 IMPLICATIONS OF THE LIMITATIONS OF OHLSON'S MODEL.

9.4.1 Introduction

Chapter 6 identified the absence of theoretically developed valuation models as a major problem with the valuation approach. By using Ohlson's model, this study provides evidence on the practical application of this theoretical model. As few studies have applied Ohlson's model a general discussion on the implications of the limitations of Ohlson's model appears warrented. This discussion considers the implications for - the model's validity, and its application.

9.4.2 The Validity of Ohlson's Model

Ohlson assumes a linear relationship between share values (dependent variable) and book values, earnings, and dividends (independent variables). However, the specification analysis performed on all models in this study questions the validity of this assumption. The plots of the standardised residuals against the predicted values of the dependent variable show evidence of an observable pattern in these plots (see Appendices 8.A and 8.B) This could be attributed to a nonlinear relationship existing between the dependent and the independent variable. It may be that the linearity assumption is unsatisfactory as it allows for the possibility of negative share values which is inappropriate in the context of limited liability (see Brennan, 1991). Accordingly, Ohlson's model may be suited only to successful companies as it fails to consider the possibility of bankruptcy.

The evidence from the first differences models indicated that Ohlson's model may not be stationary over time. The constant term was found to be a significant variable for both groups of companies. This suggests that the mean effect of the variables captured by the constant term is not stationary. A further indication that Ohlson's model is not stationary over time is that the direction of the relationship between EARNHC and Company Value is not always in the predicted direction. In particular, in the first differences models, a negative relationship is observed between the variables. This association could be attributed to the instablity of the EARNHC coefficient. Instability in the model may also explain the variation in the significance of the individual variables in the test periods. Evidence of instability in Ohlson's model is consistent with the findings from other valuation studies (see Lev, 1989). Brennan (1991) suggested that the instability of regression coefficients across years is symptomatic of the omission of important variables. In Chapter 8 (see p. 251) it was noted that Ohlson acknowledges that his basic model can be extended to include additional valuation relevant variables. However, he makes no comment on the implications of the omission of these variables for his basic model.

9.4.3 The Application of Ohlson's Model

Despite using a wide variety of measures, it was not possible to derive a statistically sound form of the model within Ohlson's theoretical framework. The analysis in Chapter 8 and Appendix 8.L revealed that the models derived suffered from econometrical problems. As the consequences of these problems are difficult to specify, this makes it difficult to interpret the models findings.

When drawing conclusions on the utility of inflation accounting data the limitations of Ohlson's model should be kept in mind. The next section presents the conclusions that may be drawn from the empirical analysis.

9.5 CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

The evidence presented in this study provides some support for the IEP of inflation accounting data. This suggests that the inflation accounting data contains information relevant to investors for investment decision making in addition to HCA data.

This conclusion should be of interest to accounting policy makers. In promulgating the disclosure of inflation accounting data, both the ASC and the FASB expressed their desire for research to assess the utility of this data.

Evidence in this study supporting the utility of inflation accounting data is in contrast with the findings of the majority of inflation accounting studies reviewed in Chapter 4. However, many of the previous studies were subject to several methodological problems, as discussed in Chapter 6. The present study attempted to minimise these problems and employed an approach which built on the findings of earlier studies. As the research design used in this study is quite different from the approaches taken in the earlier studies, its findings are not directly comparable with those of previous studies.

However, this study's findings suggest that the debate on inflation accounting is far from closed. More research is needed before any final conclusions can be drawn. In particular, the present study provides a basis for further exploration, as discussed below.

This study confirms that the evaluation of the utility of inflation accounting data is a complex issue. Differences in commitment towards disclosure and ability to respond to price changes lead to different implications for companies. Studies which ignore these differences by indiscriminately grouping companies, may be biased against detecting evidence supporting the utility of inflation accounting data. Diversity with respect to the effects of inflation means that future studies should use greater refinement in the classification of companies to effectively assess the utility of inflation accounting data.

Finding that some companies were committed to the disclosure of inflation accounting prior to the mandatory period suggests a differential behaviour among companies with respect to inflation accounting. This study provides evidence which indicates that this differential behaviour may have effected the utility of the inflation accounting data. This finding has implications for accounting policy makers, as it implies that commitment among companies to accept accounting policy decisions may vary and this variation may affect the utility of the accounting disclosures.

Research should be undertaken which would help accounting policy makers to predict the response of companies to accounting policies decisions on inflation accounting. Developments in the area of positive accounting theory (PAT) provides a framework for this research - (see Watts and Zimmerman, 1986 for a discussion of this theory). Identification of the factors which determine a company's policy towards the disclosure of inflation accounting data, would help accounting policy makers to predict the economic and social consequences of their policy decisions in respect to inflation accounting.

Furthermore, the evidence may be useful in classifying companies into more homogeneous groups. For example, by grouping together companies that are favourably/unfavourably disposed towards the disclosure of inflation accounting data may increase the power of the tests used by researchers to evaluate the utility of this data.

This study suggests that more evidence is required on assessing the utility of cumulative inflation accounting adjustments. Previous studies have focused on the utility of inflation accounting adjustments to HC income measures. As these are single period adjustments it is possible that they may be severely distorted by measurement errors. The effect of these errors may be randomised over a number of periods, which may make the cumulative inflation accounting adjustments more reliable.

Although this research provides evidence supporting the utility of inflation accounting data to investors, the previous comments indicate that the topic warrants further consideration. More research is needed if accounting policy makers are to improve the quality of the information disclosed in financial reports. Although inflation accoounting is only 1 factor to be considered in the development of financial reporting, Arnold, Boyle, Carey, Cooper and Wild (1991) regard it as being central to ensuring that financial reporting meets its objective.

In the final analysis, it is hoped that the results from this study, along with the findings from other studies, will contribute to developing theories that may be used by accounting policy makers to resolve the issue of inflation accounting. May and Sundem (1976) suggested that this is "the most promising use of any given research strategy" (p. 747). In this context perhaps, the words of Santayana should be remembered

> "Our knowledge is a torch of smoky pine
> That lights the pathway but one step ahead"

APPENDICES

APPENDIX 2.A

US PROPOSALS ON INFLATION ACCOUNTING

US Proposals on Inflation Accounting

<u>December 1974</u>
The Financial Accounting Standards Board (FASB, 1974a) issued an Exposure Draft which required manadatory presentation of supplementary price level adjusted financial statements. However, the Exposure Draft was never issued as an official pronouncement.

<u>March 1976</u>
The Securities and Exchange Commission (SEC, 1976) issued Accounting Series release (ASR) 190 which required the disclosure of replacement cost accounting information. In particular, it required SEC registrants with inventories and gross property, plant and equipment exceeding $100 million and constituting more than 10% of total assets, to disclose information about the replacement cost of inventories, cost of goods sold, the productive capacity of fixed assets, and depreciation. This requirement was the first mandatory requirement imposed by an authoritative rule making body on inflation accounting.

<u>December 1978</u>
The FASB (1978) issued an Exposure Draft which required certain large, publicly held companies to disclose supplementary information showing the effect of inflation on a general purchasing power basis or on a CC basis.

<u>September 1979</u>
The FASB (1979) promulaged SFAS 33 which required large companies to disclose certain CC and constant dollar information in supplementary form. This statement applied to enterprises that had either (i) inventories and property, plant and equipment amounting to more than $125 million or (ii) total assets amounting to more than $1 billion.

<u>November 1984</u>
FASB (1984) issued SFAS 82 which eliminated the constant dollar income disclosures previuosly required by SFAS 33.

<u>October 1986</u>
FASB (1986) issued SFAS 89 to replace SFAS 33, detailing the change from mandatory to voluntary disclosure of inflation accounting data.

APPENDIX 2.B

UK PROPOSALS ON INFLATION ACCOUNTING

UK Proposals on Inflation Accounting

<u>January 1973</u>
The Accounting Standards Steering Committee (ASSC, 1973) issued Exposure Draft 8 (ED 8) proposing a system of current purchasing power (CPP), requiring supplementary statements incorporating both a balance sheet and a profit and loss account drawn up on a CPP basis.

<u>July 1973</u>
The government announced its intention to set up a committee to look into the problem of inflation accounting. In December 1973 the membership of the Sandilands Committee was announced.

<u>May 1974</u>
PSSAP 7 was issued by ASSC (1974) as a provisional standard pending the report of the Sandilands Committee. It followed ED 8 in laying down a system of supplementary CPP accounting.

<u>September 1975</u>
The Sandilands Report (Sandilands, 1975) rejected CPP and recommended that CC accounts should replace HC accounts

<u>November 1976</u>
The Inflation Accounting Steering Group (ASC, 1976) presented ED 18 containing detailed proposals for the implementation of a CCA system.

<u>May 1977</u>
The Inflation Accounting Steering Group announced that, in response to strong criticism of ED 18, the proposals would be considerably simplified and subjected to further debate.

<u>July 1977</u>
A special meeting of the Institute of Chartered Accountants in England and Wales voted for the resolution "That the members of the Institute of Chatered Accountants in England and Wales do not wish any system of Currrent Cost Accounting to be made compulsory".

November 1977
The ASC (1977) published an interim statement, the "Hyde Guidelines", which recommended the disclosure of supplementary CCA information dealing only with the profit and loss account and applying only to listed companies.

April 1979
ED 24 was issued by the ASC (1979) proposing that listed and certain other large companies should be required to present supplementary CC accounts.

March 1980
SSAP 16 was issued by the ASC (1980). This was based on ED 24 with minor adjustments and prescribed a minimum of supplementary abridged CC accounts dealing with both the profit and loss account and the balance sheet.

July 1980
The Stock Exchange issued a letter requiring listed companies to comply with SSAP 16 and also to include CCA information in the preliminary announcement and the interim report. In response to representations from listed companies the Stock Exchange agreed that CCA information was only required in the interim report after companies had prepared 2 sets of annual accounts on the basis of SSAP 16, i.e. the interim reports for accounting periods starting on or after 1 January 1982.

June 1985
The mandatory status of SSAP 16 was withdrawn.

July 1988
SSAP 16 was formally withdrawn.

APPENDIX 3.A

ASSUMPTIONS OF THE CAPM

ASSUMPTIONS OF THE CAPM

All investors are single period expected utility of terminal wealth maximizers who choose among alternative portfolios on the basis of the mean and variance of return.

All investors can borrow or lend an unlimited amount at an exogenously determined risk free rate of interest.

All investors have identical subjective estimates of the means, variances and covariances of return among all assets, that is, they have homogenous expectations.

The capital markets are perfect in the sense that:

> there are no transaction costs;
>
> there are no taxes;
>
> all investors have equal and costless access to information; and,
>
> competition is atomistic, that is, all investors are price takers.

APPENDIX 4.A

IMPORTANT EVENT DATES USED IN RO'S STUDIES (1980 & 1981)

IMPORTANT EVENT DATES USED IN RO'S STUDIES (1980 & 1981)

Event

1. ARS 190 proposal (August 21, 1975):
The SEC proposed amendments to Regulations S-X requiring the following replacement cost (RC) disclosures in 10-K reports: (a) the current RCs of inventories and productive capacity; (b) cost of sales; (c) depreciation, depletion, or amortization expense; and (d) the methods used in determining the above replacement cost data. The proposal includes general guidelines for measuring the effects of inflation on a firm (especially on current business operations rather than the value of business assets), and proposes a definition of RC, inventory assets, and productive capacity. The proposals also indicates that only those firms which meet a size standard will evevtually be subject to the proposed rule.

2a. ARS 190 (March 23, 1976):
The above proposal was formally adopted in ASR 190. A $100- million materiality standard for RC disclosure was suggested

2b. SAB No. 7 (March 23, 1976):
This is the first SAB published to implement ASR 190. SABs are neither rules nor official views of the SEC; they are interpretations. SAB No. 7 suggest a definition for RC, productive capacity and inventories. The bulletin also provides guidelines for estimating RC data for inventories (allowing the use of LIFO and FIFO methods under certain conditions), productive capacity, depreciation (requiring the use of straight-line method and the average current RC), and cost of sales. The bulletin also briefly explains how to disclose the RC information in a footnote to the 10-K report.

3. SAB No. 9 (June 17, 1976):
SAB No. 9 clarifies the scope of productive capacity and inventories beyond that discussed in SAB No.7. Guidelines are also suggested for the size test. Land, but not non-capitalised financing leases is included in the test.

4. SAB No. 10 (July 27, 1976):
SAB No. 10 presents a change in the definition of productive capacity. Several specific guidelines for developing RC data for inventories, productive capacity, and the cost of sales, including the use of indices in estimating RC are suggested. The bulletin also recommends the following to be excluded from the materiality

test: (a) inventories and productive capacity of unconsolidated subsidiaries and companies accounted for under the equity method, and (b) land held for investment. An example of a schedule of items to be included in and excluded from the RC disclosure is presented.

5. SAB No. 11 (September 3, 1976):
The bulletin interprets operating leases as part of the lessor's productive capacity, and fully depreciated assets as part of productive capacity if they are still in use and material. The bulletin also suggests four general RC measurement techniques: indexing, direct pricing, unit pricing, and functional pricing.

6. SAB No. 12 (November 10, 1976):
SAB No. 12 suggests that the use of the indexing method alone is not acceptable under certain conditions in estimating the RCs of productive assets. It also provides further guidelines for estimating the RC data for "limited-use" assets, productive capacity, and depreciation. Four complete examples of RC disclosures in footnote to the 10-K report are also presented.

7. ASR 203: Safe Harbor Rule (December 9, 1976):
On March 23, 1976, the SEC had proposed a safe harbor rule to protect persons involved in developing the RC data from potential legal liabilities under certain conditions. The SEC adopted the rule because of the imprecise nature of RC data and its desire to encourage the development and disclosure of such data.

8. SAB No. 13 (January 4, 1977):
The bulletin suggests that the FASB Statement No. 13 definition of capital lease may be used for financing leases under certain conditions in determining productive capacity. It also recommends certain repair parts, materials, and supplies to be included in inventories for the RC disclosure. Two examples of the RC disclosures in the annual report to stockholders are presented. The bulletin also suggests that RC disclosures for the parent company financial statements are not required if RC data are provided for the consolidated financial statements.

9. 10-K Disclosure Week:
The week in which the 10-K reports containing footnote disclosure on RC accounting data are released.

NOTE

In Ro's 1980 study the critical event weeks are 1 to 8 above.

