

THE ASSOCIATION BETWEEN PUBLISHED ACCOUNTING
DATA AND THE BEHAVIOUR OF SHARE PRICES

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UNIVERSITY OF CAPE TOWN

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P A R T 1

INTRODUCTION AND BACKGROUND

CHAPTER 1INTRODUCTION AND ORGANISATION1.1 ORIENTATION

This dissertation presents a variety of empirical studies in financial accounting with an emphasis on the association between published accounting data and share prices. These studies are the first attempt at empirical research in accounting in South Africa.

There has been an alarming lack of research in this discipline in this country and only 14 doctorates in the accounting field have ever been conferred by South African universities.

The major aim of the dissertation is to contribute to the understanding of (1) the usefulness of accounting data and (2) the effect that certain financial disclosures (and non-disclosures) have on share prices and consequently on the wealth of the users and potential users of these data.

An essential premise of this thesis is that the primary purpose of financial reporting is the provision of information useful for economic decision making.

This seems a reasonable point of departure and is well supported in the literature (see Beaver (1981)).

1.2 THESIS ORGANISATION

The thesis has been organised into the following three parts :

Part 1 : Introduction and Background

Part 2 : The Association Between Company Information
Releases and Share Prices

Part 3 : On Information and Risk

Part 1 : Introduction and Background

Part 1, comprising Chapters 1, 2 and 3, constitutes an essential background to Parts 2 and 3.

Chapter 1 introduces the thesis and describes its organisation and structure.

Chapter 2 provides a brief background to the contextual setting for financial reporting and describes in broad terms state-preference theory, mean-variance portfolio theory and market efficiency. Although emphasis is placed on the implications for financial reporting,

the analysis does not purport to be exhaustive.

Chapter 3 surveys all the published (and some unpublished) research on the Johannesburg Stock Exchange (JSE). Virtually all the research has addressed the question of market efficiency. This chapter is introduced by a very brief description of the origin and functioning of the JSE.

Part 2 : The Association Between Company Information
Releases and Share Prices

Part 2 reports the results of four separate studies on the association between specific information releases and share prices. These studies are organised into five chapters (4 through 8) with an additional synopsis chapter (Chapter 9).

The chapters have been designed in such a way that each constitutes a separate study and retains a certain independent character. Chapter 4 is an 'umbrella' chapter and introduces the general rationale for such studies. It describes the various methodologies and models common to all studies. Note that the latter are specified in terms of the study presented in Chapter 5.

A certain degree of repetition has, however, been

incorporated into Chapters 6, 7 and 8 in order to enhance their continuity and coherence. A continual cross-reference to previous chapters is thus avoided.

Chapter 5 presents the empirical evaluation of the information content of annual earnings releases through company announcements using a variety of research designs.

Chapter 6 extends the work on annual earnings to half-yearly earnings. The incremental information content of half-yearly earnings releases is empirically evaluated.

Chapter 7 investigates the information content of dividends employing a number of dividend expectations models. This study, although also of interest in itself, is a vital corroboration of the conclusion drawn in Chapters 5 and 6.

Chapter 8 examines the market reaction to the accounting policy change from FIFO to LIFO. While a knowledge of the market reaction to such a change should be of considerable interest to investors and policy makers alike, an additional purpose in reporting this study is its confirmation of certain phenomena displayed by the (different) data set used in the previous three

studies.

Chapter 9 contains a summary of the conclusions drawn in the previous four chapters. This is not repeated in this chapter and the reader is referred directly to Chapter 9.

Where appropriate, literature surveys and background discussions are dealt with in the relevant chapters, rather than separately in the dissertation.

Part 3 : On Information and Risk

Part 3 focuses on another aspect of the association between published accounting data and share prices, viz. the effect of certain voluntary disclosures and non-disclosures on market determined risk measures.

This part consists of one lengthy chapter (10) only, which stands completely independent of Part 2.

Applying the increased disclosure requirements introduced by the 1973 Companies Act (South African) as a research tool, it was tentatively concluded that the voluntary non-disclosure of information may, of itself, increase the systematic risk of a share.

For the benefit of the reader, it was felt appropriate

to repeat, to a limited extent from Part 2, the definition of certain risk measures.

As with Part 2, the literature survey and background will be discussed in the chapter itself.

A conclusion to Part 3 is provided in Chapter 10 which likewise will not be repeated here.

Finally, attention is drawn to the fact that all the studies reported in this dissertation are based exclusively on South African data.

CHAPTER 2THE OBJECTIVES OF FINANCIAL REPORTING :
A CONTEXTUAL SETTING

2.1 INTRODUCTION AND PURPOSE

The purpose of this chapter is to provide the necessary contextual setting for the empirical findings reported in Parts 2 and 3. The chapter will also illustrate the importance of share price research for accounting.

This chapter commences with a brief review of the primary objectives of financial reporting, followed by a review of the investor setting at both the individual and the market levels. At the individual level, time-state preference theory will be the general paradigm assumed within which mean-variance portfolio theory and specifically the market model will be introduced. The rôle of information in and the implications for financial reporting of such a setting will be reviewed.

At the market level, the notion of market efficiency will be defined and some of the implications of this condition for financial reporting will be presented. It must be emphasised that this does not purport to be an

exhaustive treatment of these topics.

2.2 THE OBJECTIVES OF FINANCIAL REPORTING

In an economy characterised by the separation of ownership and management of resources, one justification of financial reporting might be to facilitate the evaluation of the stewardship of management by the owners. In this sense management account periodically to the suppliers of capital for their performance over the preceding period. Indeed, this retrospective, stewardship orientated view of the purpose of financial reporting has traditionally dominated the process in most countries.

In the last decade, however, there has been a discernible expansion of the perceived objective of financial reporting to a prospective, information orientated perspective. This evolution, which some have even called a revolution,⁽¹⁾ has several implications for financial accounting and, consequently, research in the discipline.

A publication by the Institute of Chartered Accountants

(1) Footnotes appear at the end of the chapter (page 30).

of England and Wales (ICAEW, 1975) does refer to this informational approach,⁽²⁾ but the major impetus seems to be in the United States of America. Two publications by the American Institute of Certified Public Accountants (AICPA) in the early seventies alluded to the 'decision-usefulness' or informational approach.⁽³⁾ In 1978 the Financial Accounting Standards Board (FASB) issued a statement on the objectives of financial reporting (FASB, 1978) which stated the objectives as follows :

"Financial reporting should provide information that is useful to present and potential investors and creditors and other users in assessing the amounts, timing, and uncertainty of prospective cash receipts Since investors' and creditors' cash flows are related to enterprise cash flows, financial reporting should provide information to help investors, creditors and others assess the amounts, timing and uncertainty of prospective net cash inflows to the related enterprise." (page (viii)).

This change of emphasis subsumes the traditional stewardship rôle and introduces some powerful implications for all associated with the process of financial reporting. This transition is not without opposition, in fact many practising accountants (particularly in

South Africa) are not even aware of the change.⁽⁴⁾ Although the historic data produced by accountants may have a certain informational value,⁽⁵⁾ under the traditional approach the objective of reporting was not to provide some optimal information set to a defined group of users. Consequently, it could be argued that in such a setting the accountant need not be concerned with the decision making processes of the investor.

However, if the more ambitious decision-useful rôle of financial reporting is accepted, the rôle of information at the individual and market levels becomes significant.

As will be suggested below, the wealth of an individual affects consumption/investment decisions. Changes in share prices affect wealth and thus any potential association between accounting data and share prices is of considerable relevance to accountants given the informational objective of their endeavours.

In fact, a major proposition in this dissertation is that a fruitful way of investigating the usefulness of accounting data in decision making is by observing the behaviour of share prices contemporaneously with accounting information releases.

For a more detailed review of the changes in the objectives of financial reporting see Beaver (1981, Chapters 1 and 2).

In view of the wider objective of financial reporting, it is considered appropriate to briefly review what is known about the investor environment (i.e. decision context) and the rôle of information therein.

2.3 THE INVESTOR ENVIRONMENT

There are at least two major rôles of a capital (share) market. Firstly, it allows a separation of the ownership and the management of resources in such a way that those agents with a comparative advantage in the deployment of these resources are able to take all relevant production decisions. Secondly, it provides a mechanism whereby individual investors are able to optimise the utility of their consumption patterns through the exchange of consumption rights (i.e. shares).

The pricing mechanism in a share exchange ideally results in an optimal allocation of resources among producers and an optimal allocation of shares among the suppliers of capital.

Financial information can be viewed as having a rôle at two levels :

- (1) A rôle in the setting of prices (market level);
and
- (2) A rôle in portfolio selection by individual investors (individual level).

Although markets are an aggregation of individuals, it would be incorrect to translate evidence or conclusions from one level to another. The aggregation may be distortive and what holds at the individual level may not hold at the market level. These two aspects of the investor environment will be briefly described separately, emphasising the implications for financial reporting.

2.3.1 The Individual (Single Person) Setting

Time State Preference Theory

Hirshleifer (1970) combined the multi-period/certainty approach of Fisher (1930) with the utility theory work of Arrow (1971) and Debreu (1959) to develop the most general framework of an individual's investment decision under uncertainty. This framework, called 'State Preference Theory' (or 'Time-State Preference Theory')

characterises the individual's investment decision as one where current consumption is exchanged for uncertain future consumption so as to maximise the expected utility of life-time consumption. The sole determinants of the investor's utility function are time-labelled, state-contingent consumption claims. The investor will determine all potential states of the world and the attendant payoffs, then, based on a unique preference determined probability assessment of the likelihood of each state occurring, take that investment/consumption decision which maximises his/her expected utility. In this setting there is only uncertainty about which state of the world will prevail.

Therefore, the rôle of information is only to revise the probability assessments about future states. Naturally uncertainty about payoffs and possible states would extend the rôle of information. Information will thus only be worth, at a maximum, the increase in expected utility in transferring the investor from an uninformed to an informed setting.

This framework provides extensive insights into the individual investment decision under uncertainty and, therefore, the potential rôle of information.

Unfortunately, the theory is non-operative as the set of potential states is unmanageably high. Markowitz

(1952) and others have, however, with further assumptions developed a more operative framework to analyse the individual investment decision. This more specific set of state preference theory is termed mean-variance portfolio theory and is described below.

Prior to leaving the general state preference framework, it is necessary to point out the following : the investment/consumption decision is bound by the investor's 'wealth' which is defined as the present certainty equivalent value of present and future consumption. Thus, since current wealth includes all endowments including shares, share price changes will induce changes in consumption patterns.

Clearly, the importance of share price behaviour for the welfare of investors requires that accountants should be concerned with the association of their output with share prices. Given the informational objectives of financial reporting, the share price research constituent in any comprehensive programme of accounting research is indispensable.

Mean Variance Portfolio Theory

The mean-variance approach suggested by Markowitz (1952) and others is an operational extension of the more

general state-preference theory. With certain specific simplifying assumptions, including that investor preferences are completely defined in terms of two parameters (the mean and variance of expected one period portfolio returns), a powerful framework was developed to characterise the individual investor decision under uncertainty. This framework provides interesting insights into the determinants of individual demand for information. This section briefly describes the basic tenets of portfolio theory, defines the market model and considers the rôle of financial reporting in this context. Excellent technical descriptions of portfolio theory are available and it is considered unnecessary to pursue these here.⁽⁶⁾

The most important impact of portfolio theory was to change the focus from the individual share level to the portfolio level. It implies that investors are only concerned with the risk/return attributes of portfolios of shares and not of the shares themselves. It can be shown that in a mean-variance world, the variance of expected returns of a portfolio is not merely a weighted average of the constituent return variances. Rather, the risk of a portfolio is a function of both the average variance of the constituents' returns and a weighted average of all the covariances between each share and every other

share in the portfolio. This is more easily perceived notationally :

$$\sigma^2 (R_p) = \sum_{i=1}^N \sigma_i^2 \chi_i^2 + \sum_{i=1}^N \sum_{\substack{j=1 \\ i \neq j}}^N \sigma_{ij} \chi_i \chi_j \quad (1)$$

where

χ_i = the proportion of portfolio value invested in share i

σ_i^2 = the variance of share i returns

σ_{ij} = the covariance between the returns of shares i and j

Two important points can be made at this stage. Firstly, the second term on the right hand side of expression (1) will tend to dominate as the number of shares in the portfolio increases.

Secondly, the combination of shares with negatively correlated returns will reduce the portfolio risk level to below that of the weighted average of the individual, share-return variances.

Note, how the expected return on a portfolio will always be a weighted average of the expected returns on the constituent shares.

Clearly, these conclusions have significant implications

for investment managers.

What are the implications for information demand?

The investor, in a Markowitzian world, faces a formidable extent of parameter estimation; namely, the expected return and variance of the expected return for each share (i.e. $2n$) and the covariance in returns between each pair of shares (i.e. $(N^2 - N)/2$).

Having estimated all the parameters, the investor combines shares into a portfolio with the desired risk/return characteristics to maximise his/her expected utility in terms of personal risk preferences.

Presumably, information will have a rôle in this parameter estimation and the investor will demand firm specific information to that point where the expected increase in utility from knowing the implication of the information equals the estimated procurement costs.

This, in itself, does not provide much additional insight, but a closer examination of (1) may well do so.

It is clear from portfolio theory that the attributes of the shares themselves are only of consequence to the extent that they affect the mean and variance of portfolio returns. Thus, consider from (1) the

contribution of each share to total portfolio risk. If a portfolio is sufficiently large the variance of the share's expected return contributes little. Yet, it can be shown that it affects portfolio risk by

$$\chi_i \cdot \frac{\sigma_{iA}}{\sigma_A^2}$$

i.e. the proportion invested multiplied by the covariance of the share i 's return with the average returns of all other constituents over the average variance of all other constituents' returns. As a portfolio becomes larger, so the average variance of returns tends to be the variance of the returns of the market portfolio. Thus, the relation

$$\frac{\sigma_{iM}}{\sigma_M^2}$$

tends to determine the contribution an individual share makes to total portfolio risk. Thus, the total variance of a share is not important to the investment decision, only that portion associated with market risk. This has led to the familiar dichotomy of a share's risk into systematic (non-diversifiable) and unsystematic (diversifiable) components. This notion, suggested by Markowitz, was extended by Sharpe (1963) into what is known as the Market (Diagonal) Model.

Notationally :

$$R_{it} = \alpha_i + \beta_i R_{Mt} + \epsilon_{it} \quad (2)$$

where

$$E(\epsilon_{it}) = 0$$

$$\sigma(R_{Mt}, \epsilon_{it}) = 0$$

$$\sigma(\epsilon_{it}, \epsilon_{jt}) = 0$$

R_{it} = return on share i in period t

R_{Mt} = return on market portfolio in period t

ϵ_{it} = individualistic factor

α_i, β_i = intercept and slope associated with the linear relationship

The return of a share is characterised as being composed of an element linearly related to the market return and a residual element independent of the market return. The respective variances of these elements are the systematic and unsystematic risks referred to above.

Since the residual terms are by construction uncorrelated across firms, they tend to set off as shares are combined so that portfolio unsystematic return tends to zero. Thus, only the systematic portion of risk is relevant in the well diversified

portfolio. β_i , in fact, is equivalent (under certain assumptions) to

$$\frac{\sigma_{iM}}{\sigma^2_M}$$

The market model, therefore, provides a powerful simplification of the parameter estimation of the original Markowitz approach.

The diversified investor must estimate only the expected return and β for each share, i.e. $2N$ parameters.

Before discussing some of the implications of portfolio theory for financial information, a short digression on the importance of the market model ensues.

An intuitive explanation of the market model is that the factors impinging on the firm may be categorised into two groups : (1) market-wide factors affecting all firms in some way, e.g. business cycle, etc.; and (2) individualistic factors peculiar to each firm. Therefore, the market model provides a mechanism to remove the effects of the first category and derives a series which reflects the effects of firm specific factors. This residual series provides a rich source of data for empirically evaluating the impact of certain events on the value of the firm. Furthermore, this

abstraction from market-wide factors allows the pooling of residuals through time and across firms, which increases the number of observations thus improving the power of certain tests. Finally, the market model is expressed in *ex post* terms which renders it amenable to empirical studies. This model provides the basis of much of the empirical work reported in Parts 2 and 3 of this dissertation and will be reviewed there where appropriate.

A review of certain implications of mean-variance portfolio theory follows :

In the extreme case, the portfolio decision in a mean-variance world is reduced to the selection of a portfolio with a desired β . This could be achieved by buying the market (e.g. via an index fund) and borrowing or lending to increase or reduce portfolio β to taste. There is no obvious rôle for firm specific information in such a setting. An investor who proposes to construct a portfolio, entirely of shares, with a certain β will, however, attempt to estimate β . Thus, he may have some demand for firm specific information which will improve his assessments of β in a cost-effective manner. However, his demand is likely to be low since in a portfolio context his uninformed β estimate errors are likely to be uncorrelated across

firms and, therefore, his portfolio β estimate error will be considerably smaller than the average error at the individual β level.

However, an investor may choose to remain undiversified for a number of reasons :

- (1) Perceived transaction costs.
- (2) A belief that the market does not reflect all information, i.e. $E(\epsilon_{it})$ is non-zero. That is, an investor does not believe in market efficiency (see Section 2.3.2).
- (3) A belief that there is some relationship between α and β not specified in portfolio theory.

Thus, it can be seen that different portfolio strategies and beliefs about the structure of share returns will determine the individual demand for information.

The Market Level will now be introduced and the implications for financial reporting in that setting reviewed.

2.3.2 The Market Level - Market Efficiency

There are a number of issues in the multi-person setting which have implications for financial reporting, but many of these are beyond the scope of the current work and will not be addressed. However, one aspect of the market level of the investor environment, market efficiency, is of some relevance to the dissertation and so the remainder of this chapter will deal with this issue and its importance for financial reporting.

Fama (1970) presents a formal definition of market efficiency as that condition in which share prices reflect all relevant information. In order for this condition to hold at all times, it is necessary that all new relevant information be impounded into prices instantaneously. However, this rather loose description is acknowledged as being non-operative and thus most efforts to operationalise the concept and empirically test it have focused on a testable property of this condition - the fair game property.

If the market is efficient *vis à vis* a particular piece of information, all investors are said to play a fair game with respect to that information.

Notationally :

$$E(\tilde{p}_{j,t+1} | \phi_t) = \{1 + (E(\tilde{R}_{j,t+1} | \phi_t) p_{j,t})\} \quad (3)$$

where

p_{jt} = price of share j at time t

\tilde{R}_{t+1} = the period percentage return
 $(p_{j,t+1} - p_{j,t}) / p_{jt}$

ϕ_t = symbol for defined information set

Three levels of the concept have been delineated depending on the set of information implied by ϕ_t . The weak form of efficiency defines the history of prices as ϕ_t , the semi-strong form expands this definition to include all publicly available information and the strong form includes all information, i.e. including inside information.

The most widely discussed implication of market efficiency is that investors cannot earn an 'abnormal return', that is, on average each investor will earn a return commensurate with the level of risk taken.

There are of course difficulties in testing the ability of investors to earn abnormal returns as these returns are difficult to define. Portfolio theory and the

capital asset pricing model do, nevertheless, provide a mechanism to 'risk adjust' raw returns to establish abnormal returns.

Beaver (1981a) advances a slightly different definition of market efficiency expressed in terms of universal access to information :

"The market is efficient with respect to some specified information system, if and only if security prices act *as if* everyone observes the information system." (page 28).

This property implies the 'fully reflect' notion of the formal definition, and this definition has a number of important facets. *Inter alia*, it allows market efficiency in a world of heterogeneous beliefs and further, it allows individuals to perceive the market to be inefficient in some respects even though it is not.

Note, it is not required that universal access holds literally; the 'as if' qualification is sufficient for the market to reflect the information system.

There is a considerable amount of evidence supporting this relationship between information and prices on

the major stock exchanges, but there are a number, albeit few, which contradict this evidence. This evidence and counter-evidence will not be reviewed here. As so little research has been done in South Africa in this context, a major part of Chapter 3 will be devoted to reviewing the empirical research on market efficiency in the context of the Johannesburg Stock Exchange (JSE).

Before proceeding to Chapter 3, the implications for financial reporting in an efficient market will be briefly summarised. Generally speaking, these are the implications of the semi-strong form of the concept which naturally subsumes the weak form.

A major implication for investors is embodied in the fair game property of an efficient market (see above). This in turn may affect the demand for firm specific information by the individual. As indicated in Section 2.3.1, the individual's perceptions of the relationship between share prices and information will have a significant impact on his/her demand for information. However, the significance for financial reporting of this fair game property is that the traditional concern for the naive investor may be trivial. If information is publicly available in an efficient market, it is difficult to see how the naive

investor is prejudiced,⁽⁷⁾ whereas if information is not publicly available, the ignorant (as regards the non-public information) will be prejudiced. Thus, in an efficient market the concern for the naïve (or rather ignorant) investor is reduced to ensuring the admission of information to the public domain in the fastest manner. It seems clear that it is not necessary to expend resources on reducing the complexity of financial statements to the level of the layman, but it suffices that they be directed at the sophisticated investor.

Related to this, it is implied by the efficiency concept that the market will not be fooled by the form of a disclosure; it will see through pure book-keeping entries to the underlying economic substance of what is being reported. This has a message for policy makers - resources spent on issues of display (e.g. extraordinary items above or below 'the line') are resources wasted - once disclosed, the market will correctly interpret the implications.

An efficient market is likely to reflect a much wider set of information than that provided by the accountant and the evidence on the U.S. markets indicates that share prices reflect a very rich information system. Accountants should take cognisance of this and provide

information in the production of which they enjoy a comparative advantage.

There are a number of aspects of market efficiency not covered in this brief section. However, it is hoped that a sufficient background has been provided on this very important aspect of the relationship between share prices and information at the market level. (8)

It must be emphasised, before concluding, that the condition of market efficiency is essentially empirical and as such cannot be accepted or rejected on purely intuitive grounds.

2.4 CONCLUSION

In introducing an informational perspective to the objectives of financial reporting, empirical research on the association between accounting data and share prices is absolutely essential. This is so because of the rôle information plays at both the individual and market levels. Accounting data have the potential to change investor expectations which cause price induced wealth changes that affect investment/consumption decisions. Given this impact on general well-being, it is impossible to imagine an accounting

research programme which excludes this branch of research.

This thesis sets out to explore the relationships between accounting data and share prices and addresses the most fundamental questions, such as :

- (1) How useful are published accounting data in South Africa?
- (2) How important are accounting data relative to other sources of firm specific data in South Africa?
- (3) How efficient is the JSE *vis à vis* accounting information?

Before proceeding to the empirical studies, Chapter 3 provides a brief background on the JSE and reviews all previous empirical work which has been carried out in that environment.