In Ro's 1981 study the critical event weeks are 1 to 9 above

APPENDIX 7.A

DATA EXTRACTED FROM DATASTREAM TO DERIVE THE INDEPENDENT VARIABLES

DATA EXTRACTED FROM DATASTREAM TO DERIVE THE INDEPENDENT VARIABLES

VARIABLE

Book Value (HC)	=	Ordinary Share Capital + Share Premium + Reserves - Intangibles
Book Value (CC)	=	Total Share Capital - Preference Share Capital - Other Equity Capital + CCA Reserves + Other Reserves - Intangibles
Earnings (HC)	=	Opening Book Value (HC) - Closing Book Value (HC) - Equity Issued for Cash (Ordinary Shares + Premium) - Equity Issued for Acquisition (Ordinary Shares + Premium) - Conversion (Loan stock/Preference Shares) into Equity (Ordinary Shares + Premium) + Dividends
Earnings (CC)	=	Opening Book Value (CC) - Closing Book Value (CC) - Equity Issued for Cash (Ordinary Shares + Premium) - Equity Issued for Acquisition (Ordinary Shares + Premium) - Conversion (Loan stock/Preference Shares) into Equity (Ordinary Shares + Premium) + Dividends

APPENDIX 7.B

SAMPLE OF COMPANIES

SAMPLE OF COMPANIES

SUPPORTIVE COMPANIES

CAPE INDUSTRIES
KALON GROUP
RMC GROUP
STEETLEY
BPB INDUSTRIES
HENDERSON GROUP
REDLAND
GALLIFORD
LOVELL, Y. J.
BICC
HAWKER SIDDELEY
LEC REFRIGRATION
CHLORIDE GROUP
M. K. ELECTRICAL
BOWTHROPE HOLDINGS
DIPLOMA
ELECTROCOMPONENTS
FARNELL ELTN.
FERRANTI
PLESSEY
RACAL ELECTRONIC
UNITECH
BRIDON
CENTRAL & SHERWOOD
FOLKES GROUP
HALL, MATTHEW
LAIRD
MOLINS
PORTALS HOLDINGS
RANSOMES, SIMS
SIMON ENGINEERING
TI GROUP
VICKERS
APV BAKER
BSS GROUP
BULLOUGH
DAVY CORPORATION
DELTA GROUP
DOBSON GROUP
DOWTY
ELLIOTT, B
FENNER, J. H.
HOPKINSONS HOLDINGS

RHP GROUP
SMITH INDUSTRIES
UTD. SCIENTIFIC
WELLMAN
WESTLAND
GLYNWED
JOHNSON, MATTHEY
McKECHNIE
TRIPLEX LLOYD
BARR & WALLACE ARNOLD
B.B.A. GROUP
B.S.G. INTERNATIONAL
E.R.F. HOLDINGS
GKN
LEX SERVICE
WEST MOTOR HOLDING
CAFFYNS
HARTWELL
LUCAS INDUSTRIES
COOKSON GROUP
TURNER & NEWALL
ENG. CHINA CLAYS
NORCOS
SCAPA GROUP
WHITECROFT
ALLIED-LYONS
BASS
BULMER, H.P.
GRAND METROPOLETAN
GREENALL WHITLEY
GUINNESS
MARSTON, THOMPSON
SCOTTISH & NEWCASTLE
VAUX GROUP
WHITBREAD
WOLVTON & DUDLEY
BOOKER Mc CONNELL
CLIFFORDS DAIRIES
FEEDEX AGRICULTURAL
MATTHEWS BERNARD
UNILEVER
BARR, A.G.
BASSETT FOODS
CARR'S MILLING
DALEGTY
RANKS, HOVIS
ROWNTREE
TATE & LYLE
DEE CORPORATION
KWIK SAVE GROUP
LOW, WILLIAM
SAINSBURY, J

TESCO
FISONS
RECKITT & COLMAN
GLAXO HOLDINGS
LADBROKE
TRUSTHOUSE FORTE
BLADGEN INDUSTRIES
ASSOCIATED PAPER INDUSTRIES
FERGUSON INDUSTRIAL
REDFEARN
WADDINGTON, J
DE LA RUE
EMAP
REED INTERNATIONAL
TRINITY INDUSTRIAL HOLDINGS
HARRIS QUEENSWAY
GREAT UNIVERSAL STORES
WARD WHITE GROUP
BOOTS
EMPIRE STORES
GOLDBERG, A
MENZIES, JOHN
REED AUSTIN
SMITH, W. H.
COURTAULDS
READICUT INTERNATIONAL
TOOTAL GROUP
GEER GROSS
SAATCHI & SAATCHI
BRENT CHEMICALS
BRITISH VITA
CRODA INTERNATIONAL
IMPERIAL CHEMICAL INDUSTRIES
RENTOKIL
SEQUA
BOC GROUP
EVODE GROUP
HOLT LLOYD INTERNATIONAL
BIBBY, J
GRAMPIAN HOLDINGS
PEARSON
HANSON TRUST
POWELL DUFFRYN
BRITISH PETROLEUM
BURMAH OIL
CENTURY OILS
LONDON SCOTTISH MARINE OIL
RTZ CORPORATION
COSALT

A.A.H.
GESTETNER
KALAMAZOO
ROTHMANS INTERNATIONAL
SKETCHLEY
YALE & VALOR

<u>RELUCTANT GROUP</u>

BLUE CIRCLE INDUSTRIES
ERITH
EXPAMET INTERNATIONAL
HEPWORTH CERAMIC
JOHNSTON GROUP
MANDERS HOLDINGS
PHEONIX TIMBER
RUBEROID
RUGBY GROUP
TARMAC
TRAVIS & ARNOLD
MAGNET
MARSHALLS (HALIFAX)
WOLSELEY
ABERDEEN CONSTRUCTION
BARRATT DEVELOPMENT
CONDER GROUP
COSTAIN GROUP
HIGGS & HILL
LAING, JOHN
MOWLEM, JOHN
TAYLOR WOODROW
TILBURY
TURRIFF CORPORATION
WILSON CONNOLLY
WIMPEY GEORGE
BRYANT HOLDINGS
BURNETT & HALLAMS
DOUGLAS, ROBERT M
GLEESON, M. J.
LILLEY, F.J.C.
NORTHERN ENGINEERING INDUSTRIES
VOLEX GROUP
STC
BRAMMER
BRITISH AEROSPACE
DYSON J & J
EIS GROUP
HUNTING ASSOCIATED
NEILL, JAMES HOLDINGS
RICHARDSONS WSTGTH
SENIOR ENGINEERING
SPIRAX-SARCO
WEIR GROUP
BIRMID QUALCAST
GEI INTERNATIONAL
HOWDEN GROUP
MS INTERNATIONAL

PRIEST, BENJAMIN
RENOLD
SIEBE
WAGON INDUSTRIAL HOLDINGS
WHESSOE
COHEN, A
IMI
LEE, ARTHUR
APPLEYARD GROUP
GATES, FRANK
ALEXANDERS HOLDINGS
COWIE, T
BOOT, HENRY
BTR
CAPARO INDUSTRIES
MORGAN CRUCIBLE
BROWN & TAWSE
STAVELEY
CLARK, MATTHEW
MANSFIELD BREWERIES
CADBURY SCHWEPPS
UNITED BISCUITS
FITCH LOVELL
UNIGATE
BATLEYS
GLASS GLOVER
NURDIN & PEACOCK
ASDA-MFI GROUP
MORRISON, WM
NORMANS GROUP
SMITH & NEPHEW
BEECHAM GROUP
LONDON INTERNATIONAL GROUP
ANGLIA TV
ELECTRONIC RENTAL
H.T.V. GROUP
SCOTTISH T. V.
THORN EMI
BUNZL
DRG
METAL CLOSURE
ROCKWARE GROUP
METAL BOX
BEMROSE CORPORATION
COLLINS, WM.
UNITED NEWSPAPERS
CHURCH & CO
PENTOS
BENTALLS
BURTON GROUP
COURTS (FURN.)
FINE ART DEVELOPMENTS

SEARS
WIGFALLS
BAIRD WILLIAM
CORAH
LISTER & CO
VIVAT HOLDINGS
CELESTION INDUSTRIES
DAWSON INTERNATIONAL
ELLIS & GOLDSTEIN
HOLLAS GROUP
ILWORTH. MORRIS
PARKLAND TEXT
REXMORE
AGB RESEARCH
BRUNNING GROUP
DAVIS, GODFREY
COATES BROTHERS
FOSECO
LAPORTE
ALLIED COLLOIDS
COALITE GROUP
DAVIES & NEWMAN
OCEAN TRANSPORT
RUNCIMAN, W
BET
HUNTING PETROLEUM
ULTRAMAR
BOUSTEAD
HARRISONS & CROS.
WILLS GROUP
PATERSON ZOCH.
BAT INDUSTRIES
BROWN & JACKSON
JOHNSON CLEANERS
TELEVISION RENTALS
BLACK, PETER
CHAMBERLIN. PHIPPS
COWAN, DE GROOT
SECURICOR

APPENDIX 7.C

QUESTIONNAIRE AND LETTERS USED TO DETERMINE COMPANIES' POLICY ON THE DISCLOSURE OF INFLATION ACCOUNTING DATA PRIOR TO THE MANDATORY PERIOD

Date as per postmark

Dear Financial Controller,

I am a lecturer at Dublin City University and I am at present gathering information to complete a thesis for a Ph.D. degree.

My research is concerned with examining the "explanatory power" of inflation adjusted information in relation to the share prices of the top 550 U.K. listed companies.

An essential part of this research is to establish which of these companies disclosed inflation adjusted information prior to SSAP 16 becoming mandatory. In view of this I would greatly appreciate it if you could complete the attached questionnaire and return it to me as soon as possible as I urgently require the information. I assure you that your reply will be treated in the strictest confidence.

I thank you in anticipation of your co-operation.

Yours sincerely,

Marann Byrne
Lecturer

Enc.

QUESTIONNAIRE

Accounting Years Ended

Inflation adjusted information was disclosed in the published accounts of your company (please indicate with an X if Yes). ____ ____

The information was prepared in accordance with the requirements of:

Exposure Draft 18 ____

Hyde Guidelines ____

Sandiland's Report ____

SSAP 16 ____

Please indicate by means of an X which guidelines were followed for each of the years.

If none of the above guidelines were followed, briefly describe the method used to account for the effects of inflation.

____

____

____

____

____

Marann Byrne
December 1986

Dear Financial Controller,

I recently wrote to you (copy of letter attached) regarding a research study I was undertaking and asked for your co-operation in completing a short questionnaire.

As I have not received your completed questionnaire, I now enclose a further copy of the questionnaire and would appreciate it if you would complete it and return it to me as soon as possible. If you are not in a position to complete it, perhaps you could forward me copies of the annual accounts in respect of your company for the accounting periods ending 1979 and 1980. I repeat the assurance in my previous letter that your replies will be treated in strict confidence.

Thank you for your co-operation.

Yours sincerely,

____

Marann Byrne
Lecturer

Encs.

APPENDIX 7.D

COMPANIES CLASSIFIED BY INDUSTRY

COMPANIES CLASSIFIED BY INDUSTRY

INDUSTRY	SUPPORTIVE COS.	RELUCTANT COS.
Building	7	14
Contracting and Construction	2	17
Electricals	5	2
Electronics	8	1
Mechanical Engineering	26	19
Metals and Metal Forming	4	3
Motors	10	4
Other industrial Materials	6	6
Brewers and Distillers	11	2
Food Manufacturing	12	4
Food Retailing	5	6
Health and Household	3	3
Leisure	2	5
Packaging and Paper	5	5
Publishing and Printing	4	3
Stores	9	8
Textiles	3	11
Agencies	2	3
Chemicals	9	5
Conglomerates	4	1
Shipping and Transport	1	3
Oil and Gas	4	2
Overseas Trade		4
Mining	1	
Miscellaneous	7	8
	150	139

APPENDIX 7.E

REPORTING DATES OF THE SAMPLE COMPANIES

REPORTING DATES OF SAMPLE COMPANIES

	NO. OF COMPANIES			
	SUPPORTIVE COMPANIES		RELUCTANT COMPANIES	
MONTH ENDS		%		%
JANUARY	7	(5)	5	(4)
FEBRUARY	7	(5)	1	(1)
MARCH	41	(27)	38	(27)
APRIL	3	(2)	9	(7)
MAY	2	(1)	2	(1)
JUNE	3	(2)	2	(1)
JULY	4	(3)	2	(1)
AUGUST	5	(3)	1	(1)
SEPTEMBER	20	(13)	5	(4)
OCTOBER	4	(3)	2	(1)
NOVEMBER	0	(0)	0	(0)
DECEMBER	54	(36)	72	(52)
	150	(100)	139	(100)

APPENDIX 8.A

SUPPORTIVE COMPANIES

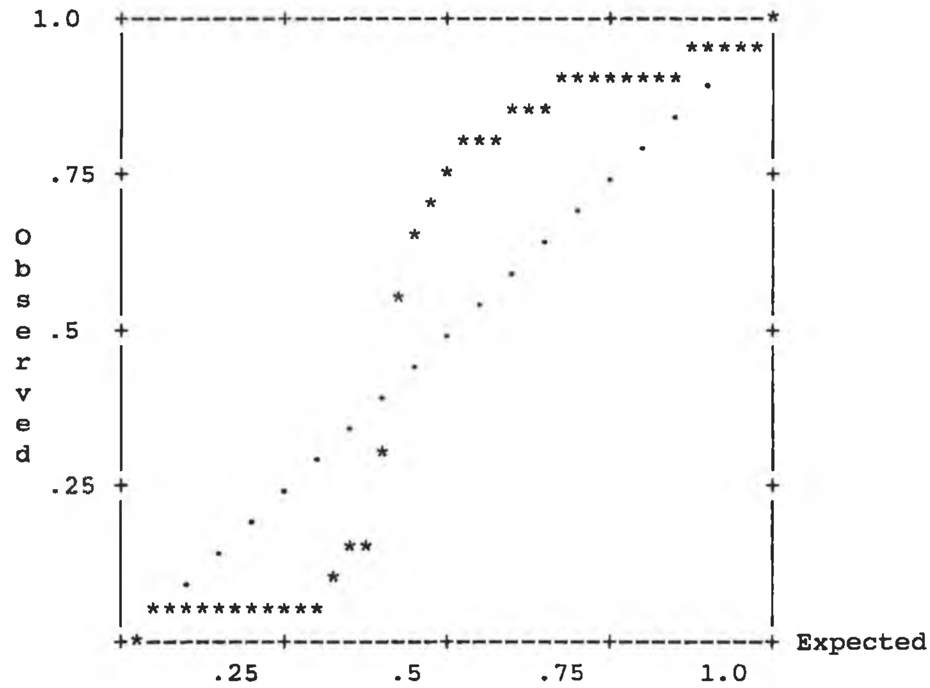
PLOTS OF THE OBSERVED CUMULATIVE DISTRIBUTION OF THE RESIDUALS AGAINST THE DISTRIBUTION EXPECTED UNDER THE ASSUMPTION OF NORMALITY

APPENDIX 8.A.1

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 1 (BMP1)