FOOTNOTES : CHAPTER 2

- (1) See Beaver (1981).
- (2) See ICAEW (1975).
- (3) See AICPA (1970 and 1973).
- (4) The author has had considerable experience in lecturing to practising accountants on this issue.
- (5) A major part of this dissertation is devoted to empirically evaluating the informational content of the accountant's output.
- (6) See Beaver (1972).
- (7) Even the naïve play a fair game with respect to future information.
- (8) A more thorough treatment of this topic is presented in Knight (1981).

CHAPTER 3A REVIEW OF PUBLISHED RESEARCH ON THE
JOHANNESBURG STOCK EXCHANGE

3.1 INTRODUCTION

The main purpose of this chapter is to review the empirical research which has been conducted on the Johannesburg Stock Exchange (JSE). This is considered appropriate as the dissertation presents additional research on the market and, furthermore, there is such a paucity of research that a comprehensive review is easily manageable. Virtually all the work has focused on the efficiency issue and, therefore, the review will group studies according to the various facets of efficiency investigated.

A brief background on the JSE will precede the review.

3.2 THE JOHANNESBURG STOCK EXCHANGE

Trading began on the JSE on January 16, 1888. At this time all quoted shares were associated with mining particularly gold and diamonds. Although

the mining sector is still of significant importance, there is a respectable industrial sector.

As at 24 January 1982, 263 industrial companies were listed. There are 19 industrial sectors including an Industrial Holding category. The mining section consists of five major categories, Golds, Coal, Diamonds, Metals and Minerals and Mining Financial. There were (at 29.1.82) 96 companies (including 22 mining financial) associated with mining. Some 51 companies are categorised as financial, including insurance companies and banks. In total, therefore, there were about 400 companies quoted as at 29 January 1982.

By market capitalisation, Golds constitute 26% of the whole market. By this measure Industrial and Financials constitute \pm 51%.

In view of the different factors affecting gold and mining shares, e.g. commodity prices, this dissertation confines itself to the industrial sector of the JSE.

One phenomenon prevalent on the JSE that is worth noting is the significant level of concentration of ownership. As of May 1983 the Anglo American Corporation and four other companies effectively held 74% of the shares on the JSE.

3.3 THE EVIDENCE OF MARKET EFFICIENCY ON THE JSE

3.3.1 Overview

A brief survey of the empirical evidence for the efficiency or otherwise of the JSE follows.⁽¹⁾ As there has been a relative scarcity of share market studies in South Africa, the survey will examine various methodological and technical issues encountered in these studies.

The studies will be surveyed through the various levels of efficiency, namely :

(1) Weak Form Tests

(A) Non-Correlation Property

- (i) Serial correlation tests
- (ii) Runs tests

(B) Homogeneous Distribution Property

- (i) Distribution tests

(C) Fair Game Property

- (i) Trading Rule (TR) tests

(1) Footnotes are given at the end of the chapter, page 50.

(2) Semi-Strong Form Tests

Speed of Adjustment tests⁽²⁾ - No studies⁽³⁾

(3) Strong Form Tests

Mutual Fund performance tests.

3.3.2 Weak Form Tests(A) Tests of the Non-Correlation of Returns Property(i) Serial correlation tests

Recall equation (3) of Chapter 2 :

$$E(\tilde{p}_{j,t+1} | \phi_t) = \{1 + E(\tilde{R}_{j,t+1} | \phi_t) p_{j,t}\} \quad (1)$$

Where ϕ_t defines the share price history, thus (1) represents the independence condition of the strict Random Walk Model (RWM). Bearing in mind that a lack of correlation in share returns is a sufficient condition for acceptance of weak form efficiency, tests evidencing a lack of such correlation in a series of share returns would constitute support for the weak form.⁽⁴⁾

One of the first share market tests in South Africa was published by Affleck-Graves and Money (1975). They performed a serial correlation

test on the returns of 50 shares quoted on the JSE. They used weekly data on 10 lag categories and thus 500 coefficients of correlation were calculated. (5, 6)

The result was that 33 of the 500 were more than two standard deviations from zero, of which 14 were in the lags of one and two weeks.

Accordingly they concluded that the condition of zero-autocorrelation was a reality for lags of greater than two weeks. They admitted that the existence of seven out of 50 coefficients greater than two standard deviations from zero for lags of one and two weeks may indicate dependence. They concluded that the results were consistent with what would be expected for weak form efficiency for 80% of the market. Furthermore, they suggest that what little dependence may exist would be useless to a technical analyst attempting to earn an abnormal return by analysing price histories.

Although in support of weak form efficiency, the results are by no means categorical. The authors acknowledge that the conclusions drawn, although logical, are dependent on the implicit assumptions which underlie the tests, namely,

normally distributed returns with finite variance.

In a further test on the same data, Affleck-Graves (1974) applied the non-parametric Wald-Wolfowitz test.⁽⁷⁾ The results led to similar conclusions as of the parametric test referred to above. Although the null hypothesis (i.e. that returns were random) was rejected for a number of shares, weak form efficiency was an accurate description of most of the market. Affleck-Graves performed runs tests reviewed in the next section.

Two other works on serial correlation were subsequently published indicating support for weak form efficiency.⁽⁸⁾ However, in both tests a certain amount of dependence was observed, but not to such an extent as to constitute support for rejection of weak form efficiency. The researchers simultaneously reported the results of runs tests which are also reviewed in the next section.

It is submitted that an acceptance of zero-autocorrelation is not unjustified on the JSE, thus providing evidence consistent with weak form efficiency. The technical analyst

could argue that non-linear correlations would escape detection in such tests. These correlations could be capitalised upon and thus earn the analyst abnormal returns which would contradict the efficient market hypothesis (EMH). This emphasises how zero-autocorrelation is a condition consistent with the weak form EMH and not a proof thereof. The argument of the analyst is unsupported empirically.

(ii) Runs Tests

A runs test is a test of randomness where a run is defined as a sequence of the same sign in a time series of data (i.e. positive, negative or zero). In this case, it is a sequence of increasing, decreasing or constant price changes that determines the runs.

Affleck-Graves (1974) performed runs tests on the same data used in the serial correlation tests referred to above. His results accepted the null hypothesis of randomness at a 95% confidence interval, thus concurring with the conclusions of his previous tests. This was evidence consistent with the weak form efficient market condition.

In contrast to their serial correlation tests both Hadassin (1976) and Gilbertson and Roux (1977) found evidence of non-random behaviour.

Hadassin reports significant dependence in share price changes of 24 out of 30 shares using a differencing interval of one day and of 12 out of 30 for a differencing interval of four days. He thus concluded :

"(The JSE) . . . has been proved to be an inefficient market . . . thus . . . chartists . . . should be able to make greater returns than those of the market." (p.24).

Gilbertson and Roux admit evidence of non-random behaviour and thus for rejection of the weak form efficiency. However, they point out that a certain dependence has been exhibited by erstwhile efficient markets as shown by Solnik (1973) on the Paris Bourse and by Fama (1965) on the NYSE. (9)

Saloner and Strebel (1977) carried out runs tests on 10 highly traded shares and obtained results that evidenced randomness, thus being consistent with weak form efficiency. However, they found

the converse on 10 thinly traded shares. Their observation on the dependence of Beta (β) on volume and the implied inefficiency on the thinly traded section of the market is addressed in the next section.

The evidence from runs tests is not conclusive even should any shortcomings in method be ignored.

The general conclusion drawn from tests on the correlation condition is that the JSE conforms to a weak form efficient market.

(B) Homogeneous Distribution

Gilbertson and Roux (1976) and Ozen (1977) reported strongly leptokurtic characteristics for the distributions of share returns, i.e. strongly peaked distributions with long tails.

On six highly traded shares Schlosberg (1976) compared the distributions to the normal, stable Paretian, Student-t and Compound normal models. He showed that the Student-t and Compound normal provided the best fit. Further, he showed that over short periods share returns do exhibit homogeneous distributions. These short-term

distributions have been shown to be normal or leptokurtic.⁽¹⁰⁾ Over longer periods these distributions combine to form the Student-t or Compound normal observed by Schlosberg.

Strebel (1977) suggests that thinly traded shares exhibit non-randomness and have leptokurtic distributions. He does, however, acknowledge the very limited number of shares examined. This conclusion he finds consistent with his own runs tests referred to above. He also acknowledged the limited extent of these tests, being on only 10 highly traded and 10 thinly traded shares.

The major import of this evidence is not merely to the acceptance or rejection of the RWM, but to the appropriateness of statistical tests involving the assumption of a normally distributed population. Strebel states that any test on the JSE which involves an explicit or implicit assumption of normality would only be appropriate to highly traded shares. He further defines 'highly traded' as those shares with an annual traded volume of 250 000 and more.

This conclusion seems to be based on three

studies involving only 31 shares :

- (1) Saloner and Strebel (1977) using runs tests on 10 shares of each category (i.e. highly and thinly traded) showed that the highly traded shares exhibited randomness while thinly traded shares exhibited non-randomness.
- (2) Schlosberg (1976) showed that five of the six highly traded shares he studied were best described as having a Student-t or Compound normal distribution of returns, which is not too great a departure from normality. The distributions were symmetrical.
- (3) Ozen (1977) showed on tests of only five shares that those with leptokurtic characteristics exhibited non-randomness while those with quasi-normal characteristics exhibited randomness.

Although each study is internally valid, the general conclusions drawn from each as to the whole market are to be treated with caution, in view of the limited number of shares examined. It is respectfully submitted that Strebel's final assertion, based on the above, that thinly

traded shares on the JSE have leptokurtic distributions of returns is not justified.

In another paper Strebel (1978) argues, *inter alia*, that linear regression tests on thinly traded shares would be worthless as the normality assumption was not valid for these shares. The normality assumption of Ordinary Least Squares Regression (OLS) only applies to the tests of significance of the parameters calculated, e.g. F-tests. Notwithstanding any distribution that may prevail, the OLS model, as applied in this thesis, establishes the best linear unbiased estimate of the relationship being explored.

However, the departure from zero-autocorrelation which Strebel suggests is associated with thinly traded shares, could present a problem for the current model. The estimates, of course, would be unbiased and considering the lack of pervasive evidence to the contrary,⁽¹¹⁾ and the existence of evidence supporting zero-autocorrelation of returns for shares on the JSE,⁽¹²⁾ it is submitted that the assumption is valid for the current study. A departure from autocorrelation is unlikely to be an undermining factor for this study.⁽¹³⁾

(C) Fair Game Property Tests

Trading Rule (TR) Studies

The rationale behind such an approach to testing weak form efficiency is that for the fair game property to hold,⁽¹⁴⁾ no mechanistic market strategy based on historical prices (and volumes) should be able to consistently outperform the market.

Gilbertson and Roux (1976) used the TR approach on the JSE. This is the only published work in this category.

They applied four different TRs to 24 shares and found that a buy and hold (B&H) strategy consistently outperformed the TR in each case. This result, they claim, constitutes evidence consistent with weak form efficiency.

Bear and Stevenson (1976) have suggested that the TR approach is the only method of testing market efficiency directly. It is respectfully submitted, however, that the TR approach is the most indirect test of market efficiency in that failure to establish a TR which consistently outperforms the market is merely consistent

with the notion of efficiency. This certainly falls far short of asserting efficiency. Admittedly, the existence of a TR which consistently outperformed the market would constitute a rejection of the efficient market hypothesis (EMH), subject to the below-mentioned constraints.

These constraints, the first three of which were acknowledged by Gilbertson and Roux and partially adjusted for subsequently,⁽¹⁵⁾ are :

- (1) The comparison is biased towards rejection of the TR due to the differences in expected returns with the B&H.⁽¹⁶⁾
- (2) Short-term interest rates on uninvested cash should be accounted for.⁽¹⁷⁾
- (3) The outperformance by the B&H must be consistent.
- (4) The implicit assumption that all transactions can be executed at the price which signals action, may not be valid.⁽¹⁸⁾

Strebel (1977) points out that the TR approach does not avoid the importing of some implicit model with attendant questions of validity.⁽¹⁹⁾

This is so because in order to compare the two sets of

returns they must be positioned in the same risk class. Thus a market model is implied.