Normal Probability (P-P) Plot
Standardized Residual



APPENDIX 8.A.1

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 2 (BMP2)

```
Normal Probability (P-P) Plot
Standardized Residual
  1.0  +---------+---------+---------+---------*
       |                             **********|
       |                          ***      .   |
       |                       ***       .     |
       |                     **        .       |
   .75 +                    *        .         +
       |                   *       .           |
 O     |                  *      .             |
 b     |                       .               |
 s     |                     .                 |
 e .5  +                 * .                   +
 r     |                 .                     |
 v     |               .                       |
 e     |             .                         |
 d     |           .                           |
   .25 +         .      *                      +
       |       .       *                       |
       |     .       **                        |
       |   .      ***                          |
       | .********                             |
       +**-------+---------+---------+---------+ Expected
               .25        .5       .75       1.0
```

APPENDIX 8.A.2

SUPPORTIVE COMPANIES

FIRST DIFFERENCE MODEL (FD)

```
Normal Probability (P-P) Plot
Standardized Residual
  1.0   +---------+---------+---------+--------**
        |                                ******|
        |                              **   .  |
        |                           ***   .    |
        |                          *    .      |
   .75  +                       ***   .        +
        |                      *    .          |
 O      |                     *   .            |
 b      |                       .              |
 s      |                    *.                |
 e .5   +                   .                  +
 r      |                 .                    |
 v      |               .   *                  |
 e      |             .                        |
 d      |           .                          |
   .25  +         .        *                   +
        |       .         *                    |
        |     .        ***                     |
        |   .     *****                        |
        | .  ******                            |
        +***------+---------+---------+---------+ Expected
                 .25        .5       .75       1.0
```

APPENDIX 8.A.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY SALES   (D1BMP1)

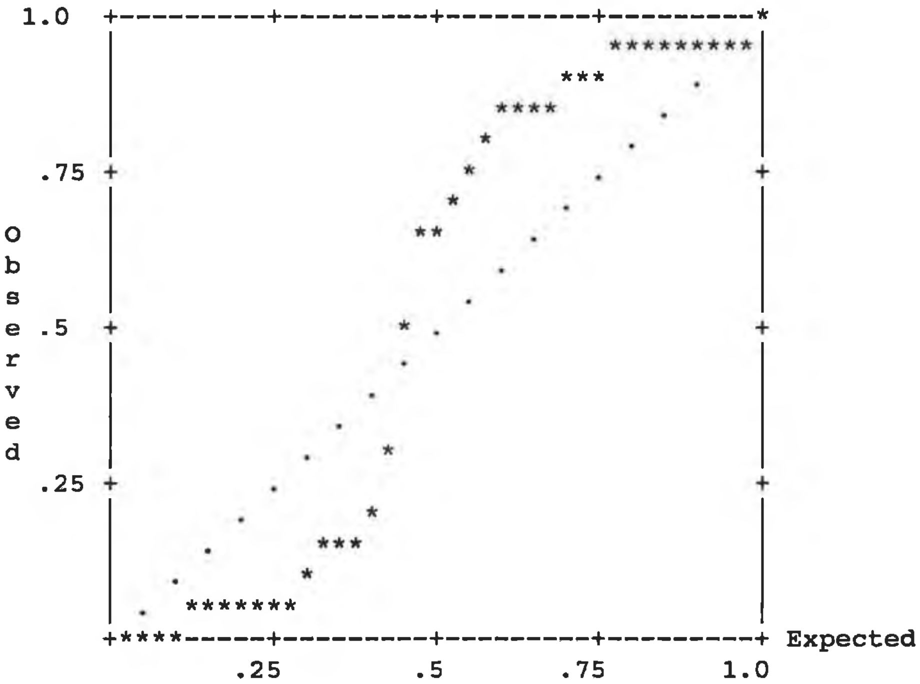
```
Normal Probability (P-P) Plot
Standardized Residual
  1.0  +---------+---------+---------+---------*
       |                                 ******|
       |                            *****  .   |
       |                       *****     .     |
       |                      *       .        |
   .75 +                    **       .         +
       |                   *       .           |
 O     |                 **      .             |
 b     |                       .               |
 s     |                *    .                 |
 e .5  +                   .                   +
 r     |                 .                     |
 v     |               .                       |
 e     |             . *                       |
 d     |           .                           |
   .25 +         .                             +
       |       .                               |
       |     .       **                        |
       |   .     **                            |
       | . ********                            |
       +***------+---------+---------+---------+ Expected
               .25        .5        .75       1.0
```

APPENDIX 8.A.3

<u>SUPPORTIVE COMPANIES</u>

BASIC MODEL PERIOD 2 DEFLATED BY SALES (D1BMP2)

Normal Probability (P-P) Plot
Standardized Residual

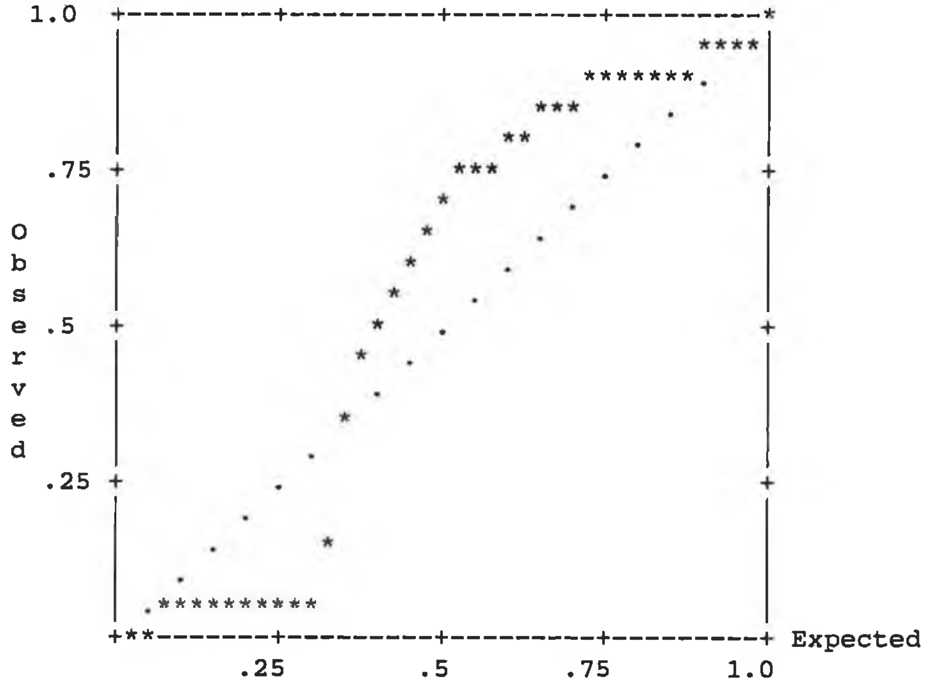


APPENDIX 8.A.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY CLSEHC (D2BMP1)

Normal Probability (P-P) Plot
Standardized Residual

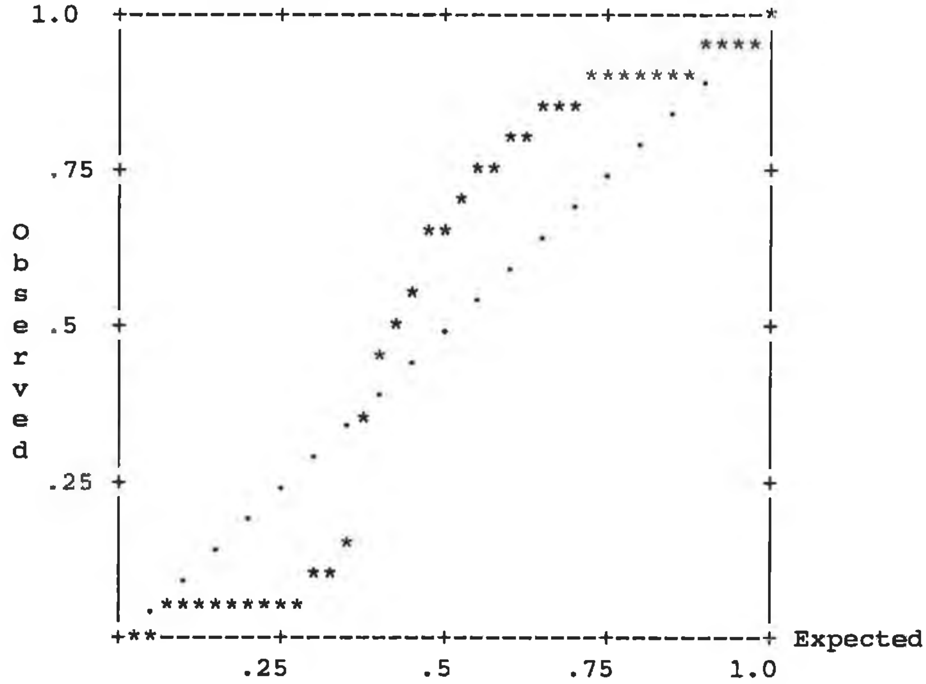


APPENDIX 8.A.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 2 DEFLATED BY CLSEHC (D2BMP2)

Normal Probability (P-P) Plot
Standardized Residual

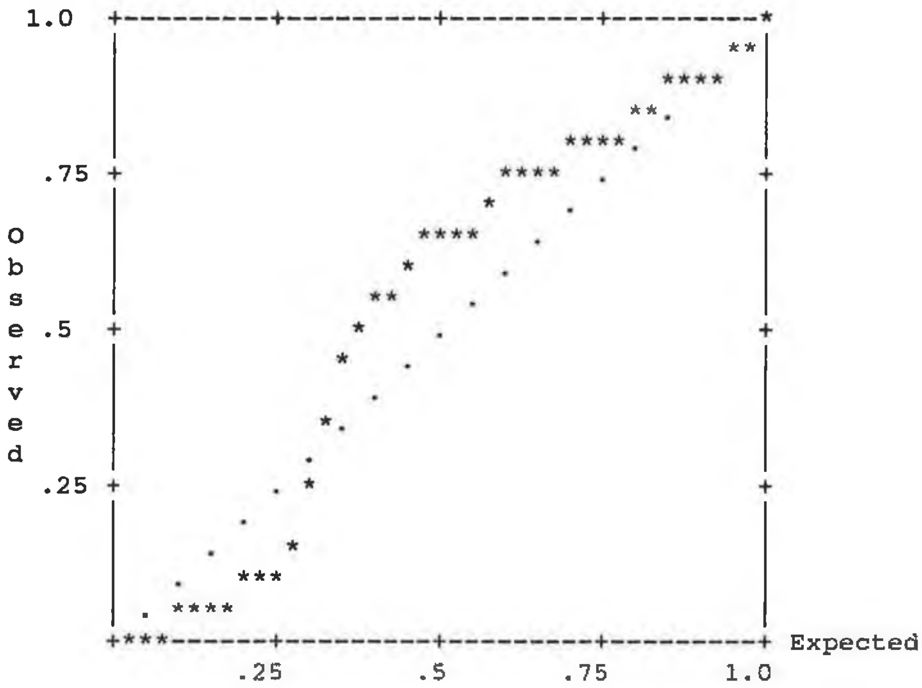


APPENDIX 8.A.3

SUPPORTIVE COMPANIES

FIRST DIFFERENCE MODEL DEFLATED BY CLSEHC (D2FD)

Normal Probability (P-P) Plot
Standardized Residual



APPENDIX 8.B

RELUCTANT COMPANIES

PLOTS OF THE OBSERVED CUMULATIVE DISTRIBUTION OF THE RESIDUALS AGAINST THE DISTRIBUTION EXPECTED UNDER THE ASSUMPTION OF NORMALITY

APPENDIX 8.B.1

RELUCTANT COMPANIES

BASIC MODEL PERIOD 1 (BMP1)

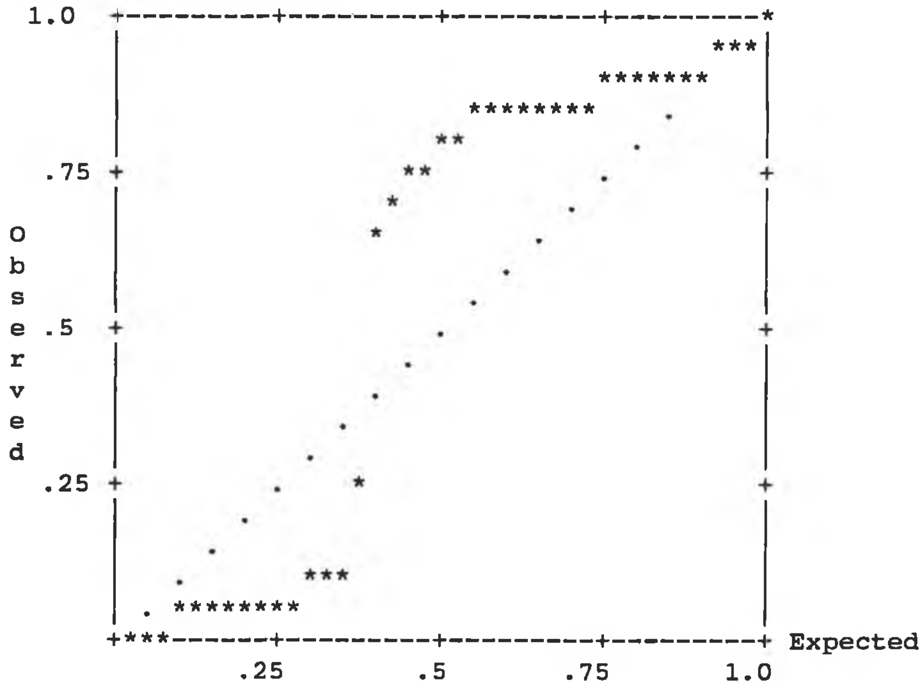
```
 Normal Probability (P-P) Plot
 Standardized Residual
    1.0 +---------+---------+---------+---------*
        |                               ********|
        |                           ****    .   |
        |                      *****      .     |
        |                    **         .       |
    .75 +                  **         .         +
        |                 *         .           |
  O     |                         .             |
  b     |                       .               |
  s     |                *    .                 |
  e  .5 +                   .                   +
  r     |                 .                     |
  v     |               .                       |
  e     |             .                         |
  d     |           .                           |
    .25 +         .     *                       +
        |       .                               |
        |     .        *                        |
        |   .       ***                         |
        | . ********                            |
        +***------+---------+---------+---------+ Expected
                .25        .5       .75       1.0
```

APPENDIX 8.B.1

RELUCTANT COMPANIES

BASIC MODEL PERIOD 2 (BMP2)