In an interesting application of the TR approach to their previous results, Gilbertson and Roux applied the TRs to the shares which had exhibited non-randomness in their serial correlation tests referred to above. The TRs failed to outperform the B&H strategy. They concluded that the correlation exhibited was insufficient to be capitalised into a trading rule to earn an abnormal return. However, they ignore the possibility of the existence of a more sophisticated rule which could outperform a B&H strategy on the shares exhibiting non-randomness in particular and the market in general.

The general suitability of the TR approach and the results of this particular study are inconclusive.

The reader is referred to Jensen (1967), Levy (1967), Praetz (1976) and Bear and Stevenson (1976) for a full debate on the TR approach and for empirical evidence for and against the existence of successful TRs on the New York

Stock Exchange.

Conclusion on the Evidence for Weak Form Efficiency

Despite Strebel's objections, it seems that the evidence reviewed supports, in the main, the validity of the weak form EMH on the JSE. Further work is obviously required to assert the complete veracity of the EMH.

3.3.3 Strong Form Tests

Mutual Fund Performance

Tests of the performance of professionally managed portfolios, such as unit trusts, are generally classified as strong form tests (see Dyckman, Downes and Magee (1975, p.31)) based on the rationale that the managers of these funds are more likely to have access to inside information than the average investor. Thus, if these funds could be shown to outperform the average or overall market performance, it could be concluded that the market was not efficient in the strong form. However, if the premise that the managers do have access to inside information is incorrect then it is the semi-strong form of the EMH that would be negated.⁽²⁰⁾ This is so because

the funds would be earning an abnormal return by analysing publicly available information. Alternatively, it may be the fair game property of weak form efficiency that would be contradicted.

On the other hand, if the funds are proved not to be outperforming the market, this would indicate consistency with strong form efficiency on the premise of access to inside information. If the premise is incorrect and the managers only have publicly available information, consistency only with the semi-strong form may be inferred. Thus, the Mutual Fund tests would only be giving the negative assurance of a TR test. (21)

The above illustrates the further problems encountered in hypothesis setting on venturing beyond the weak form EMH. This problem is compounded by the use of indirect negative assurance tests such as Mutual Fund performance measurement.

Tests of this nature carried out in the United States can be criticised on the abovementioned grounds. However, certain cognisance has been taken of the problem and the literature indicates that the conclusions have been drawn cautiously. The reader is referred particularly to Jensen (1969) and Friend, Blume

and Crockett (1970). These studies indicated that the Funds tested did not outperform the market. There has been a certain misconception that based on these results portfolio managers are proved incompetent. Jensen (1969) asserts that this notion is unjustified as the efficiency of portfolio management should be measured and compared with the market in *ex ante* terms and not in *ex post* terms as in the studies. (22)

There have been two studies published of this nature on the JSE : Du Plessis (1974) and Gilbertson and Roux (1976).

Although involving a number of unresolved methodological issues (see Gilbertson and Roux (1976) and Strebel (1977)) the results indicate that the funds did not outperform the market. In view of these unresolved methodological issues, (23) and the hypothesis setting problems referred to, only very tentative conclusions should be drawn from these studies. Suffice to say, that the results constitute negative assurance *vis à vis* efficiency on the JSE subject to the reservations cited.

3.3.4 Conclusion on the Evidence for the EMH in the Context of the JSE

The evidence is by no means voluminous or conclusive and seems particularly weak when compared to the evidence on the efficiency of the NYSE.⁽²⁴⁾ Further, Strebel suggests that the results are not conclusive because the tests to date may have been bedevilled by the phenomenon of 50% of the shares on the JSE being thinly traded. The studies in this dissertation will generally be invulnerable to this phenomenon as it is predominantly based on actively traded shares.

Notwithstanding Strebel's posture on this issue, it is submitted that the evidence for acceptance of weak form efficiency outweighs evidence to the contrary. However, no statement is made, even tentatively, on the EMH in any other form in the context of the JSE. It is emphasised that this conclusion does not imply that the JSE is inefficient, but merely that its efficiency has not been established.

FOOTNOTES : CHAPTER 3

- (1) As evidence of market efficiency is not transferable from one market to another it is considered inappropriate to review the copious evidence of market efficiency of the NYSE. The interested reader is referred to the didactic review of such by Fama (1970).
- (2) The current study constitutes the first of this type.
- (3) This fact is further acknowledged by Gilbertson and Roux (1976).
- (4) Such evidence would not necessarily prove the Random Walk Model.
- (5) These lag categories were lags of (1, 2, 3, 4, 5, 7, 9, 10, 15 and 20) weeks.
- (6) This was repeated for bi- and tri-weekly data. The results were substantially the same as for weekly data.
- (7) Being a non-parametric test the Wald-Wolfowitz approach is independent of the population parameters from which the sample is drawn. Thus no specific assumptions of distribution are made.
- (8) Hadassin (1976) and Gilbertson and Roux (1977).
- (9) Their rationale for citing such is presumably that a small amount of dependence is not sufficient to reject the null hypothesis of randomness, and not the fact of consistency with the observations of efficient markets.
- (10) See Ozen (1977).
- (11) Strebel only examined 20 shares in total.
- (12) See Affleck-Graves and Money (1975) and Affleck-Graves (1974) and Gilbertson and Roux (1976).
- (13) See Chapter 4.
- (14) The fair game property of market efficiency was described in Chapter 2.

- (15) See Gilbertson and Roux (1978).
- (16) See Praetz (1976).
- (17) See Gilbertson and Roux (1978).
- (18) See Jensen (1967).
- (19) Refer to Strebel's concern for the appropriateness of statistical models assuming normality for thinly traded shares.
- (20) This would of course simultaneously negate the strong form.
- (21) Negative assurance means that the evidence does not contradict the hypothesis; however, it does not prove it.
- (22) It is submitted that the failure of a Fund to outperform the market merely indicates that the managers are competing in an efficient market, not that they are incompetent.
- (23) These are not central to the current thesis, but flow from Strebel's assertion on the inappropriateness of statistical models assuming normality in the context of thinly traded shares. Furthermore, Strebel and Saloner (1977) claim that because of the volume dependence of β (Beta) for these shares, the CAPM is inappropriate. See also Saloner (1977) for the evidence of the volume dependence of β (Beta) for these shares.
- (24) See Fama (1970).

P A R T 2

THE ASSOCIATION BETWEEN COMPANY INFORMATION
RELEASES AND SHARE PRICES

This part of the dissertation presents empirical evidence of the contemporaneous association between a number of company announcements and share prices.

Chapters 4 and 5 investigate the information content of annual earnings releases with particular reference to the statutory reports, viz. the interim report (first-half results), the preliminary report (annual results - summarised) and the annual report (complete financial statements). Chapter 4 presents a background for such a study and describes the various research designs applied. Chapter 5 describes the data, the results and various interpretations.

Employing a similar methodology, Chapter 6 describes a study investigating the incremental information content of the half-yearly earnings series over the annual earnings series. Chapter 7 extends the studies on earnings releases to investigate the confounding effect of simultaneous dividend announcements. A number of dividend models are developed in an attempt to establish the incremental information content of dividends over earnings.

Chapter 8 reports a study investigating the impact of the announcement of a change in accounting policy on share prices. The policy change is the FIFO to LIFO change and, while of interest in itself, it provides a useful confirmatory control of the previous studies.

Chapter 9 concludes Part 2 with a brief summary.

CHAPTER 4THE INFORMATION CONTENT OF ANNUAL EARNINGS
RELEASES : BACKGROUND AND APPROACH

4.1 AIMS OF THE CHAPTER

The primary objective of this chapter is to provide an introduction and background to the empirical testing of the informational content of accounting earnings releases. It describes the methodologies employed in the study reported in Chapter 5. The methods described in this chapter are employed (with certain re-specifications) in the studies reported in Chapters 6 and 7.

The chapter can, therefore, be viewed as providing the necessary background to all the studies reported in Part 2. The objectives of the study reported in Chapter 5 are set out, followed by a literature survey of similar studies and some reflections on 'Information Content'. The balance of the chapter is devoted to a description of the empirical study of the information content of annual earnings releases within which the hypotheses to be tested are set up and the models used are described.

Naturally, no conclusions are drawn in this chapter as

no results are reported.

4.2 BACKGROUND

4.2.1 Objectives

It is now widely accepted that the primary objective of Financial Reporting is the provision of information useful to economic decision making.⁽¹⁾

In order to establish how well this objective is being achieved, it is necessary to define a user group and investigate the decision making processes of this group and then evaluate the usefulness of accounting information in this context.

Accounting theorists have generally failed to agree on a common user/environment specification. This lack of consensus has been cited as being contributory to the failure of attempts at developing a comprehensive and widely accepted accounting theory.⁽²⁾ Purely analytical approaches to the evaluation of usefulness, given an assumed user/environment specification, are severely

(1) Footnotes appear at the end of the chapter, page 108.

limited since such approaches ignore the extent to which the predictions of the implied (and explicit) model conform to reality. A significant number of theorists, particularly the 'true income' school (prominent in the literature during the 1960s),⁽³⁾ implied that as historic cost based income is an aggregation of dissimilar elements, it is un-interpretable and, therefore, of doubtful utility.

The question of whether accounting information is useful is necessarily empirical. To investigate the usefulness of accounting information empirically, it is imperative to first establish which observable phenomena are indicative of utility.

This and the following chapters seek to investigate, *inter alia*, the usefulness of accounting earnings releases empirically. This investigation should provide insights into the importance of published accounting data as a source of information for equity investors in South African quoted shares. It is obvious that in a competitive market all potential sources of information will be sought to price shares and thus the accountant must be seen as competing with all other sources of price sensitive information. It is important to identify all potential sources of information and develop only those with a comparative advantage in information production.

This study will, however, not attempt to identify potential alternative sources of information.

The selection of the equity investor seems well supported in the literature since this group is probably the most significant constituent in the primary user class of economic decision makers. Furthermore, the choice of this group in the context of an organised share market need not reduce the generality of the findings. The share market provides a useful 'laboratory' to examine *in situ* the role of information in the decision process.

Another aspect of the environment which will be simultaneously examined is the informational efficiency of the JSE with respect to published accounting data. This is more fully explained in Section 4.2.3 below.

To summarise, the objectives of this study are :

- (1) to measure the extent to which accounting data are used to price shares;
- (2) to estimate the relative importance of annual accounting releases to other sources of information as regards timing and content; and
- (3) given that the data are useful in content and timeliness, to test the efficiency of the

market in assimilating the content.

These issues are of obvious concern to all associated with financial reporting in South Africa. Yet it is hoped that the evidence provided will contribute to the international community as well. The U.S. markets are all well researched, however, as Foster (1978) indicates :

"Evidence from non-NYSE markets is important as there is a limited amount of information one can extract from any one data base. If the results found on the NYSE are supported for other data bases, one's confidence in their generality (rather than their being period - or sample - specific) is increased." (p. 336)

Furthermore, where the results are non-compatible with other markets, analyses of the differences may provide additional insights to those provided by the studies separately.

At the very least, this study provides an essential first step in empirical research in accounting in South Africa.

4.2.2 Literature Survey

This literature survey is confined to studies on the information content of the annual information releases

by companies. The objective is to survey the prominent papers which have reported empirical evidence of the information content of these releases in a variety of stock markets worldwide.