Normal Probability (P-P) Plot
Standardized Residual

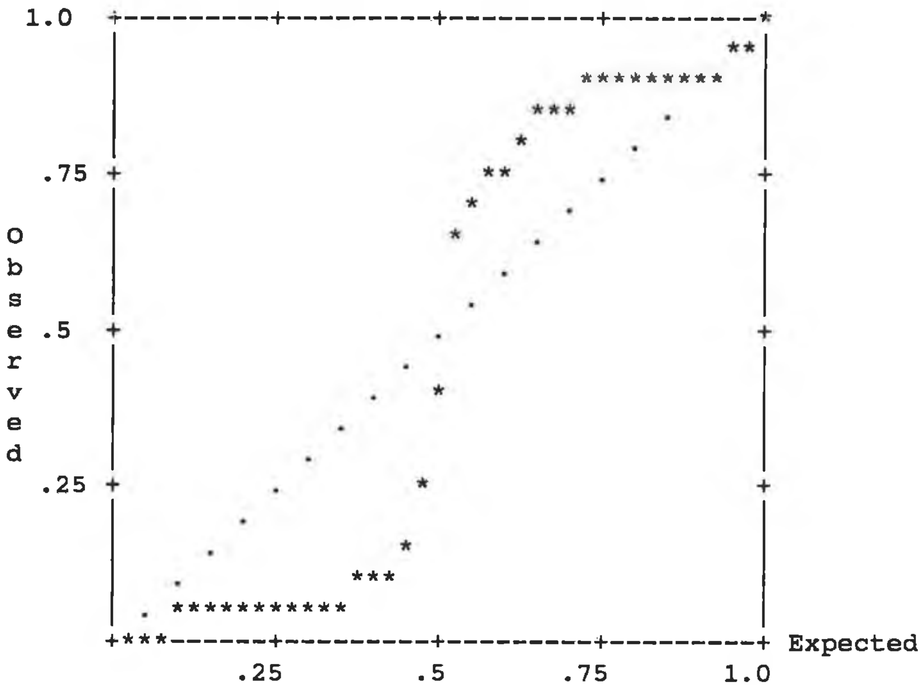


APPENDIX 8.B.2

RELUCTANT COMPANIES

FIRST DIFFERENCE MODEL (FD)

Normal Probability (P-P) Plot
Standardized Residual

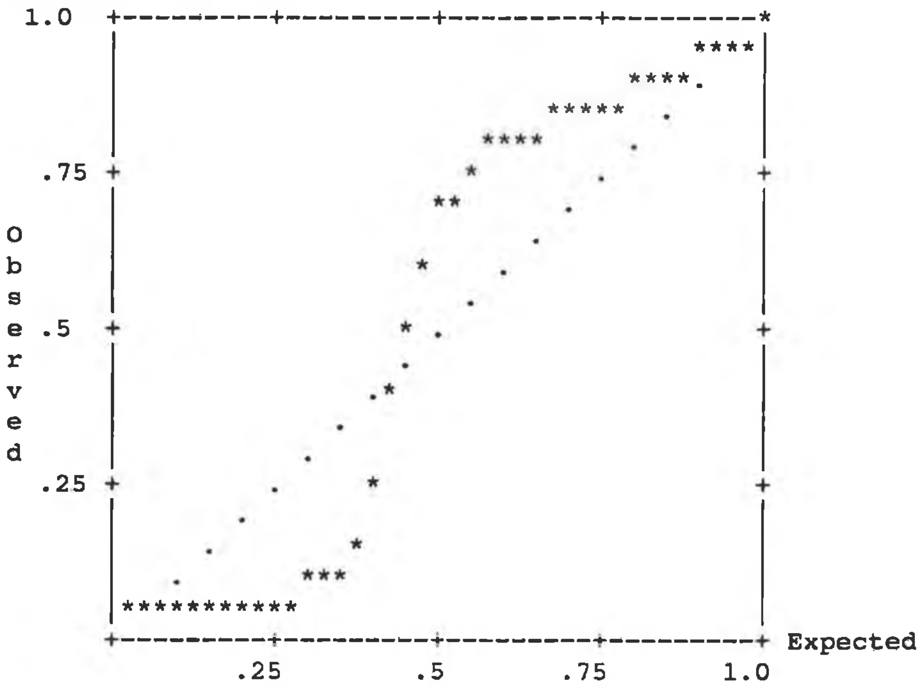


APPENDIX 8.B.3

RELUCTANT COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY SALES (D1BMP1)

Normal Probability (P-P) Plot
Standardized Residual



APPENDIX 8.B.3

<u>RELUCTANT COMPANIES</u>

BASIC MODEL PERIOD 2 DEFLATED BY SALES (D1BMP2)

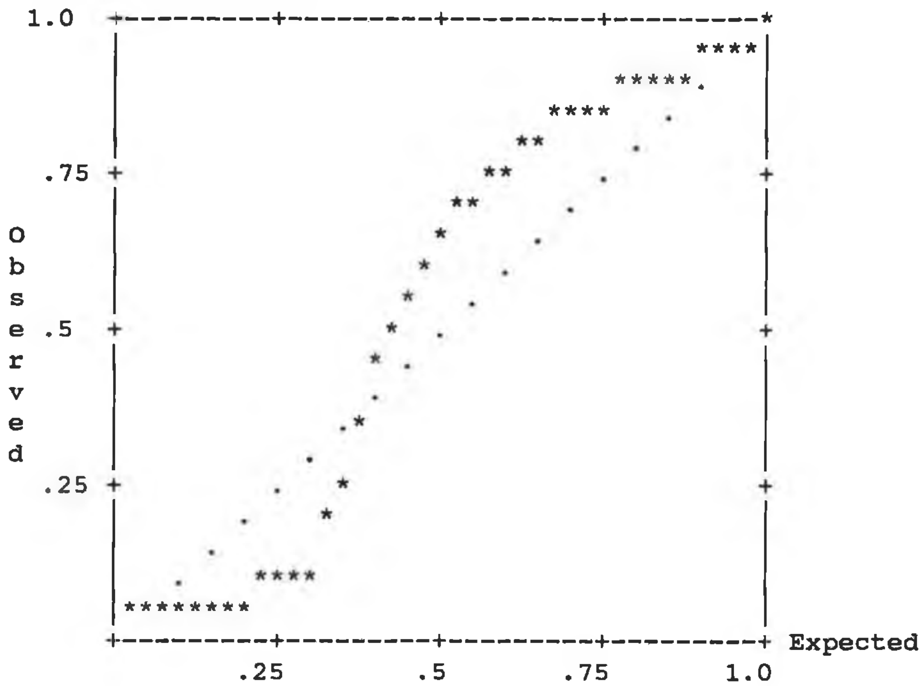
```
  Normal Probability (P-P) Plot
  Standardized Residual
   1.0 +---------+---------+---------+---------*
       |                                    ***|
       |                            ********   |
       |                        ****     .     |
       |                      **       .       |
   .75 +                   ***       .         +
       |                           .           |
O      |                  *      .             |
b      |                 *     .               |
s      |                     .                 |
e   .5 +                   .                   +
r      |                 .                     |
v      |               .*                      |
e      |             .                         |
d      |           .                           |
   .25 +         .                             +
       |       .       *                       |
       |     .        *                        |
       |   .     *****                         |
       |*********                              |
       +---------+---------+---------+---------+ Expected
               .25        .5       .75      1.0
```

APPENDIX 8.B.3

RELUCTANT COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY CLSEHC (D2BMP1)

Normal Probability (P-P) Plot
Standardized Residual

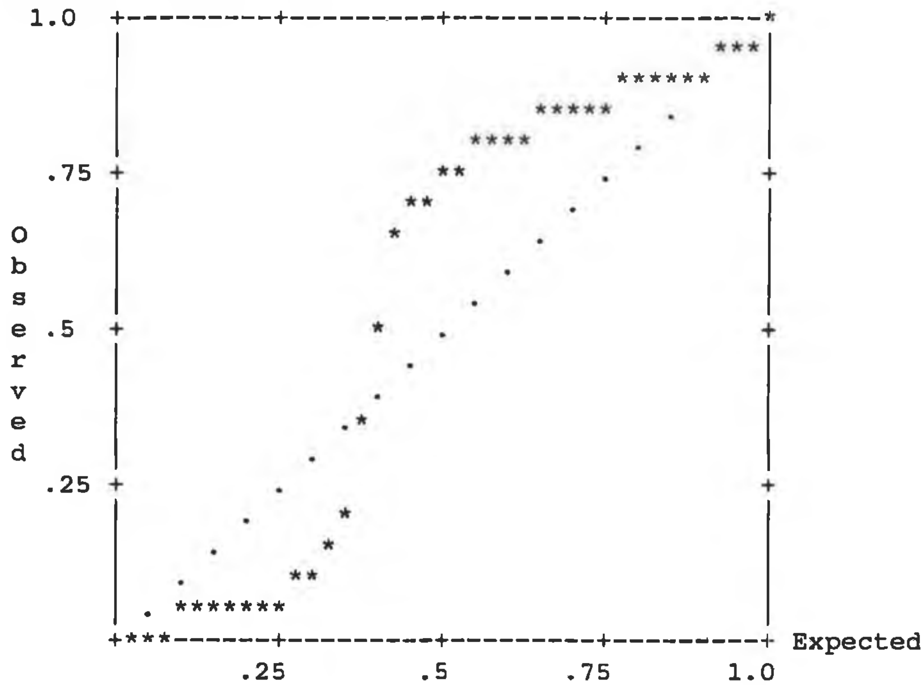


APPENDIX 8.B.3

<u>RELUCTANT COMPANIES</u>

BASIC MODEL PERIOD 2 DEFLATED BY CLSEHC (D2BMP2)

Normal Probability (P-P) Plot
Standardized Residual

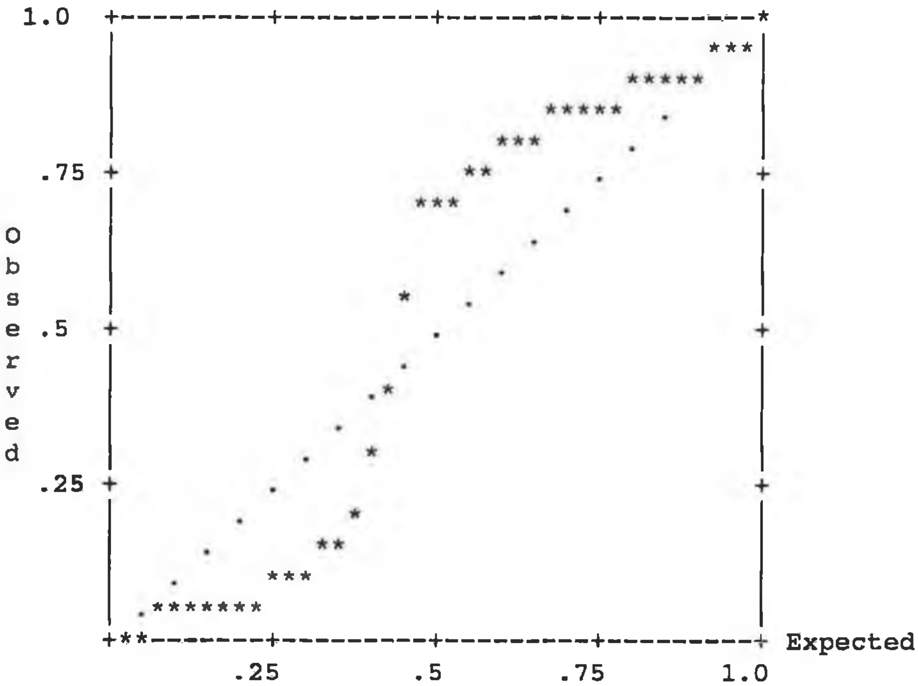


APPENDIX 8.B.3

RELUCTANT COMPANIES

FIRST DIFFERENCE MODEL DEFLATED BY SALES (D1FD)

Normal Probability (P-P) Plot
Standardized Residual

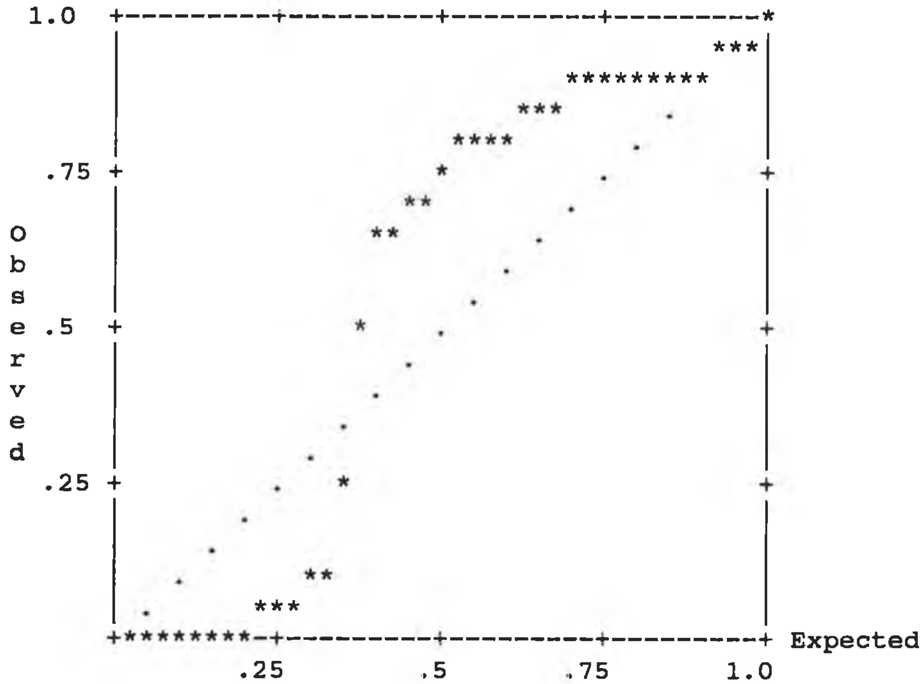


APPENDIX 8.B.3

<u>RELUCTANT COMPANIES</u>

FIRST DIFFERENCE MODEL DEFLATED BY CLSEHC (D2FD)

Normal Probability (P-P) Plot
Standardized Residual



APPENDIX 8.C

SUPPORTIVE COMPANIES

SCATTERPLOTS OF STANDARDISED RESIDUALS AGAINST PREDICTED VALUES OF Y

APPENDIX 8.C.1

<u>SUPPORTIVE COMPANIES</u>

BASIC MODEL PERIOD 1 (BMP1)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+----- ... -+-----+-----++
  3 +                                     +   Symbols:
    |                                     |
    |                                  .  |      Max N
  2 +                   .                 +
    |                  .                 .|   .     14.0
    |               .                     |   :     28.0
  1 +                 ..        .         +   *     57.0
    |                 .    ..             |
    |                ....                 |
  0 +                :...        .        +
    |                *...                 |
    |                 .. ..               .
 -1 +                   .
    |                          .          |
    |                       . .           |
 -2 +                            .        +
    |                                  .  |
    |                       .             |
 -3 +                                     +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.C.1