The information content subset of capital market research in accounting has expanded substantially in the last decade. Mainly focusing on the New York Stock Exchange (NYSE), the studies have concentrated on a variety of company releases, from profit announcements to earnings forecasts by company officials. This study will be investigating official annual earnings releases and therefore the literature survey is confined to similar studies.

The first of the modern genre of information content studies was published by George J. Benston (1967). The modern genre is distinguished by the methodology employed, namely the market model (Section 4.3.2). There were a few market based studies prior to this, using a variety of techniques which sought to determine the association between accounting data and share returns.⁽⁴⁾ The Benston study, after a formidable numerical analysis (24 pages of results), concluded, albeit tentatively, that the information contained in published accounting reports is a relatively small proportion of the information set used to price shares.

The really seminal information content studies were those carried out by Ball and Brown (1968) and Beaver (1968). These papers are considered the most relevant to the current study and thus they will be reviewed in a greater methodological depth in Section 4.3.2.3.

Ball and Brown (1968) employed the now familiar Abnormal Performance Index (API) metric (see Section 4.3.2.1) to examine the performance of various groups of shares in the 18 month period surrounding the date of the annual release of accounting earnings, i.e. 12 months before and six months after. The study was based on approximately 2 340 announcements of 261 NYSE firms with 31 December financial year ends, over the nine year period 1957 through 1965. Two types of portfolios were constructed, namely 'good news' portfolios and 'bad news' portfolios. These were formed 12 months prior to the relative announcements. The announcements were classified 'good news' or 'bad news' according to the sign of the unexpected earnings, a 'good news' announcement being identified by a positive unexpected earnings figure. The portfolio selection was dependent on three expectations models of income.

The results (see Figure 4.2, page 100) imply that a foreknowledge of the sign of unexpected earnings could be used to earn abnormal returns. Firms reporting

'good news' in a particular year, on average show abnormal positive returns in every month prior to the announcement date. The converse applied to the 'bad news' releases. Moreover, for both groups little abnormal performance was discernible in the month of the announcement and the subsequent six months.

Ball and Brown (1968) concluded that of all the information that is impounded into a share price during a year the accounting income number captures more than half. Thus, the information content of annual releases is high, although, they add, not a very timely source of the information as most of the content (85% - 90%) seems to be captured by more prompt media.

Beaver (1968), observing price residuals derived from the market model, reports above average absolute price variations in the week of the announcement of annual accounting earnings. He concludes that earnings announcements have considerable 'news' value. In the same paper Beaver (1968) reported above normal trading volume in shares during the announcement week. This abnormal trading volume, Beaver (1968) claims, is indicative of the information content of the announcement for individuals as opposed to the market as a whole. The price residuals reflect the information to the market as a whole; this is expanded upon in Section 4.2.3.

These two studies present an apparent conflict : on the one hand, Ball and Brown (1968) implied that the preliminary report had little news value (this interpretation was made explicit by Benston (1976)) and, on the other hand, the Beaver (1968) study reports significant news value. It is argued, in Section 4.3.2.3 below, that the results of these two studies do not in fact contradict each other and the apparent conflict is resolved.

Gonedes (1974), in a study of NYSE firms based on multivariate statistical techniques, reports that a number of accounting variables do have information useful to the market. The most useful accounting datum appeared to be the earnings per share number.

In a study of the reaction of abnormal share returns to annual earnings releases by 73 insurance companies traded on the Over the Counter (OTC) market, Foster (1975) reports similar results to those reported by Ball and Brown (1968) on NYSE firms.

Using a similar methodology to that employed by Beaver (1968), Grant (1980) compared absolute price residual behaviour around the date of annual earnings releases on the NYSE and the OTC. The results reflect a far greater reaction (and therefore information content) for the OTC firms than the NYSE firms. Grant (1980)

attributes the difference to the differential amount of interim information available on these two markets. These results counter-evidence the information content discerned in the Beaver (1968) study in that for the NYSE announcements no abnormal price residual behaviour was observed. The converse applied for OTC announcements supporting the proposition that the preliminary reports are more informative in a market with a relative paucity of interim information.

Morse (1981) extended Beaver's (1968) study by analysing abnormal price behaviour and volume activity surrounding earnings announcements on both the NYSE and the OTC. The study was based on daily data (Beaver's - weekly) during the 1973 to 1976 time interval (Beaver's - 1961 to 1965). Aggregating quarterly and annual announcements, Morse (1981) reports a significant price and volume reaction on the day before and the day of the announcement. Contrasted to the Grant (1980) study, Morse (1981) reports no significantly differential reaction between the NYSE and the OTC releases. As acknowledged by Morse (1981), this difference in result may be due to the exclusive inclusion in the latter of well traded OTC firms for which there is likely to be an above average amount of interim information.

The abovementioned seven studies present evidence which

indicates that accounting releases on the U.S. markets contain significant information content. It seems that the annual releases cause increased trading activity. This phenomenon may, however, support a number of interpretations. Although the accounting releases do not have a monopoly in firm specific, price sensitive information, they may be relatively more important in markets informationally less rich than the NYSE.

The survey will now extend to studies reporting reactions to annual earnings announcements on the major stock markets of five countries. They are, in order reviewed, Sydney (Australia), Tel Aviv (Israel), Tokyo (Japan), Stockholm (Sweden) and London (England). It must be emphasised that these markets are generally not well researched and the papers reported are in most cases the only published works on the respective market. Moreover, these are the only exchanges on which the information content of annual earnings releases has been tested.

Brown (1970), employing an identical methodology to Ball and Brown (1968), reports an almost identical reaction to annual earnings releases on the Sydney Stock Exchange.

Lev and Yahalomi (1972) replicated the abnormal volume analysis of the Beaver (1968) study for the 62 firms quoted on the Tel Aviv Stock Exchange (TASE). They report no significant abnormal trading volume in the weeks surrounding the releases of the annual report. They conclude that the accounting reports have no information content. This was attributed to the small number of active traders in the TASE, the possible informational inefficiency of the TASE and delays in the release of financial information in Israel. While it is obvious that differences in institutional arrangements between two markets may explain differential reactions to accounting information, the results of this study reflect more than these differences. It is submitted that the difference in results between the Lev and Yahalomi study and the Beaver (1968) paper is almost certainly methodological.

Lev and Yahalomi do not attempt to remove market wide factors and the analysis is based on the accounting releases of one calendar year only (1969). Thus, confounding factors which effect volume are inadequately controlled. It is further noted that firms were aligned on the week of the release of their 1969 financial statements to the TASE and not the preliminary announcement date as in other studies. It seems that Israeli firms do not formally announce their results

prior to the submission of their annual reports to the stock exchange. Consequently, due to the considerable lag between financial year end and submission of annual report to the TASE, there is an increased potential for price sensitive information to 'leak out', reducing the informativeness of the annual report. This condition would be consistent with an efficient market (strong form), not an inefficient market as suggested by the authors. The criticisms of the volume approach presented in Section 4.2.3 (below) apply equally here.

Deakin, Norwood and Smith (1974), in a study on the Tokyo Stock Exchange (TSE) based on 42 companies, report significant residual volume activity in the week of the release of company results by the Japanese Tax Administration Agency. However, in contrast with the results of the Beaver (1968) study, no significant residual price variation was discerned during the week of the announcement. The conclusion drawn was that earnings announcements change individual expectations, but not market expectations. The authors claim that this was consistent with the 'efficient markets literature'. This latter conclusion is not an obvious consequence of that study, since the objective was to establish whether or not the releases had information content rather than to establish the market's efficiency in impounding such.

As with the Lev and Yahalomi (1972) study, the Deakin, Norwood and Smith (1974) results probably reflect methodological weaknesses. Market factors were removed by regression and firms were aligned on the same calendar week (11 April 1972), i.e. the date the Japan Economic Journal was published wherein the Tax Administration Agency reported the earnings of all 42 companies included in the study. This dramatically weakens the power of the test as the results are in effect based on only one observation and thus confounding factors are not adequately controlled.

Forsgardh and Herten (1975) present an information content study of 19 earnings announcements on the Stockholm Stock Exchange (SSE) during 1969. Employing the unusual methodology of establishing earnings expectations by direct communication with the dominant Swedish investors (mainly financial institutions), the study reports significant information content in annual earnings releases. The market model was used to derive price residuals during the period surrounding the announcement which were regressed with the rate of change in earnings expectations, i.e. \log_e (Actual earnings/expected earnings). The relationship between these two variables was monitored before and after the announcements by reference to R^2 (the coefficient of determination) for each regression. The R^2 were then

averaged across firms. The results indicated that the earnings releases did change expectations, thus reflecting the information content of the announcements. The authors further concluded that these results supported the semi-strong efficient market hypothesis for the SSE, since the information content of the releases is impounded rapidly. Although an intriguing approach, it would not be feasible for large markets.

A recent paper by Firth (1981) examines the reactions of absolute price residuals to annual earnings announcements on the London Stock Exchange. The study was based on 120 firms over a three year period, although each year was kept entirely separate, i.e. residuals were not averaged across years. Using the absolute residuals methodology of Beaver (1968), Firth (1981) ranked the average absolute weekly residuals for each firm in descending order of magnitude. In each of the three years, the preliminary announcement week was ranked first, with either the week of the interim report or the week of the release of an annual report second and third. He concluded that the preliminary report has considerable information content, which is consistent with the Beaver (1968) results on the NYSE.

The international research scenario is not as sharply focused as that of the U.S. It seems fair to conclude

that only the London and Sydney studies appear rigorous enough to be relied upon. These two studies render similar results to those obtained on the U.S. markets *vis à vis* the information content of annual earnings announcements.

It is a pity that more comprehensive studies of this nature have not been conducted on the other stock exchanges of the world, for it is in these settings which are so substantially informationally different that insightful transnational comparisons could be made.

The principal studies reviewed are summarised in Table 4.1 (overleaf).⁽⁵⁾

4.2.3 Information Content - Some Reflections

In general, share prices may be described as an equilibrium determined by an individual's wealth and beliefs and the state of the world. More specifically, prices are determined by market assessed distribution functions of returns to these shares, that is, the present value of all state-contingent claims to dividends. These assessed distributions are based on information pertaining to the likely amount and timing of dividends and the current and possible future state of the world.

TABLE 4.1

Studies of the Information Content of Annual Accounting Releases.

Author(s)	Market(s)	No. Firms included	No. Years studied	Period studied	Return interval	Methodology	Result
Ball & Brown (1968)	NYSE	*261	9	1957 - 1965	Monthly	API - Price	IC
Beaver (1968)	NYSE	143	5	1961 - 1965	Weekly	Absolute Residual - Price - Vol	IC IC
Brown (1970)	Sydney	*118	10	1959 - 1968	Monthly	API - Price	IC
Deakin, Norwood & Smith (1974)	Tokyo	42	1	1971 - 1972	Weekly	Absolute Residuals - Price - Vol	NIC IC
Firth (1981)	London	120	3 x 1	1976,7,8	Weekly	Absolute Residuals - Price	IC
Forsgardh & Hertzen (1975)	Stockholm	19	1	1969	Weekly	Absolute Residuals - Price	IC
Foster (1975)	OTC	73	8	1965 - 1972	Monthly	API - Price	IC
Grant (1980)	NYSE OTC	110 211	5 5	1960 - 1964	Weekly	Absolute Residuals - Price	NIC IC
Lev & Yahalomi (1972)	Tel Aviv	62	1	1968	Weekly	Average - Vol.	NIC
Morse (1981)	OTC NYSE ASE	25 20 5	4 4 4	1973 - 1976	Daily	Absolute Residuals - Price - Vol	IC IC

KEY: IC = Information Content NIC = No information content.