<u>SUPPORTIVE COMPANIES</u>

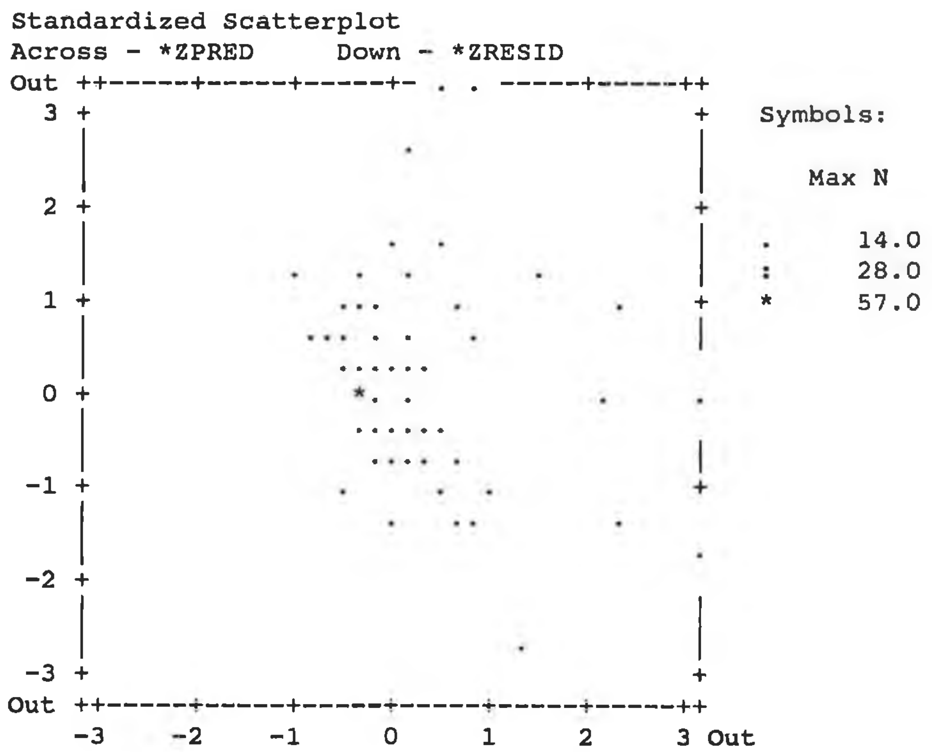
BASIC MODEL PERIOD 2 (BMP2)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+ ... +-----+-----++
  3 +                    .                +   Symbols:
    |                                     |
    |                        .            |      Max N
  2 +                                     +
    |                     .               |   .     14.0
    |                 .                   |   :     28.0
  1 +                  .                      *     58.0
    |               .. .                  .
    |                ....    .         .
  0 +               .*...  ..             +
    |                :....                |
    |                 ....     .          |
 -1 +                   .        .        +
    |                     .               |
    |                        .     .      |
 -2 +                                     +
    |                                     |
    |                                     |
 -3 +
Out ++-----+-----+-----+----- . ---+----- .
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.C.2

<u>SUPPORTIVE COMPANIES</u>

FIRST DIFFERENCE MODEL (FD)



APPENDIX 8.C.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY SALES (D1BMP1)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+---- .. . -+-----++
  3 +                      .              +   Symbols:
    |                                     |
    |                                            Max N
  2 +                     .               .
    |                 .  .                    .     11.0
    |                                     |   :     22.0
  1 +             .  . ..                     *     46.0
    |           .  . ..          .        .
    |              ........      .      ..
  0 +              .:. ..                 +
    |              .*...... .             |
    |                  .  ..  .           |
 -1 +                      . .       .
    |                                .    .
    |
 -2 +                                     .
    |
    |                                     .
 -3 +
Out ++-----+-----+-----+-----+----- . ---++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.C.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 2 DEFLATED BY SALES (D1BMP2)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-----+- . -+ . --++
  3 +                           .         +   Symbols:
    |                        .            |
    |                                     |     Max N
  2 +                                     +
    |                                     |   .      7.0
    |          .         .            .   |   :     14.0
  1 +               .          .    .     +   *     30.0
    |         .     ...   ..              |
    |              ....  .         .      |
  0 +            .*::..  .   .            .
    |             .*....  .  .      . .
    |                ....  .        .    .
 -1 +                       ..            .
    |                            . .
    |                        .            |
 -2 +                                     +
    |                                     |
 -3 +                                     .
Out ++-----+-----+-----+-----+-----+---  .
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.C.3

SUPPORTIVE COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY CLSEHC (D2BMP1)

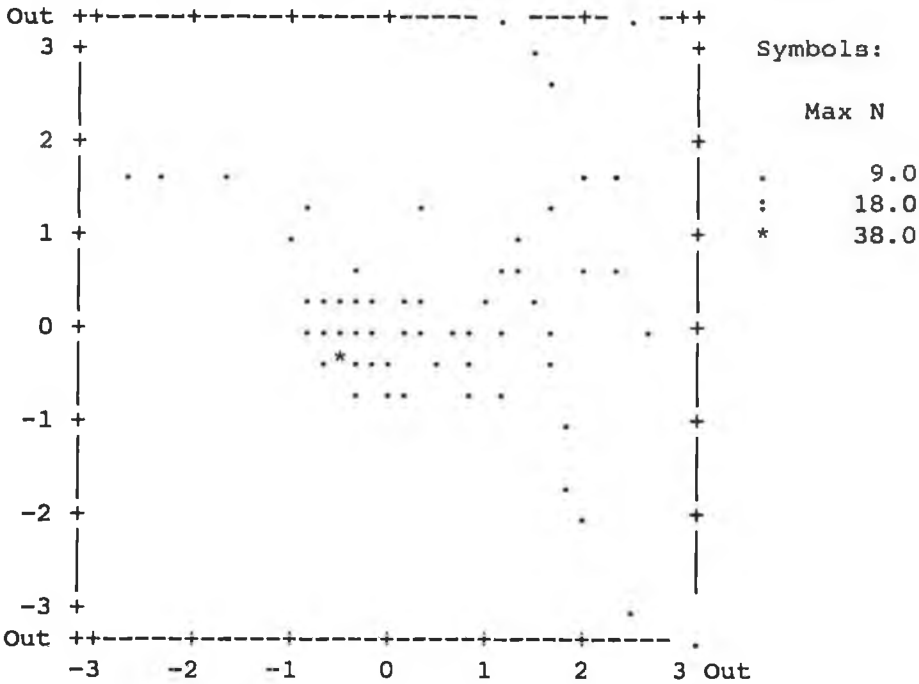
```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+---- . - .. -----++
  3 +                         .  .        +   Symbols:
    |                                     |
    |              .                      |     Max N
  2 +                                     +
    |        .              . .           |   .      9.0
    |    .                   . .          |   :     18.0
  1 +                  .           .      +   *     39.0
    |           ... .  ...                |
    |            . . .. .  .   .          |
  0 +         .......  ... .             .+
    |              .**...  . .   .        |
    |               .   .                 |
 -1 +                         .           +
    |                                     |
    |                             .
 -2 +                                     .
    |                                .
 -3 +                                     .
Out ++-----+-----+-----+-----+-----+-----+
   -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.C.3

<u>SUPPORTIVE COMPANIES</u>

BASIC MODEL PERIOD 2 DEFLATED BY CLSEHC (D2BMP2)

Standardized Scatterplot
Across - *ZPRED Down - *ZRESID



APPENDIX 8.C.3

SUPPORTIVE COMPANIES

FIRST DIFFERENCE MODEL DEFLATED BY CLSEHC (D2FD)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+--- . . ---+-----+-----++
 3 +                                     +   Symbols:
   |                  .                  |
   |                 .                   |      Max N
 2 +          .       .                  +
   |                   .                 |   .       6.0
   |                 ..  .               |   :      12.0
 1 +     .         .  ..   .             +   *      27.0
   |                 ...                 |
   |                 ...                 |
 0 +                 .:..                +
   |               .  **  .              |
                      .*.                |
-1 .                   .. .              +
                     ..       .          |
   |                                     |
-2 +                   ...               +
   |                                     |
   |                                     |
-3 +                                     +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.D

RELUCTANT COMPANIES

SCATTERPLOTS OF STANDARDISED RESIDUALS AGAINST PREDICTED VALUES OF Y

APPENDIX 8.D.1

<u>RELUCTANT COMPANIES</u>

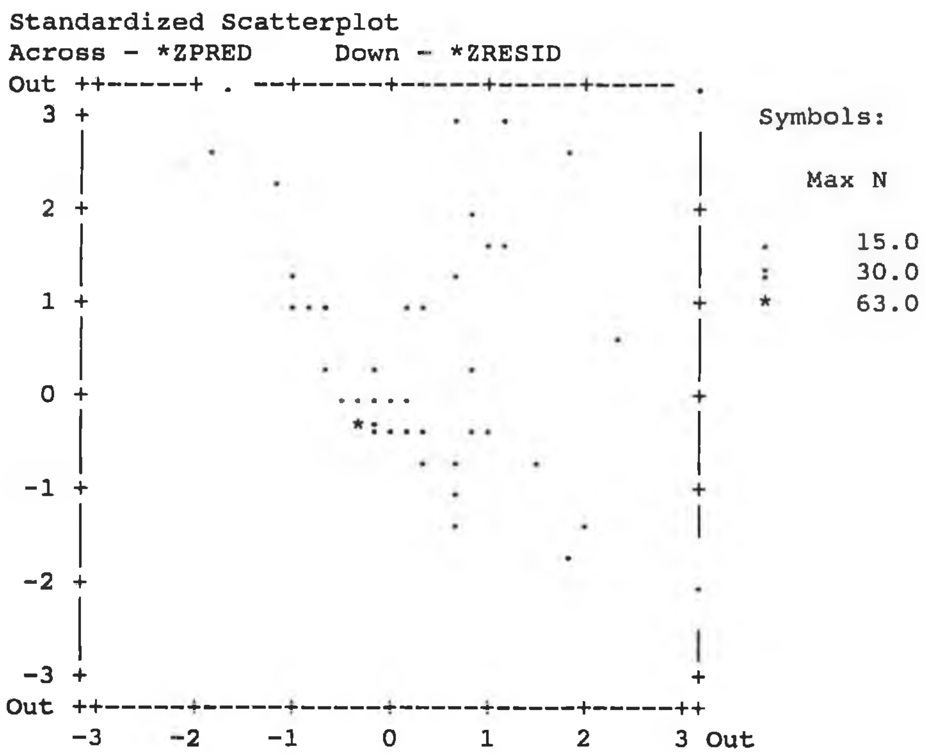
BASIC MODEL PERIOD 1 (BMP1)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-- . +-----+--- . +
  3 +                                     +   Symbols:
    |                      .              |
    |                     .               |      Max N
  2 +                   .                 +
    |                 .            .      |   .     15.0
    |                                     |   :     30.0
  1 +                    .                +   *     61.0
    |               .. ..  .  .           |
    |               .... .           .    |
  0 +               .:. ..  .             +
    |                *.....               |
    |                  . .  . ..          |
 -1 +                     .               +
    |                        .
    |                                     .
 -2 +                           .
    |
    |                                     .
 -3 +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.D.1

RELUCTANT COMPANIES

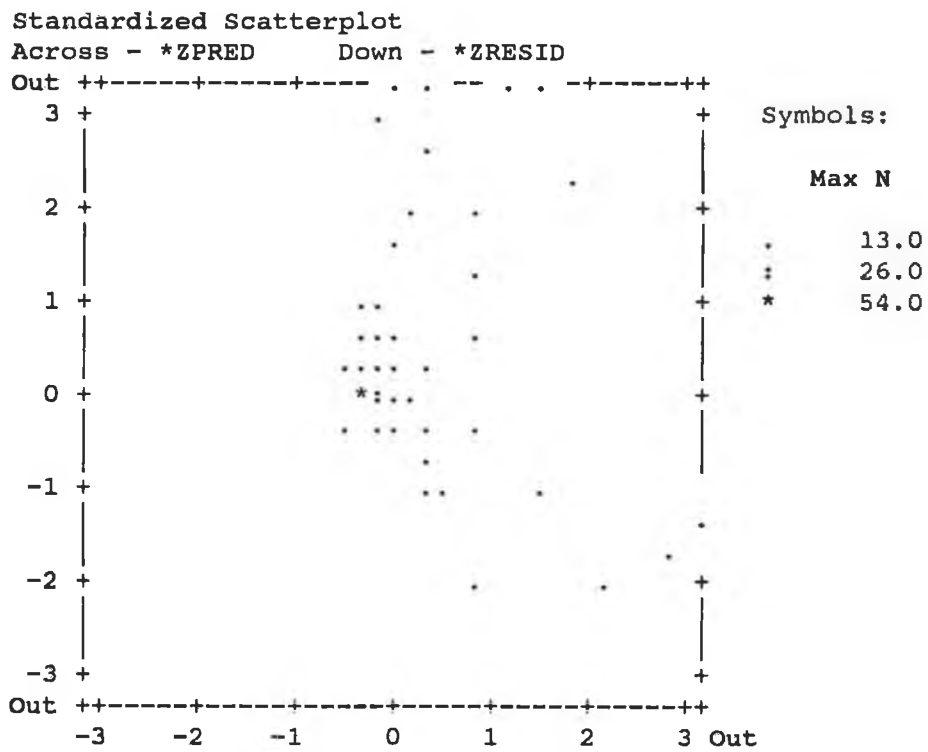
BASIC MODEL PERIOD 2 (BMP2)



APPENDIX 8.D.2

<u>RELUCTANT COMPANIES</u>

FIRST DIFFERENCE MODEL (FD)

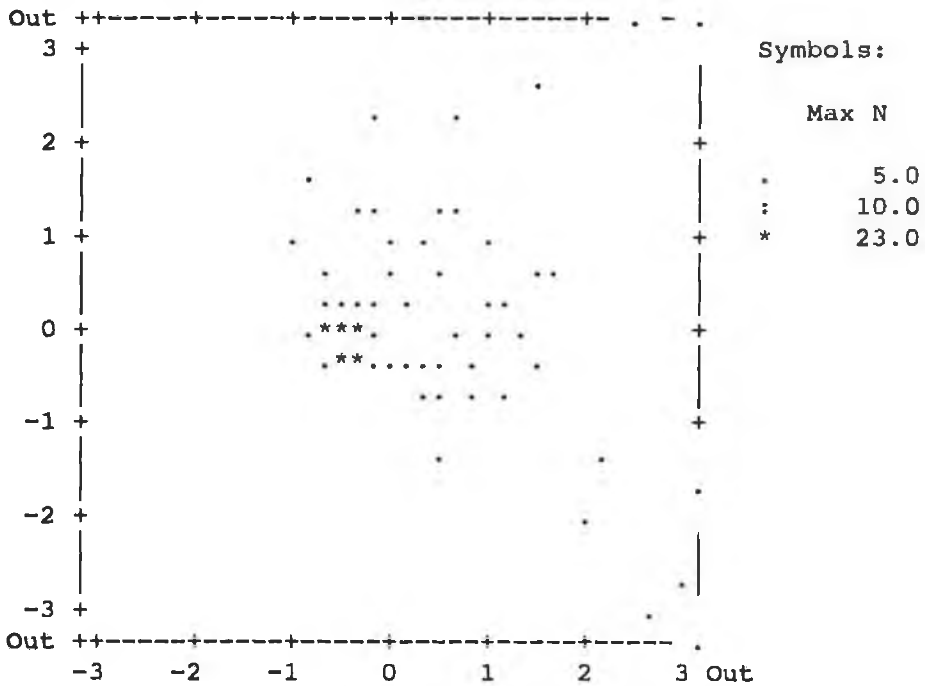


APPENDIX 8.D.3

RELUCTANT COMPANIES

BASIC MODEL PERIOD 1 DEFLATED BY SALES (D1BMP1)

Standardized Scatterplot
Across - *ZPRED   Down - *ZRESID



APPENDIX 8.D.3

<u>RELUCTANT COMPANIES</u>

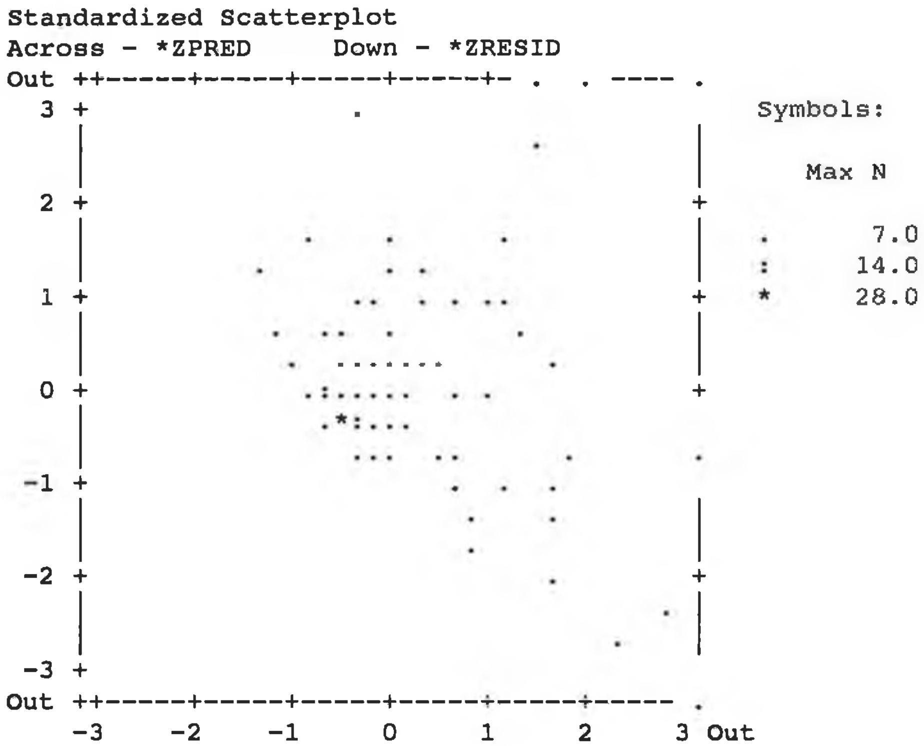
BASIC MODEL PERIOD 2 DEFLATED BY SALES (D1BMP2)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-----+-----+- . - .
  3 +                                         Symbols:
    |                       .   .         |
    |               .                     |      Max N
  2 +          .              .           +
    |                          .          |   .      5.0
    |          .             .            |   :     10.0
  1 +           .     .        .          +   *     23.0
    |             .   .   .    .          |
    |             ..... .      .
  0 +              :*:: .  .   .          .
    |               **.. . ...
    |                ..  .  .             |
 -1 +                                     +
    |                       .. .          |
    |                            .        |
 -2 +                                    .+
    |                                    .
    |                                     .
 -3 +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.D.3

<u>RELUCTANT COMPANIES</u>

BASIC MODEL PERIOD 1 DEFLATED BY CLSEHC (D2BMP1)



APPENDIX 8.D.3

RELUCTANT COMPANIES

BASIC MODEL PERIOD 2 DEFLATED BY CLSEHC (D2BMP2)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-----+- . -+----- .
  3 +                       .      .
    |                           .         |
    |            .          .             |
  2 +        .                            +
    |         .                           |
    |         .              .            |
  1 +                .  .  .      .       +
    |            ... .  .                 |
    |           . ... ...      .          |
  0 +              .....  .    .
    |               **......           .  .
    |                .. .. ....
 -1 +                        .            +
    |                          .          |
    |                               .     |
 -2 +                                     +
    |
    |                                     .
 -3 +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

```
Symbols:

   Max N

.      7.0
:     14.0
*     29.0
```

APPENDIX 8.D.3

RELUCTANT COMPANIES

FIRST DIFFERENCE MODEL DEFLATED BY SALES (D1FD)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+ . --+--- .  . --+-----++
  3 +                    .  .             +   Symbols:
    |                      .
    |                                     .      Max N
  2 +                              ..
    |                 .                   |   .      4.0
    |                  .           .      |   :      8.0
  1 +            .  . ..   .              +   *     19.0
    |             .. .. .                 |
    |      .   . . ..... .                |
  0 +      .      .**.  .                 +
    |              .**::   .   .          |
    |                ..  ... ..          .|
 -1 +                        .            +
    |                         .    .      |
    |                        .
 -2 +                                     .
    |                                     .
    |
 -3 +                             .       +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.D.3

RELUCTANT COMPANIES

FIRST DIFFERENCE MODEL DEFLATED BY CLSEHC (D2FD)

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-- . +----- . ---+-----+ . --++
  3 +                  .                  +   Symbols:
    |                                     |
    |                  .                  |      Max N
  2 +                                     +
    |           .    .. .                     .     10.0
    |            .                        .   :     20.0
  1 +                          .              *     41.0
    |            ..      ..    .          |
               . . .. .. .                |
  0 .            .. ....                  +
                 .  ..**...    .          |
    |                 .... . .  .         |
 -1 +                        .
    |                  .                  .
    |
 -2 +                                     +
    |                                     |
    |                                     |
 -3 +                                     +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.E

CORRELATION COEFFICIENTS

APPENDIX 8.E.1

CORRELATION COEFFICIENTS: BASIC MODELS

SUPPORTIVE COMPANIES

Period 1

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.8959	.8218	.8614	-.5190	-.3967
CLSEHC		.9624	.9692	-.5585	-.3998
CCADJBV			.9491	-.4492	-.2829
EARNHC				-.6180	-.4731
CCADJE					.8534

Period 2

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.8996	.7805	.6730	-.5361	.7273
CLSEHC		.9249	.7154	-.5742	.8501
CCADJBV			.7427	-.3351	.7907
EARNHC				-.1111	.5556
CCADJE					-.6580

RELUCTANT COMPANIES

Period 1

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.7935	.7765	.7803	.5161	.5570
CLSEHC		.8721	.9394	.5679	.4429
CCADJBV			.8632	.7552	.5305
EARNHC				.6398	.5753
CCADJE					.4291

Period 2

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.7868	.7459	.7284	.1571	.8297
CLSEHC		.8589	.8954	.2341	.8028
CCADJBV			.7768	.4704	.7882
EARNHC				.1172	.7517
CCADJE					.2038

APPENDIX 8.E.2

CORRELATION COEFFICIENTS: FIRST DIFFERENCE MODEL

SUPPORTIVE COMPANIES

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.2133	-.3745	-.7258	-.3674	.5750
CLSEHC		.4344	.2559	.1935	-.3444
CCADJBV			.6133	.9118	-.7165
EARNHC				.5508	-.8784
CCADJE					-.6559

RELUCTANT COMPANIES

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.6373	.1467	.2101	-.2615	.2532
CLSEHC		.0866	.5554	-.4422	.0457
CCADJBV			-.5021	.5634	-.0851
EARNHC				-.5114	-.0824
CCADJE					-.1431

APPENDIX 8.E.3

CORRELATION COEFFICIENTS: DEFLATED BASIC MODEL (DEFLATOR = SALES)

SUPPORTIVE COMPANIES

Period 1

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV	SALES
CO. VALUE	.7101	.5351	.6744	.0224	.1737	-.6181
CLSEHC		.8525	.8646	-.0126	.2719	-.8891
CCADJBV			.8256	.0880	.3369	-.8379
EARNHC				-.0855	.2141	-.8397
CCADJE					.4284	.0525
DIV						-.1529

Period 2

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV	SALES
CO. VALUE	.7007	.4902	.7009	.1378	.1725	-.5934
CLSEHC		.8041	.6888	.1632	.3570	-.8807
CCADJBV			.5218	.4194	.3948	-.7858
EARNHC				.1525	.2239	-.6093
CCADJE					-.1159	-.0835
DIV						-.3772

RELUCTANT COMPANIES

Period 1

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV	SALES
CO. VALUE	.5729	.3796	.6475	.1260	.3370	-.4573
CLSEHC		.6708	.6813	.0509	.4540	-.7603
CCADJBV			.5692	.1995	.4009	-.6568
EARNHC				.0118	.4520	-.5594
CCADJE					.0878	.0384
DIV						-.2369

Period 2

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV	SALES
CO. VALUE	.6369	.3977	.6863	.1560	.0873	-.5091
CLSEHC		.7158	.6363	.2309	.2073	-.8146
CCADJBV			.4168	.5011	.2834	-.7063
EARNHC				.1007	.1432	-.5086
CCADJE					-.0578	-.1840
DIV						-.1874

APPENDIX 8.E.4

CORRELATION COEFFICIENTS: DEFLATED BASIC MODEL (DEFLATOR = CLSEHC)

SUPPORTIVE COMPANIES

Period 1

	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.4906	.6405	.0202	.1451
CCADJBV		.8254	.1499	.3196
EARNHC			.0083	.2322
CCADJE				.4060

Period 2

	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.4583	.6668	.1087	.1419
CCADJBV		.5229	.3873	.3791
EARNHC			.1474	.1965
CCADJE				-.1187

RELUCTANT COMPANIES

Period 1

	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.3275	.5940	.1051	.1679
CCADJBV		.5000	.2668	.2660
EARNHC			.1028	.3474
CCADJE				.0464

Period 2

	CCADJBV	EARNHC	CCADJE	DIV
CO.VALUE	.3658	.6317	.1296	.0568
CCADJBV		.3866	.4180	.2624
EARNHC			.0909	.0948
CCADJE				-.0709

APPENDIX 8.E.5

CORRELATION COEFFICIENTS: DEFLATED FIRST DIFFERENCE MODEL (DEFLATOR = SALES)

RELUCTANT COMPANIES

	CLSEHC	CCADJBV	EARNHC	CCADJE	DIV	SALES
CO. VALUE	.4466	-.1625	.2978	-.2284	.1600	-.5905
CLSEHC		-.5662	.7856	-.4926	-.0131	-.3490
CCADJBV			-.6297	.7659	-.1616	.0479
EARNHC				-.4558	.0745	-.0316
CCADJE					-.1583	.1187
DIV						-.2458

DEFLATED FIRST DIFFERENCE MODEL (DEFLATOR = CLSEHC)

SUPPORTIVE COMPANIES

	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	-.6376	-.8309	-.5417	.7583
CCADJBV		.7323	.9382	-.7858
EARNHC			.6152	-.8956
CCADJE				-.6999

RELUCTANT COMPANIES

	CCADJBV	EARNHC	CCADJE	DIV
CO. VALUE	.1999	-.0380	.0790	.2000
CCADJBV		.1199	.4920	-.1087
EARNHC			.5385	-.5134
CCADJE				-.0972

APPENDIX 8.F

GLEJSER'S REGRESSION EQUATIONS

GLEJSER'S REGRESSION EQUATIONS

SUPPORTIVE COMPANIES

PERIOD 1

$$y = 97263.449055 + .015868x_1$$

PERIOD 2

$$y = 105776.35430 + .019359x_1$$

FIRST DIFFERENCE

$$y = 42771.935527 + .021475x_1$$

RELUCTANT COMPANIES

PERIOD 1

$$y = 43522.532809 + .064165x_1$$

PERIOD 2

$$y = 77795.524280 + .050380x_1$$

FIRST DIFFERENCE

$$y = 25684.696645 + .105229x_1$$

where

y = Company value

x_1 = Sales

GLEJSER'S REGRESSION EQUATIONS

SUPPORTIVE COMPANIES

PERIOD1

$y = 94872.948181 + .060372x_1$

PERIOD 2

$y = 100595.32384 + .084997x_1$

FIRST DIFFERENCE

$y = 32943.178824 + .742764x_1$

RELUCTANT COMPANIES

PERIOD 1

$y = 38449.493087 + .266292x_1$

PERIOD 2

$y = 73191.632293 + .215714x_1$

FIRST DIFFERENCE

$y = 27467.999481 + .302268x_1$

where

y = Company value

x_1 = CLSEHC

APPENDIX 8.G

DEFINITION OF THE ABBREVIATED MODEL TITLES

DEFINITION OF THE ABBREVIATED MODEL TITLES

BMP1	=	Ohlson's basic model (described on pp. 239-241) for period 1
BMP2	=	Ohlson's basic model for period 2
D1BMP1	=	Ohlson's basic model for period 1 deflated by sales
D1BMP2	=	Ohlson's basic model for period 2 deflated by sales
D2BMP1	=	Ohlson's basic model for period 1 deflated by CLSEHC
D2BMP2	=	Ohlson's basic model for period 2 deflated by CLSEHC
FD	=	Ohlson's model derived using first differences
D1FD	=	Ohlson's model derived using first differences deflated by sales
D2FD	=	Ohlson's model derived using first differences deflated by CLSEHC
PSBMP1	=	Per share form of Ohlson's basic model for period 1
PSBMP2	=	Per share form of Ohlson's basic model for period 2
B3BMP1	=	Ohlson's basic model for period 1 for companies in risk category 3
B4BMP1	=	Ohlson's basic model for period 1 for companies in risk category 4

APPENDIX 8.H

PER SHARE BASIC MODELS: VARIANCE INFLATION FACTORS

PER SHARE BASIC MODELS: VARIANCE INFLATION FACTORS

SUPPORTIVE COMPANIES

	PERIOD 1 VIF	PERIOD 2 VIF
CLSEHC	332.836	425.305
CCADJBV	390.739	153.708
EARNHC	156.925	86.736
CCADJE	308.007	98.372
DIV	31.958	25.296

APPENDIX 8.I

BETA DISTRIBUTIONS

SUPPORTIVE COMPANIES: BETA DISTRIBUTIONS

BETA