*These studies include a similar proportion of the respective markets, as the studies reported in this part of the thesis.

Accounting earnings represent signals from a state-determined information system. Thus, if prices and earnings reflect common aspects of the prevalent state, it is likely that a statistical association will be observable between the two realisations. This association has been termed "information content".

An alternative approach to viewing the association would be to imagine the processes generating prices and earnings as mappings between aspects of the prevalent state and these observable variables. Any association would then be due to a common mapping of some aspect of the current state of the world.

Labelling the association 'information content' is ambiguous. A statistical dependence between accounting earnings and share price is a necessary, but not a sufficient condition for earnings to have marginal information content and it is this that is really implied by the term 'information content'. A signal will have marginal information content only if a statistical association with the share price remains after accounting for the association among all signals. That is, to have marginal information content (true information content), the signal must provide a unique mapping between an aspect of the state and the share price. To be useful, accounting data must not merely

be reflected in share prices but, must also be the unique source of any information content it has.

The notion that statistical association between signal and price is indicative of information content derives from the Information Economics definition of information.⁽⁶⁾ Strictly, to be defined as information, data must have the potential to change expectations. Thus, to have information content, accounting earnings must change the market's assessed distribution functions of the returns to the share. Such a change will result in a change in price. Moreover, in an informationally efficient market, the observable change in price induced by a change in the distribution function of returns would occur simultaneously with the admission of the signal to the public domain.

Market efficiency in this sense requires that share prices reflect all publicly available information at all times.⁽⁷⁾ As a result, information incremental to the set available must be impounded instantaneously and in an unbiased fashion.

It has been suggested in the literature that, if signals have information content, they will evoke trading activity by investors who revise their portfolios as a result of changed expectations. Although

investigations of the association between earnings releases and changes in trading volume provide certain insights into the behavioural aspects of information processing, it is submitted that this definition of information content is more ambiguous than the price definition. For this reason no attempt is made in this study to investigate any aspect of trading volume and all references to information content refer to the price based definitions. A recent paper by Verrecchia (1981) is instructive on the anomalies associated with the volume analysis of information content.

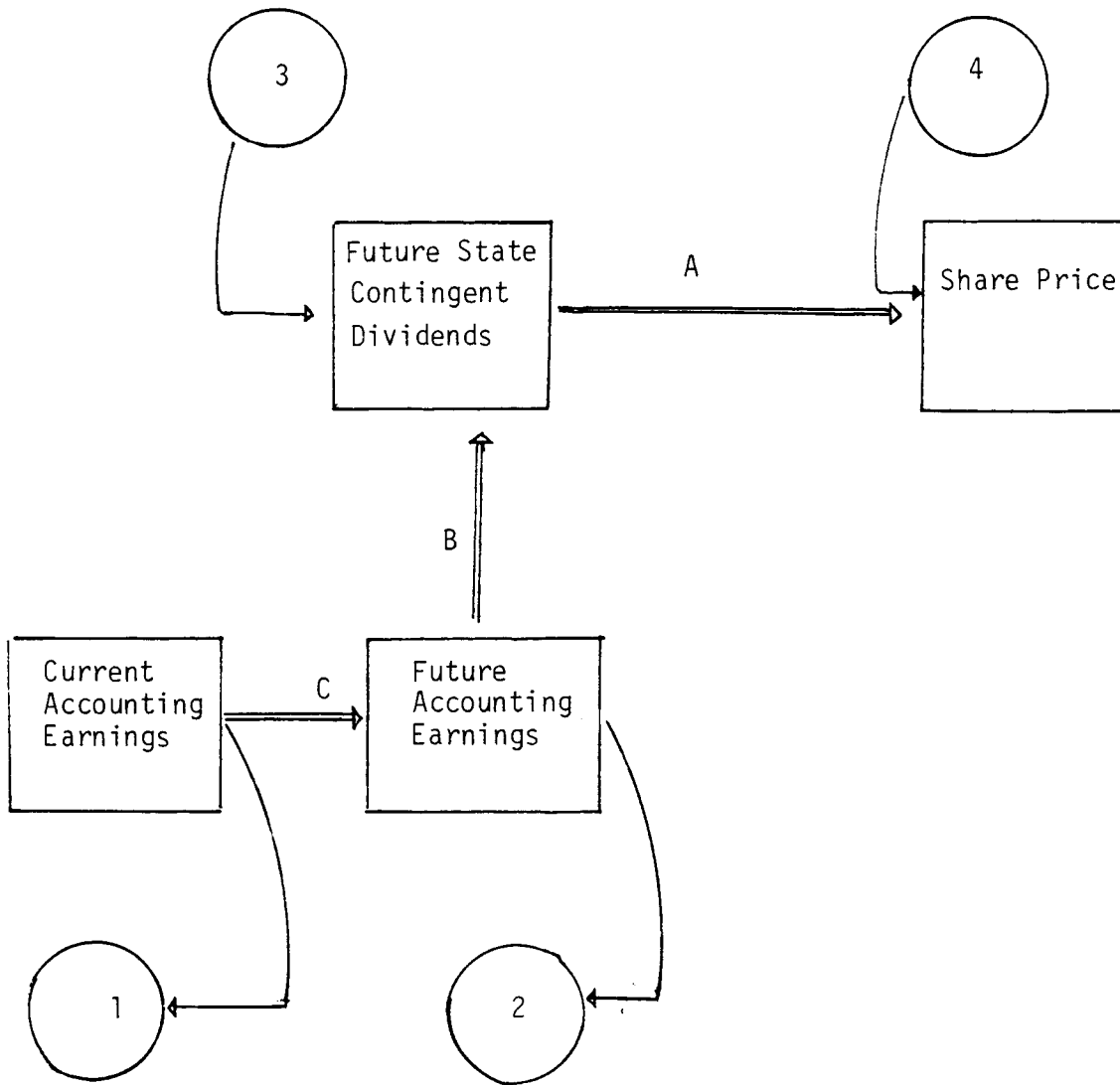
No theoretical framework has yet been developed to explain and predict the relationship between accounting earnings and share prices.

Beaver (1981), nevertheless, provides a useful conceptual framework for the relationship presented here in order to provide a simplified view of a highly complicated process. Figure 4.1 (overleaf) represents diagrammatically an interpretation of Beaver's approach. This framework provides a useful base to briefly review the empirical evidence of the relationship described. ⁽⁸⁾

There are three key relationships (depicted as \Rightarrow) presented in Figure 4.1 (A, B, C). A implies the

FIGURE 4.1

THE RELATIONSHIP BETWEEN ACCOUNTING EARNINGS AND
SHARE PRICE



familiar characterisation of share price as the present value of expected future dividends. B represents the relationship between future dividends and future earnings and C depicts the relationship between current earnings and future earnings. The curved arrows represent intervening factors which are likely to influence the association between the observable variables, current earnings and price. Without these intervening factors, there would be a direct and mechanistic relationship between current earnings and share price. This view of a mechanistic relationship is the basis of the traditional price/earnings approach to security analysis. Given relationship A, it is obvious that earnings (current and future) are only interesting *vis à vis* share price to the extent that they change dividend expectations.

In order to trace the potential association between price and current earnings, one might consider how current earnings will reflect the dividend paying ability of the firm. Only that component of current earnings which will be reflected in future earnings has such potential. This component is known as "permanent earnings". The balance of earnings is by definition transitory, that is, those components of earnings are once-off and not expected to recur. This transitory component is represented by $\rightarrow \bar{1}$ which

indicates that the association between total earnings and share price will be dampened by this component. The B relationship is not that clear, but it is unlikely to be 1 : 1 or even a function of a constant pay out ratio. → ② represents that part of future earnings not perfectly correlated with future dividends. *Inter alia*, accounting methods with no cash flow implications would explain such a lack of correlation.

Another aspect (depicted as ③ →) which may distort the mechanistic approach to the price earnings association, comprises of the factors that impinge on the dividend paying ability of the firm that are not transmitted through the "earnings channel". This may come about for two major reasons :

- (1) Certain events may occur which impact on future dividend paying ability, but do not affect current (or even future) earnings.
- (2) Certain events of type (1), although reflected as earnings, may be reported to the market through more timely media.

Finally, ④ → characterises those factors, mainly market wide, which do not impinge on the likelihood, amount or timing of the dividends, but affect the price.

Obvious examples are interest rate changes and market risk premium changes.

The evidence in the literature to date indicates :

- (1) There is a positive correlation between changes in earnings and changes in prices (Ball and Brown (1968)).
- (2) The relationship is not 1 : 1 (Beaver, Clarke and Wright (1979)).
- (3) Prices behave as if there is a transitory component in earnings (Beaver and Morse (1978)).
- (4) Prices see through different accounting methods (Beaver and Dukes (1973); Sunder (1973)).
- (5) Changes in price are more correlated with earnings than with "cash flow" (Beaver and Dukes (1972)).
- (6) Prices behave as if earnings are an important source of information, but not the only source (Beaver (1968); Ball and Brown (1968)).
- (7) Prices are better forecasters of earnings than past earnings (Beaver, Lambert and Morse (1980)).
- (8) Systematic risk (β) seems correlated with the

analogous measure of systematic variation in earnings (β_{acc}) (Beaver, Kettler and Scholes (1970); Beaver and Manegold (1975); and Beaver, Clarke and Wright (1979)).

Note that all these studies are American based and that no South African research has been carried out.⁽⁹⁾ Furthermore, the relationship between earnings and share prices is obviously highly complex and any observed statistical association may be interpreted in a number of ways. An investigation into this association should, nevertheless, provide insights into the process of information dissemination and consumption in a particular market. The application of an appropriate research design should reduce the ambiguity in interpretation.

Changes in share price may still, however, be viewed as reflecting the impact of information on investor expectations. The information may relate to any aspect of the state or expected state and may be firm specific or economy wide. In a market which is informationally efficient, the changes in share price may be interpreted as reflecting the entry of information to the public domain. This feature facilitates studies of the association between prices and earnings releases. Any observed changes in price occurring simultaneously with earnings releases may be attributed

to the effect of these releases on market expectations, assuming an adequate control of other factors. In a grossly inefficient market, the information content of earnings releases would be impossible to test, since the lag between the release and the price change would hamper any conclusion. In studies on markets of proven efficiency, this lagging of price reaction is not problematic and most studies merely assume market efficiency (based on conclusive evidence) and proceed to measure the contemporaneous relationship between price changes and information releases. Unfortunately, the JSE is a market of unproven efficiency, as the few studies that have been done reflect conflicting evidence (see Chapter 3).

This aspect will naturally add a certain ambiguity to the results. It is, however, unlikely that the market is so inefficient that the lag in price reaction is so great and variant across firms that no conclusion is possible. In fact, this study will attempt to test the speed of market reaction to information releases. It is submitted that it is not the assumption of complete efficiency in the semi-strong form that is required, but the assumption that the market is not excessively inefficient that is required.⁽¹⁰⁾ Furthermore, it is acknowledged that efficiency with respect to the information content of accounting releases presupposes

that the releases have unique information. The testing of efficiency, then, is considered a by-product of this research study which focuses primarily on information content. The efficiency issue is one that could hamper the methodological approach and this is addressed in Section 4.3.2 below.