```
Count   Midpoint    One symbol equals approximately   .60 occurrences

    0       .100
    0       .175
    0       .250
    1       .325  **
    1       .400  :*
    5       .475  **:*****
    3       .550  ***** .
    7       .625  ***********:
    4       .700  *******           .
   17       .775  **************************:*
   18       .850  ******************************   .
   23       .925  ***********************************:**
   27      1.000  *********************************:***********
   18      1.075  ****************************:*
   13      1.150  ********************:*
    8      1.225  ************:
    4      1.300  ******:
    1      1.375  ** .
    0      1.450   .
    0      1.525  .
    0      1.600
                 I....+....I....+....I....+....I....+....I....+....I
                 0         6         12        18        24        30
                           Histogram frequency
```

Mean	.932	Std err	.017	Median	.955
Mode	.745	Std dev	.206	Variance	.042
Kurtosis	.273	S E Kurt	.394	Skewness	-.553
S E Skew	.198	Range	1.074	Minimum	.296
Maximum	1.370	Sum	139.766		

Kolmogorov - Smirnov Goodness of Fit Test

BETA

Test distribution - Normal

Mean: .93
Standard Deviation: .21

Cases: 150

Most extreme differences

Absolute	Positive	Negative	K-S Z	2-Tailed P
.06644	.03045	-.06644	.814	.522

RELUCTANT COMPANIES: BETA DISTRIBUTIONS

```
BETA

Count   Midpoint    One symbol equals approximately   .40 occurrences

    0        .30  .
    3        .35  :*******
    1        .40  *:*
    2        .45  ***:*
    3        .50  ******:*
    2        .55  *****     .
    5        .60  *************  .
   12        .65  ********************:*********
    6        .70  ***************           .
   14        .75  *******************************:***
   12        .80  ******************************    .
   15        .85  ***********************************:**
   16        .90  **********************************:*****
   13        .95  ******************************:**
   13       1.00  *************************:*******
    3       1.05  ********            .
    6       1.10  **************:
    8       1.15  **********:*********
    3       1.20  ******:*
    2       1.25  ***:*
    0       1.30   .
                  I....+....I....+....I....+....I....+....I....+....I  .
                  0         4         8         12        16        20
                            Histogram frequency

Mean          .848       Std err          .016      Median           .861
Mode          .763       Std dev          .193      Variance         .037
Kurtosis     -.090       S E Kurt         .408      Skewness        -.296
S E Skew      .206       Range            .905      Minimum          .346
Maximum      1.251       Sum           117.853


    Kolmogorov - Smirnov Goodness of Fit Test

       BETA

    Test distribution  -  Normal                         Mean:    .85
                                           Standard Deviation:    .19
      Cases:  139
      Most extreme differences
    Absolute      Positive      Negative          K-S Z       2-Tailed P
      .04599        .02826      -.04599            .542             .930
```

APPENDIX 8.J

BETA GROUPS: VARIANCE INFLATION FACTORS

BETA GROUPS: VARIANCE INFLATION FACTORS

SUPPORTIVE COMPANIES

Variable	GROUP 3 VIF	GROUP 4 VIF
CLSEHC	73.348	21.699
CCADJBV	285.327	16.302
EARNHC	571.885	8.604
CCADJE	11.689	2.463
DIV	9.746	4.455

RELUCTANT COMPANIES

Variable	GROUP 3 VIF	GROUP 4 VIF
CLSEHC	11.115	8.733
CCADJBV	13.843	9.086
EARNHC	13.372	4.727
CCADJE	12.047	1.990
DIV	2.834	2.491

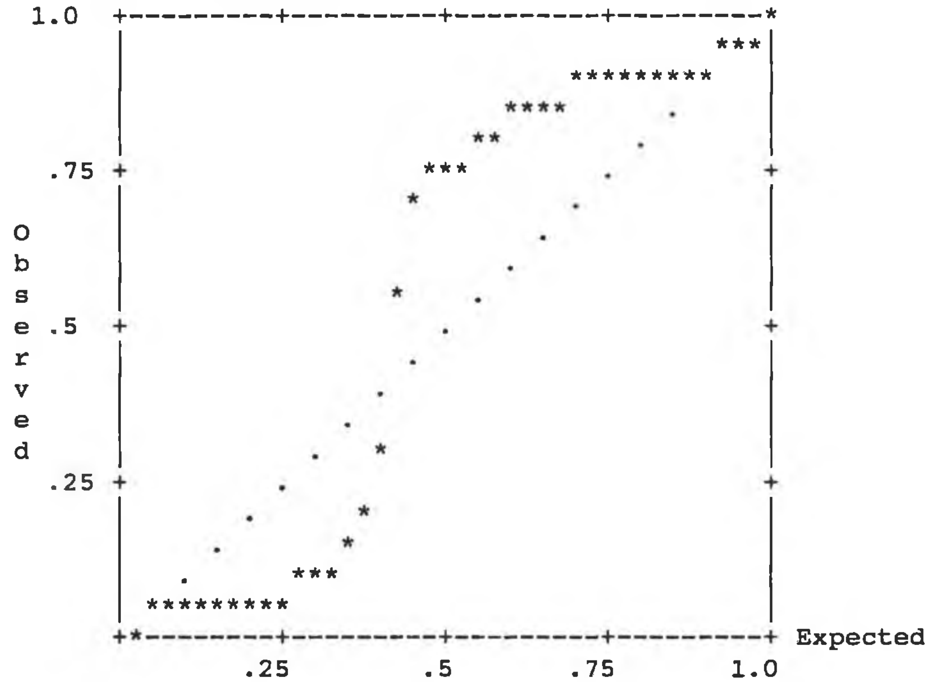
APPENDIX 8.K

BETA GROUPS: STANDARDISED RESIDUAL PLOTS

SUPPORTIVE COMPANIES

GROUP 3 PERIOD 1

Normal Probability (P-P) Plot
Standardized Residual



SUPPORTIVE COMPANIES

GROUP 3   PERIOD 1

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+--- . -----+-----+-----++
  3 +                                     +   Symbols:
    |                                     |
    |                  .                  |      Max N
  2 +                                     +
    |                                     |   .      4.0
    |                 .            .      |   :      8.0
  1 +                                     +   *     18.0
    |                .                    |
    |                ..     .             |
  0 +                :.
    |                *..     .            .
    |                 .
 -1 +                                     +
    |                                     |
    |                      .              |
 -2 +                   .                 +
    |                                     |
    |                                     |
 -3 +                                     +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

SUPPORTIVE COMPANIES

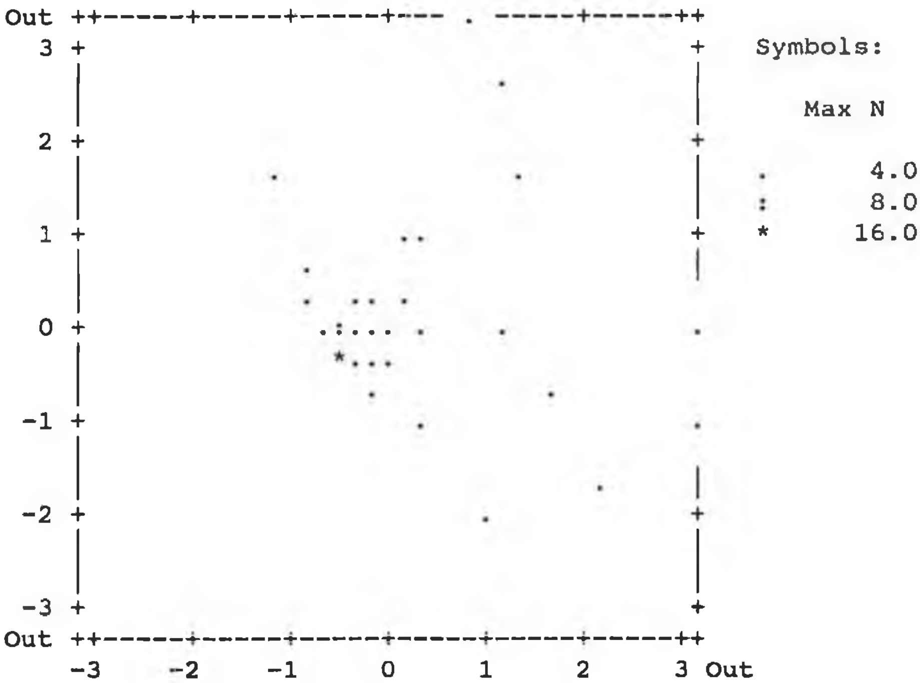
GROUP 4 PERIOD 1

```
Normal Probability (P-P) Plot
Standardized Residual
  1.0  +---------+---------+---------+---------*
       |                                 ******|
       |                         ********  .   |
       |                       **        .     |
       |                      *       .        |
   .75 +                    **       .         +
       |                   *       .           |
 O     |                         .             |
 b     |                 **    .               |
 s     |                     .                 |
 e .5  +                *  .                   +
 r     |                 .                     |
 v     |               .                       |
 e     |             . *                       |
 d     |           .                           |
   .25 +         .    *                        +
       |       .     *                         |
       |     .                                 |
       |   .    *****                          |
       | *******                               |
       +*--------+---------+---------+---------+ Expected
                .25       .5       .75       1.0
```

SUPPORTIVE COMPANIES

GROUP 4 PERIOD 1

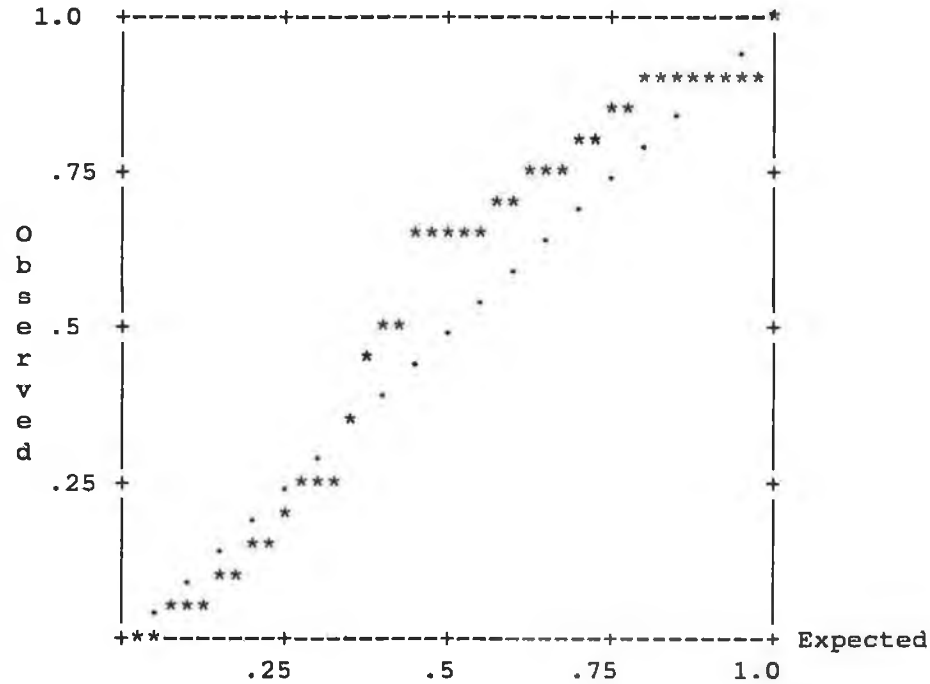
Standardized Scatterplot
Across - *ZPRED Down - *ZRESID



RELUCTANT COMPANIES

GROUP 3 PERIOD 1

Normal Probability (P-P) Plot
Standardized Residual



RELUCTANT COMPANIES

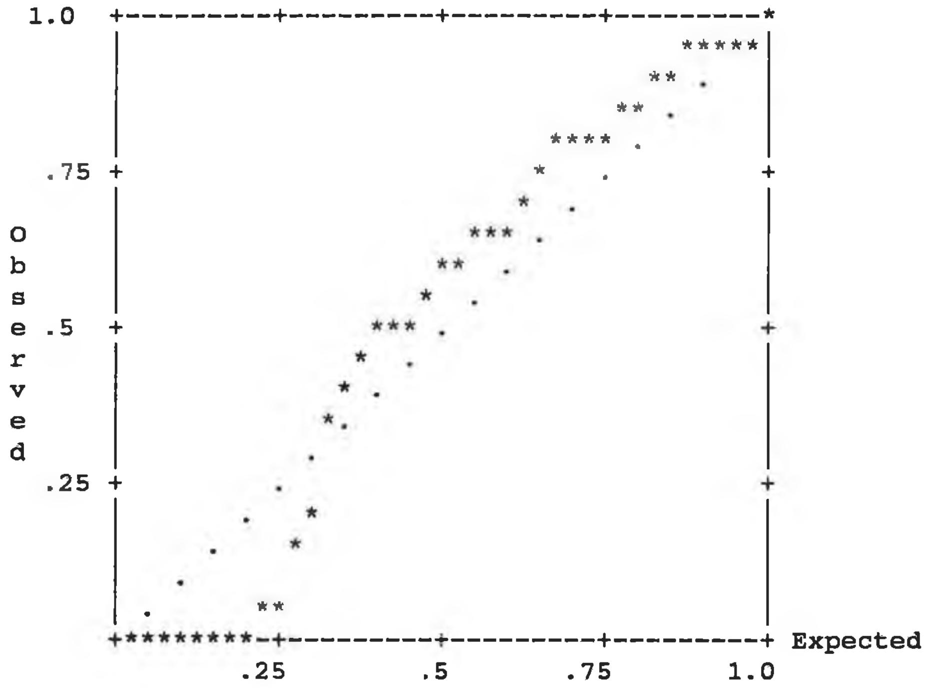
GROUP 3   PERIOD 1

```
Standardized Scatterplot
Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-----+-----+-----++
  3 +            .                        +   Symbols:
    |                                     |
    |                                     |      Max N
  2 +              . .              .     +
    |                            .            .      1.0
    |                                     .   :      2.0
  1 +                                         *      7.0
    |              .:. .                  |
    |               :.      .             |
  0 +               *. .                  +
    |               **:
    |                *                    .
 -1 +                .:
    |                     .               |
    |                         .        .  |
 -2 +                                     +
    |                                     |
    |                                     |
 -3 +                                     +
Out ++-----+-----+-----+-----+-----+-----++
    -3    -2    -1     0     1     2     3 Out
```

RELUCTANT COMPANIES

GROUP 4 PERIOD 1

Normal Probability (P-P) Plot
Standardized Residual



RELUCTANT COMPANIES

GROUP 4   PERIOD 1

```
 Standardized Scatterplot
 Across - *ZPRED     Down - *ZRESID
Out ++-----+-----+-----+-----+-----+-----++
  3 +                                     +   Symbols:
    |                                     |
    |                .    .               |      Max N
  2 +                     .               +
    |                                     |   .      2.0
    |                                         :      4.0
  1 +               ..                    .   *      9.0
    |               . .
    |              .  . .. .   .          |
  0 +               * :                   +
    |               ::.                   |
    |                * .                  |
 -1 +                                     +
    |                                     |
    |                                     |
 -2 +                                     +
    |                                     |
    |                                     |
 -3 +                                     +
Out ++-----+-----+-----+-----+-----+- . -++
   -3    -2    -1     0     1     2     3 Out
```

APPENDIX 8.L

ALTERNATIVE SPECIFICATIONS OF OHLSON'S MODEL

Ohlson (1989) suggests 2 variations to the form of the model used in Chapter 8. The first of these is expressed in his paper as follows:

$$P_t = Y_t + q(X_t - (R_f-1)Y_{t-1}$$

where

P_t = price of the security at time t

X_t = earnings realised between dates t-1 and t

R_f -1 = risk free rate of return

Y_t = book value (or owners equity) at time t

For the purposes of the analysis the above model is referred to as a residual income model. Rearranging the model and applying it to the data in the current study the following formation is derived:

$$\frac{P_t - Y_t}{Y_{t-1}} = a + b_1 \frac{1}{Y_{t-1}} + b_2 \frac{X_t}{Y_{t-1}} + b_3 Beta + e \qquad (1)$$

Using HC data the variables in equation (1) are defined as follows:

$$\frac{P_t - Y_t}{Y_{t-1}} = \frac{\mathrm{CV}_t - \mathrm{CLSEHC}_t}{\mathrm{OPSEHC}_t} = y$$

$$\frac{1}{Y_{t-1}} = \frac{1}{\mathrm{OPSEHC}_t} = x_1$$

$$\frac{X_t}{Y_{t-1}} = \frac{\mathrm{EARNHC}_t}{\mathrm{OPSEHC}_t} = x_2$$

$$Beta = x_3$$

To test the IEP of periodic unrealised holding gains the following equation was estimated:

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \qquad (2)$$

where

$$x_4 = \frac{CCADJE_t}{OPSEHC_t}$$

To test the IEP of cumulative unrealised holding gains the following equation was derived:

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 \qquad (3)$$

where

$$x_5 = \frac{CCADJBV_t}{OPSEHC_t}$$

The results from deriving equations (1), (2) and (3) for periods 1 and 2 are presented in Table 8.L.1 for the Supportive Companies and Table 8.L.2 for the Reluctant Companies.

Table 8.L.1

SUPPORTIVE COMPANIES: HC RESIDUAL INCOME MODEL

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 \quad (1)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	52041.42	166.70	17454.47	23.42
x_2	4.63	1727.80	2.29	9.81
x_3	6.42	3.38	2.57	12.11
constant	-8.01	5.72	-2.60	10.99
	R^2 = .99912		R^2 = .15341	

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \quad (2)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	11284.84	99.48	16526.65	19.94
x_2	-2.92	444.85	2.03	7.07
x_3	2.00	7.13	2.49	11.28
x_4	10.10	3067.03	-.86	1.22
constant	-1.78	6.03	-2.50	10.05
	R^2 = .99996		R^2 = .16047	

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 \quad (3)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	Note tolerance limit reached x_5 could not enter the equation.		16350.98	19.41
x_2			2.07	7.30
x_3			2.44	10.73
x_4			-1.00	1.58
x_5			-.31	.68
constant			-2.36	8.51
			R^2 = .16441	

Table 8.L.2

RELUCTANT COMPANIES: HC RESIDUAL INCOME MODEL

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 \quad (1)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	32.66	.00	396.61	.04
x_2	-.72	3.43	1.24	4.52
x_3	.16	.06	.33	.32
constant	.08	.02	-.12	.05
R^2	= .04751		= .03414	

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \quad (2)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	641.73	.12	898.41	.22
x_2	-2.13	20.47	1.60	8.71
x_3	.20	.10	.22	.17
x_4	2.54	21.93	3.15	25.41
constant	.17	.08	-.04	.01
R^2	= .18146		= .18812	

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 \quad (3)$$

Variable	Period 1 Coefficient	Period 1 F value	Period 2 Coefficient	Period 2 F value
x_1	1106.47	.36	1528.82	.67
x_2	-1.94	15.86	1.37	6.59
x_3	.26	.16	.33	.39
x_4	1.56	3.32	1.56	3.53
x_5	.43	2.14	.63	8.07
constant	-.09	.02	-.37	.50
R^2	= .19443		= .23455	

Using CC data the variables in equation (1) are defined as follows:

$$\frac{P_t - Y_t}{Y_{t-1}} = \frac{CV_t - CLSECC_t}{OPSECC_t} = y$$

$$\frac{1}{Y_{t-1}} = \frac{1}{OPSECC_t} = x_1$$

$$\frac{X_t}{Y_{t-1}} = \frac{EARNCC_t}{OPSECC_t} = x_2$$

$$Beta = x_3$$

To test if the partitioning of CC earnings into HC earnings and periodic unrealised holding gains is meaningful the following equation was derived:

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 \qquad (4)$$

where

$$x_4 = \frac{EARNHC_t}{OPSECC_t}$$

$$x_5 = \frac{CCADJE_t}{OPSECC_t}$$

To assess the IEP of cumulative unrealised holding gains the following equation was estimated:

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 \qquad (5)$$

where

$$x_6 = \frac{CCADJBV_t}{OPSECC_t}$$

The results from deriving equations (1), (4), and (5) for periods 1 and 2 for the Supportive (Reluctant) Companies are given in Table 8.L.3 (8.L.4).

Table 8.L.3

SUPPORTIVE COMPANIES: CC RESIDUAL INCOME MODEL

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 \qquad (1)$$

	Period 1		Period 2	
Variable	Coefficient	F value	Coefficient	F value
x_1	11994.07	114.30	16073.40	18.17
x_2	-4.10	336.28	.81	1.22
x_3	1.47	6.30	2.03	9.73
constant	-1.32	5.41	-2.07	9.45
R^2 = .81606			R^2 = .15029	

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 \qquad (4)$$

Variable	Coefficient	F value	Coefficient	F value
x_1	11404.52	109.71	20560.47	28.97
x_3	1.47	6.76	2.27	13.05
x_4	-3.70	238.17	2.37	8.27
x_5	.84	.38	-2.50	4.75
constant	-1.38	6.41	-2.58	15.24
R^2 = .83168			R^2 = .22273	

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 \qquad (5)$$

Variable	Coefficient	F value	Coefficient	F value
x_1	11342.80	108.00	17102.88	18.57
x_3	1.42	6.32	1.97	9.84
x_4	-3.74	235.57	1.88	5.18
x_5	1.41	.89	-.41	.09
x_6	-.71	.84	-2.42	6.91
constant	-1.17	3.93	-1.65	4.93
R^2 = .83266			R^2 = .25832	

Table 8.L.4

RELUCTANT COMPANIES: CC RESIDUAL INCOME MODEL

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 \quad (1)$$

	Period 1		Period 2	
Variable	Coefficient	F value	Coefficient	F value
x_1	2034.20	1.67	2859.40	3.35
x_2	-1.07	25.47	1.33	8.66
x_3	.28	.38	.29	.57
constant	-.40	.88	-.44	1.46
R^2 = .21287			R^2 = .07508	

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 \quad (4)$$

	Period 1		Period 2	
Variable	Coefficient	F value	Coefficient	F value
x_1	2166.02	1.89	3040.85	3.79
x_3	.28	.37	.36	.84
x_4	-1.65	9.43	1.66	10.53
x_5	-.01	.00	.19	.04
constant	-.35	.67	-.54	2.13
R^2 = .22085			R^2 = .08770	

$$y = a + b_1x_1 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 \quad (5)$$

	Period 1		Period 2	
Variable	Coefficient	F value	Coefficient	F value
x_1	1771.56	1.17	2530.22	2.30
x_3	.25	.30	.33	.71
x_4	-1.63	9.26	1.64	10.26
x_5	.55	.24	.50	.24
x_6	-.49	.77	-.45	.77
constant	-.19	.18	-.40	1.01
R^2 = .22532			R^2 = .09297	

RESULTS - RESIDUAL INCOME MODELS

Supportive Companies - HC Residual Income model

Table 8.L.1 reveals that the explanatory power of the model varies significantly over the 2 test periods. In period 1 the model explains over 99% of the variation in the dependent variable compared to 16% in period 2. In the case of the inflation accounting variables there is evidence supporting the IEP of periodic unrealised holding gains (i.e. CCADJE) in period 1. However, the entry of CCADJE into the model causes a switch in the sign of the rate of return variable (x_2), this may be explained by the presence of extreme multicollinearity between the independent variables. In period 2 the findings show that neither periodic nor cumulative unrealised holding gains possess IEP.

Reluctant Companies - HC Residual Income Model

For the Reluctant Companies the results show that in period 1 periodic unrealised holding gains possess IEP and in period 2 periodic and cumulative unrealised holding gains are significant explanatory variables. Both variables are positively correlated with company value, this concurs with the evidence in Chapter 8.

Supportive Companies - CC Residual Income Model

The explanatory power of the model varied significantly across the 2 periods with an R^2 of 83% in period 1 compared to an R^2 of 25.8% in period 2. An examination of Table 8.L.3 for period 1 suggests that the partitioning of CC earnings into HC earnings and periodic unrealised holding gains does not provide valuation relevant information. The results also suggest that cumulative unrealised holding gains are not valuation relevant. However, the findings in period 2 indicate that both periodic and cumulative unrealised holding gains have valuation relevance. The analysis reveals a negative correlation between both variables and company value, this is consistent with the findings in Chapter 8.

Reluctant Companies - CC Residual Income Model

Table 8.L.4 shows no evidence supporting the valuation relevance of either periodic or cumulative unrealised holding gains in the 2 periods.

The inconsistency in the above results across the 2 periods produces inconclusive results. Futhermore there are features of the derived models which cast doubts over the validity of any findings. First, the estimated HC and CC models contain coefficients of the incorrect sign. Second, the sizes of the estimated coefficients associated with a number of the variables are inconceivably high.

Third, an examination of residual plots showed that the error term is not normally distributed for some of the derived models. Fourth, a number of the models suffered from extreme multicollinearity between the independent variables. Finally, it appears that assumptions (3) to (6) (see p. 238) of the regression model are violated.

In a final effort to derive better specified valuation models a returns approach was used rather than a levels framework. This resulted in Ohlson's basic model being formulated as follows:

$$\frac{P_t + D_t - P_{t-1}}{P_{t-1}} = a + b_1 \frac{X_t}{P_{t-1}} + b_2 \frac{(X_t - X_{t-1})}{P_{t-1}} + b_3 \frac{(X_t^{cc} - X_t^{hc})}{P_{t-1}}$$

$$+ b_4 \frac{(X_t^{cc} - X_t^{hc}) - (X_{t-1}^{cc} - X_{t-1}^{hc})}{P_{t-1}} \qquad (6)$$

In the context of the present study, using HC data, the variables in equation (6) are defined as follows:

$$\frac{P_t + D_t - P_{t-1}}{P_{t-1}} = \frac{CV_t + D_t - CV_{t-1}}{CV_{t-1}} = y$$

$$\frac{X_t}{P_{t-1}} = \frac{EARNHC_t}{CV_{t-1}} = x_1$$

$$\frac{(X_t - X_{t-1})}{P_{t-1}} = \frac{(EARNHC_t - EARNHC_{t-1})}{CV_{t-1}} = x_2$$

$$\frac{(X_t^{cc} - X_t^{hc})}{P_{t-1}} = \frac{\text{CCADJE}_t}{\text{CV}_{t-1}} = x_3$$

$$\frac{(X_t^{cc} - X_t^{hc}) - (X_{t-1}^{cc} - X_{t-1}^{hc})}{P_{t-1}} = \frac{\text{CCADJE}_t - \text{CCADJE}_{t-1}}{\text{CV}_{t-1}} = x_4$$

Using CC data the variables in equation (6) are defined as follows:

$$\frac{P_t + D_t - P_{t-1}}{P_{t-1}} = \frac{\text{CV}_t + \text{D}_t - \text{CV}_{t-1}}{\text{CV}_{t-1}} = y$$

$$\frac{X_t}{P_{t-1}} = \frac{\text{EARNCC}_t}{\text{CV}_{t-1}} = x_1$$

$$\frac{(X_t - X_{t-1})}{P_{t-1}} = \frac{(\text{EARNCC}_t - \text{EARNCC}_{t-1})}{\text{CV}_{t-1}} = x_2$$

$$\frac{(X_t^{cc} - X_t^{hc})}{P_{t-1}} = \frac{\text{CCADJE}_t}{\text{CV}_{t-1}} = x_3$$

$$\frac{(X_t^{cc} - X_t^{hc}) - (X_{t-1}^{cc} - X_{t-1}^{hc})}{P_{t-1}} = \frac{\text{CCADJE}_t - \text{CCADJE}_{t-1}}{\text{CV}_{t-1}} = x_4$$

Table 8.L.5 presents details of the results of estimating equation (6) for the Supportive and Reluctant Companies using HC and CC data.

Table 8.L.5

RETURN MODEL

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 \qquad (6)$$

HC DATA

Variable	Supportive Companies Coefficient	F value	Reluctant Companies Coefficient	F value
x_1	.27	10.85	.26	2.49
x_2	.09	.39	.02	.01
x_3	-.17	.36	-.03	.02
x_4	.11	.51	.19	1.71
constant	.30	64.68	.31	62.29

R^2 = .46721 R^2 = .07574

CC DATA

Variable	Supportive Companies Coefficient	F value	Reluctant Companies Coefficient	F value
x_1	.27	10.85	.26	2.49
x_2	.09	.39	.02	.01
x_3	-.44	2.02	-.29	1.11
x_4	.02	.01	.17	.62
constant	.30	64.68	.31	62.29

R^2 = .46721 R^2 = .07574

To test if the inflation variables (x_3, x_4) possessed IEP, equation (6) was derived excluding these variables. An F test was performed to determine if the R^2's of the reduced models were significantly different from the R^2's associated with the full models (equation (6)). Details of the F test are presented in Table 8.L.6.

Table 8.L.6

COMPARISION OF THE R^2 OF THE FULL MODEL AND THE REDUCED MODEL

HC DATA

Cos	Full Model R^2	Reduced Model R^2	Change in R^2	Change in F	Sign. of F Change
Supportive	.467	.464	.003	.352	.7037
Reluctant	.076	.060	.016	1.113	.3316

CC DATA

Cos	Full Model R^2	Reduced Model R^2	Change in R^2	Change in F	Sign. of F Change
Supportive	.467	.445	.022	3.037	.0510
Reluctant	.076	.068	.008	.579	.5616

The results in Tables 8.L.5 & 8.L.6 reveal that neither individually nor jointly do the inflation accounting variables possess IEP. This finding is consistent across both models. However, in the case of the CC model for the Supportive Companies when testing the joint explanatory power of the inflation accounting variables the F test is only marginally insignificant.

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