4.3 EMPIRICAL STUDY

4.3.1 General Approach

In the most general terms the study tests the following competing hypotheses :

$$H_0 : E(\tilde{R}_{it} | \gamma_{it}) = E(\tilde{R}_{it})$$

$$H_a : E(\tilde{R}_{it} | \gamma_{it}) \neq E(\tilde{R}_{it})$$

where

\tilde{R}_{it} = the return on share i in period t

γ_{it} = annual earnings on share i released during period t

The null hypothesis (H_0) that expectations of returns are unaltered with the release of the annual earnings report (no information content) is tested against the alternative hypothesis (H_a) of altered expectations

(information content).

It is thus necessary to establish as accurately as possible the time of the release (t) and to observe any abnormal price changes at this time.

Changes in R_{it} are induced by changes in market expectations which in turn are induced by information of all types. Information that affects expectations about a share will continuously affect price. These information releases will range from economy wide factors, affecting all firms, through firm specific releases, such as earnings releases which may only affect the share itself. Clearly, to focus on firm specific items it is necessary to remove the effect of all other factors. Thus the observable R_{it} needs to be transformed in order to abstract away from all non-firm specific information.

The familiar market model suggested by Markowitz (1952) and developed by Sharpe (1963) has provided a useful mechanism for analyses of this nature.

This model (often called the diagonal model) dichotomises the return of a share into systematic and non-systematic components which respectively reflect a common movement with the average return of all shares and a unique movement specific to a particular share. Observable changes

in R_{it} can be interpreted as being induced by two types of information, viz. that which affects all firms (which will affect the systematic component) and firm specific information. Changes in these components reflect the flow of these two types of information into the public domain. The variable portion of the firm specific component of return, viz. the unsystematic return are defined as 'residuals' from the market model of the form :

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \tilde{\epsilon}_{it} \quad (1)$$

where

\tilde{R}_{it} = distribution of the return on share i
in period t

\tilde{R}_{mt} = distribution of the return on all shares
(market return in period t)

$\tilde{\epsilon}_{it}$ = unsystematic return on security i in
period t

α_i, β_i = the intercept and slope coefficients
specific to share i

This transformation of \tilde{R}_{it} to $\tilde{\epsilon}_{it}$ is essential to test the hypotheses cited which now become :

$$H_0 : E(\tilde{\epsilon}_{it} | Y_{it}) = E(\tilde{\epsilon}_{it}) = 0$$

$$H_a : E(\tilde{\epsilon}_{it} | Y_{it}) \neq E(\tilde{\epsilon}_{it})$$

Untransformed the \tilde{R}_{it} represents one realisation from a distribution. A meaningful testing of the hypotheses would naturally require a large number of drawings from the distribution. In order to obtain a larger number of observations, it is convenient to pool data over time and across firms. This would be permissible only where the expected value of the marginal distribution of \tilde{R}_{it} is the same for all i and t . This is unlikely to be the case. By assumption $E(\tilde{\epsilon}_{it}) = 0$, through use of O.L.S. $\sum_t \hat{\epsilon}_{it} = 0$ and thus the unsystematic returns facilitate the pooling of data over time and across firms to expand the number of observations in order to adequately test the competing hypotheses.

An obvious omission from (1) would be an industry factor. The evidence, however, suggests that this is not a serious misspecification (see King (NYSE 1966) and Visser (JSE 1982)).

This study will be based entirely on residual price analysis.

It must be noted that the market model introduces no assumptions as to the stochastic process generating \tilde{R}_{it} and \tilde{R}_{mt} .

The following sections explain the basis for estimating unsystematic returns and provide two methods to analyse these residuals in order to interpret the effects of firm specific information releases.

4.3.2 Methodology

The usual approach to residual analysis is in three phases :

- (1) An estimation of the α, β parameters of the market model excluding the periods surrounding the events
- (2) Based on the $\hat{\alpha}$ and $\hat{\beta}$ of (1) the residuals ($\hat{\epsilon}$) are estimated for the excluded periods.
- (3) Finally the $\hat{\epsilon}$ from (2) are pooled over time and cross-sectionally to derive average residuals ($\bar{\epsilon}$) aligned on the common event.

A variety of approaches to (3) and subsequent average residual analysis are evident in the literature. Two such methods are employed in this study, details of which appear in subsequent sections. The two approaches taken to Phase 3 (and subsequent analysis) have Phases 1 and 2 in common. Thus, both procedures are based on the same set of estimated residuals.

The rationale of estimating residuals in two phases stems from ordinary least squares (OLS) regression. The OLS approach for estimating residuals is by far the most common in studies of this nature. One of the assumptions of OLS is that the expected value of each residual is zero, i.e. $E(\tilde{\epsilon}_{it}) = 0$. An inclusion of periods where $E(\tilde{\epsilon}_{it}) \neq 0$ would contravene this assumption and thus render the regression redundant. It has been argued (Ball and Brown (1968)) that since the expected value of the residuals at the time of earnings announcements is non-zero, the estimates of residuals surrounding particular announcements should be derived from $\hat{\alpha}_i$ & $\hat{\beta}_i$ estimates based on regressions of R_{it} on R_{mt} excluding the announcement period.

The announcement period in this study spans 18 months, 12 months prior to the announcement and six months after the announcement. In order to comply with the abovementioned assumption, the complete data set would be deleted which is nonsensical. An alternative has been to base $\hat{\alpha}_i$ & $\hat{\beta}_i$ estimates on a fixed period (usually five years) up to the period of interest (i.e. 12 months prior to the announcements). These estimates would then be used to estimate the residuals in the subsequent period (18 months). This approach is considered to be unnecessarily inefficient, since prior earnings announcements (where $E(\tilde{\epsilon}_{it}) \neq 0$) are invariably included.

The approach adopted here will be to integrate phases (1) and (2) so that the residuals will be estimated directly.

The unsystematic returns (residuals) were estimated from a time series regression of R_{it} on R_{mt} based on the OLS method; the form of the regression is :

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \hat{\epsilon}_{it} \quad (2)$$

where $\hat{\alpha}_i, \hat{\beta}_i$ = estimates of the intercept and slope obtained from the linear regression specific to share i

$\hat{\epsilon}_{it}$ = an estimate of unsystematic return on share i in week t

$$R_{it} = \log_e \left(\frac{P_{it} + D_{it}}{P_{it-1}} \right)$$

D_{it} = cash dividends on share i in week t

P_{it} = share i closing price at the end of week t*

P_{it-1} = share i closing price at the end of week t-1*

R_{mt} = the return on the market in period t.

The RDM 100 industrial index was used as a surrogate. The return is calculated analogously to the return on share i.

* Prices are adjusted for all capitalisation issues and share splits in week t.

To achieve a consistent estimation of the α_i and β_i parameters using the OLS technique, the following conditions must prevail :

- (1) $E(\tilde{\epsilon}_{it}) = 0$ for all t
- (2) $\sigma(\tilde{\epsilon}_{it}; \tilde{\epsilon}_{it'}) = 0$ for all $t \neq t'$ (zero auto-correlation)
- (3) $\sigma^2(\tilde{\epsilon}_{it}) = \sigma_i^2$ for all t (homoskedasticity)
- (4) $\sigma(R_{mt}; \tilde{\epsilon}_{it}) = 0$ for all t

(1) and (2) are unlikely to constrain the application of OLS. Studies on the NYSE, e.g. Fama *et al.* (1969) have indicated a compliance with these assumptions. Random walk studies on the JSE by Affleck-Graves and Money (1975) indicate similar results to those obtained on the NYSE. It is stressed that an assumption of semi-strong market efficiency is not implied by the above conditions. Provided the conditions are complied with, this procedure does not introduce circular reasoning if inferences are drawn from the emergent results on market efficiency (see Section 4.2.3 above).⁽¹¹⁾

The assumption of constant variance (3) may not be literally correct. Affleck-Graves (1977) reports the heteroskedastic condition in a few shares from

a sample of JSE firms. It is acknowledged that this condition is a potential weakness in the current study.

A lack of independence between \tilde{R}_{mt} and $\tilde{\epsilon}_{it}$ could arise for two reasons :

- (a) the returns on share i are included in the market index; and
- (b) a cross-sectional correlation could be induced by industry effects.

(a) is unlikely to be significant since firstly, share i is a small part of the index and secondly, the index does not comprise all shares in the market (only 100) and thus the returns on share i may not be included.

(b) King (1966) has shown that industry factors explain about 10% of a share's return (compared with 30% - 50% due to market factors) on the NYSE. Visser (1982), in a study on the JSE, reports no industry effects and that market factors explain about 30% of a share's return.

The fourth OLS condition is therefore not likely to be problematic to this study.

The $\hat{\epsilon}_{it}$ were computed based on model (2) using an OLS regression. Weekly share and market returns were used over an eight year period. Thus 404 weekly residuals were estimated for each share.

Seventy-five weekly residuals were thus estimated for each preliminary announcement (PA), viz. weeks -50 through +24 where week 0 is the week of the PA.

It should be noted that approximately two-thirds of all residuals ($\hat{\epsilon}_{it}$) were included as observations in more than one of the PA's analyses due to the overlap of time intervals.

261 preliminary announcements were examined and 261 groups comprising 75 weekly residuals provided the data base for subsequent analysis.

These residuals were then averaged over time and across firms according to the two methods described in Sections 4.3.2.1 and 4.3.2.2 below.

4.3.2.1 The API Metric and Income Expectations

The Abnormal Performance Index (API) is a widely used metric in empirical work in Finance and Accounting. It presents a method of pooling the residuals (returns

transformed to abstract from market factors) over time and across firms to seek a larger number of observations to test hypotheses. The API is computed as follows :

$$API_w = \frac{1}{N} \sum_{n=1}^N \prod_{k=-50}^w (1 + \hat{\epsilon}_{nk}) \quad (3)$$

where N = the number of earnings announcements examined

$\hat{\epsilon}_{nk}$ = residual in week k relative to the n th announcement.

The API may be interpreted as tracing the value of one Rand invested in equal amounts in all shares at the end of week -51 (i.e. 51 weeks prior to the earnings announcement) and held to the end of an arbitrary period (say week w) excluding the market effect.

The gains and losses are considered abnormal since they are above or below what would be expected after risk adjustment. The API thus has an expected value of zero in all weeks.

The API approach has been used in a variety of research settings and interpretations have been varied, from the inferences of information content to investor preference for particular accounting techniques. (12)

Within an information-content test, the API is interpreted as reflecting price changes which are observable realisations of informationally induced expectations changes. As expectations are likely to be changed positively and negatively and in different magnitudes, an averaging of residuals for all announcements per (3) will remove the effects that the metric attempts to measure. The API metric is only useful, therefore, where an assumption is made about investors' expectations. These expectations, being unobservable, necessitate the development of an observable model of expectations. This model of investor expectations is required to provide an observable criterion by which to partition announcements of different impacts. This study will be confined to a model which provides a criterion to partition all announcements as having a positive effect on expectations ('good news') and a negative effect ('bad news'). Naturally, the power of the API depends on the validity of the assumptions about investor expectations. An evaluation of the model, however, is only testable where assumptions are possible on information content. The above two aspects cannot be tested simultaneously as each requires the other as a maintained hypothesis. Patell (1979) is instructive on this aspect of research design.

The model of expectations employed in this study is known as the "earnings forecast error". It is hypothesised that investor expectations of a firm's earnings will be determined by the earnings of all firms and the relationship between the firm and all other firms. This is analogous to the price residual transformation and the forecast error is determined using the OLS technique of linear regression in the following form :

$$\Delta I_{it} = \hat{a}_i + \hat{b}_i \Delta I_{mt} + \hat{e}_{it} \quad i = 1..41 \quad (4)$$

where

$$\Delta I_i = \text{year to year \% change in reported EPS}$$

$$\Delta I_m = \text{year to year \% change in the average reported EPS of all industrial firms}$$

$$\hat{a}_i, \hat{b}_i = \text{estimates of the intercept and slope obtained from the linear regression specific to share } i$$

$$\hat{e}_{it} = \text{an estimate of the unsystematic accounting return}$$

The usual OLS conditions apply (see Section 4.3.2 above). Due to a significant level of residual autocorrelation where absolute income levels were used in the regression, first order changes were employed which significantly reduced this phenomenon.

While no previous work has been done in South Africa on the behaviour of earnings, studies in the U.S. (see Ball and Brown (1967)) indicate that about half of the variability in the level of earnings of the firms is attributable to economy wide effects. The results of the 41 regressions on earnings carried out in this study indicated a similar proportion.

The possibility of a bias in estimates being introduced by a correlation between e_{it} and ΔI_{mt} does exist, but it is unlikely to impinge on the inferences here drawn. (13)

The amount of new information conveyed in a firm's income in a particular year is assumed to be the difference between the actual change in income and the change conditional upon the expectation implied in (4) :

$$\begin{aligned} \hat{\Delta I}_{it} &= \hat{a}_i + \hat{b}_i \Delta I_{mt} & i = 1 \dots 41 \\ & & t = 1 \dots 9 \\ \hat{e}_{it} &= \Delta I_{it} - \hat{\Delta I}_{it} \end{aligned}$$

where

$$\hat{\Delta I}_{it} = \text{the expected change in income for firm } i \text{ in year } t$$

$$\Delta I_{it} = \text{the actual change in income for firm } i \text{ in year } t$$

ΔI_{mt} = the actual change in market earnings in year t

\hat{e}_{it} = the earnings forecast error for firm i in year t

The forecast errors (\hat{e}_{it}) were computed over a similar time period as the price residuals ($\hat{\epsilon}_{it}$) although yearly data were used for the former. As with the price residuals, it was considered unnecessarily inefficient to compute the forecast errors in two stages and thus the errors were estimated directly using the data during the full period. Moreover, due to limited data and in order to include at least nine observations in each regression, the inclusion of all data was necessary. This should not constrain the research in any way since the OLS requires an assumption of the constancy of a_i and b_i and the forecast error estimates on both the full inclusion and past-data inclusion methods should consequently be similar.

The strength of the API metric to investigate the information content of earnings releases is naturally dependent on the validity of the expectations model specified. For this reason, a rather unambitious interpretation is placed on the forecast error in this study which is likely to be less sensitive to

model misspecifications than other interpretations. The sign of the forecast error is interpreted as being a signal to the market from the accounting system; an association between this sign and the sign of the API is considered to be consistent with information content. A more ambitious interpretation would be to view the forecast more as a measure of unexpected earnings with error, the latter having been introduced by misspecifications of the simple model induced by competing information sources.

Each earnings announcement is thus classified according to the sign of the earnings forecast error. Thus, two portfolio API were computed, one for negative forecast errors and one for the positive forecast errors. Portfolios were compiled 50 weeks in advance of the earnings announcement and thus the information value of a foreknowledge of the sign of the earnings forecast error will be traced.

The hypotheses to be tested with this methodology are :

$$H_0 : E(\tilde{\epsilon}_{it} | \hat{\epsilon}_{it}) = E(\tilde{\epsilon}_{it}) = 0$$

$$H_a : E(\tilde{\epsilon}_{it} | \hat{\epsilon}_{it} > 0) > E(\tilde{\epsilon}_{it}),$$

and

$$H_a : E(\tilde{\epsilon}_{it} | \hat{\epsilon}_{it} < 0) < E(\tilde{\epsilon}_{it})$$

This methodology was used (with minor deviations) by Ball and Brown (1968) on the NYSE. This paper has been surveyed in Section 4.2.2 and is analysed in Section 4.3.2.3.

The extension of this work of Beaver *et al.* (1979) into the association between the magnitude of the earnings forecast error and the magnitude of residuals would be logical in the South African context. This aspect is tentatively tested in Chapter 7.

An alternative approach to the investigation of information content in earnings announcements has been suggested by Beaver (1968). The API metric was not used and thus the attendant assumptions of investor expectations models were avoided. This approach, termed here an Absolute Residual Analysis, was also employed and the methodology is explained in the next section (4.3.2.2).

4.3.2.2 Absolute Residual Analysis (ARA)

In order to avoid the necessity for the maintained hypothesis of the API metric, the ARA abstracts from the sign of the residual ($\hat{\epsilon}_{it}$) by computing a squared residual ($\hat{\epsilon}_{it}^2$). Effectively then this approach is not concerned with whether the news content of a release

is unexpectedly 'good' or 'bad', but merely that there is news content.

The squared residual is then divided by the estimated variance of the residuals for share i ($\hat{\sigma}^2(\tilde{\epsilon}_i)$). The variance estimate is based on the full 404 weeks of data.

An index $\left(\frac{\hat{\epsilon}_{it}^2}{\hat{\sigma}^2(\tilde{\epsilon}_i)} \right)$ is thus derived which measures the magnitude of the residual relative to the average magnitude of residuals for that share. The average residual has an index value 1 since $\hat{\sigma}^2(\tilde{\epsilon}_i) = \overline{\hat{\epsilon}_{it}^2}$ (since $E(\overline{\tilde{\epsilon}_{it}}) = 0$).

An index value above 1 indicates a residual price change greater than normal.

The indices derived are then averaged across all firms and the analysis is based on an average index for each week surrounding the common announcement. In this study 75 values for the index were derived 50 weeks prior to the week of the announcement (week 0) and 24 weeks after the announcement. This is consistent with the API approach.

To summarise notationally :

- (1) Square residuals ($\hat{\epsilon}_{it}$) :

$$\hat{\epsilon}_{it}^2$$

- (2) Estimate variance over the 404 weeks :

$$\hat{\sigma}^2(\tilde{\epsilon}_{it})$$

- (3) Divide (1) by (2) :

$$u_{it} = \frac{\hat{\epsilon}_{it}^2}{\hat{\sigma}^2(\tilde{\epsilon}_{it})}$$

- (4) Average (3) across announcements :

$$\bar{u}_t = \frac{1}{N} \sum_{i=1}^N u_{it}$$

The residuals were estimated directly as described in Section 4.3.2.

The null hypothesis infers that the average index in week 0 will be 1, that is, no abnormal information is provided in the week of the announcement.

Formally :

$$H_0 : E(\bar{u}_0) = 1 \quad \text{no information content}$$

$$H_a : E(\bar{u}_0) > 1 \quad \text{information content}$$

This approach was applied by Beaver (1968) on the NYSE.

His paper is surveyed above (Section 4.2.2) and is analysed in Section 4.3.2.3 below.

4.3.2.3 A Review of Two Seminal Papers

Before proceeding to the data and results of this study, it is considered appropriate to review the two seminal papers applying the above two methodologies (separately) to NYSE data.

The two papers by Ball and Brown (1968) (BB) and Beaver (1968) (B) were published simultaneously, although are cross-referenced. The Ball and Brown study employed the API and Beaver the absolute residual approach.

Dealing firstly with BB, the work was based on monthly data and tested the association between the sign of the forecast error and the sign of the API for 261 companies over a nine year period (1957 - 1965).

Other features of the work were :

- (1) Only firms with 31 December fiscal year ends were used.
- (2) Both the price residuals and the forecast errors were derived using the full three phase approach, the estimates of the first phase being based only on data up to 12 months

prior to each announcement.

- (3) The date of the preliminary report, announced in the Wall Street Journal, was deemed week 0.
- (4) Three models were used to estimate the sign of the forecast error, two as described in this thesis ($\Delta\text{EPS}\%$) and the naïve model, the third, was based on percentage changes in net income. All three rendered similar results.

The results of the BB study are presented in Figure 4.2 (overleaf).⁽¹⁴⁾ The results of only one model (ΔEPS (regression) variable 2 in BB) are presented.⁽¹⁵⁾ The association is quite clear : the API for the 'good news' portfolio (positive forecast error) rises continuously throughout the year until the month of the announcement whereafter the API remains constant. The 'bad news' portfolio (negative forecast error) displays a continuous reduction throughout the year prior to the announcement and this continues although much more slowly for the two or three months after the announcement. It should be noted that the 'bad news' portfolio reduced value to a larger extent than the 'good news' portfolio increased value. This is to be expected as the API metric tends to have a downward bias. The conclusion drawn is that there is an association between the sign of the forecast error

and the sign of the price residuals which is consistent with information content. The extended conclusion is that the preliminary report was not a timely medium for such information since the API remained virtually constant after the announcement. This result highlights the fact that there are a number of competing sources of price sensitive information which are reflected in the changing API during the year prior to the announcement. As indicated above, this result has been interpreted by some as bearing evidence of the lack of new information in the preliminary report.⁽¹⁶⁾

The B results are presented in Figure 4.3 overleaf.

The salient features of the paper are : (1) weekly data were used, (2) only the 17 weeks surrounding the announcement were examined, (3) the residuals were estimated with the three phase method using only data up to eight weeks before the announcement, (4) only firms which did not have 31 December fiscal year ends were studied, (5) only announcements which were not accompanied by a dividend announcement were included, (6) only firms with fewer than 20 news announcements per year in the Wall Street Journal were included and (7) 143 firms were examined over a five year period (1961 - 1965).

Additional work in the B study on volume analysis is

not reviewed here.

Referring to Figure 4.3, it is obvious that the week of the announcement has above normal residuals. This suggests that the preliminary report has significant news value.

The results of these two studies seem contradictory : on the one hand, it may be implied from BB that the preliminary report has no additional news, but on the other hand, the converse may be implied from the B results. The contradiction is easily resolved. The answer stems from the decreasing validity of the maintained hypothesis, during the year, in the BB study. Recall that the announcements were partitioned as 'good news' and 'bad news' and allocated to portfolios one year prior to the announcement. During the year competing information about the firm affected the market's expectations (hence changing API). As a consequence of this, the expectations model became more and more misspecified so that on the month of the announcements both the 'good news' and 'bad news' portfolios were a random sample of both 'good news' and 'bad news' announcements. As previously indicated, the API metric cannot be used to evaluate information content without a maintained hypothesis as the expected value of the API averaged

across all firms is zero. This progressive misspecification is really the strength and the weakness of the API approach. It is a strength since changing expectations reflect the effect of new information in the changing API, but is a weakness in as much as the required assumption of an expectations model is eroded by the changing expectations.

Although the BB study provides extensive insights, it is limited by the aspects mentioned. The B study overcomes these weaknesses, but loses the positive aspects of the API method. It is the purpose of this thesis to combine the two methodologies and apply them on a consistent basis. It is considered vital to ensure that a comparison of the results from the two approaches is not distorted by unnecessary specification differences. A disappointing aspect of these two papers is that such differences may have distorted the comparison. Table 4.2 (overleaf) summarises the features of these papers and the current study. This will facilitate the brief commentary on the differences presented below.

Beaver excludes 31Dec. year end firms to avoid the clustering of announcements. This clustering may distort the results since announcement information may be 'washed out' with market information as the

TABLE 4.2

COMPARATIVE DESIGN SPECIFICATIONS

	Ball & Brown 1968	Beaver (1968)	Knight
Market	NYSE	NYSE	JSE
No. of Announcements	2340	506	261
No. of Firms	261	143	41
Period studied	1957 - 1965	1961 - 1965	1973 - 1980
Return interval	Monthly	Weekly	Weekly
Methodology	API	ARA	API & ARA
Expectations models:	- Δ % EPS (regression) - Δ Net income (regression) Δ EPS (naïve)		Δ % EPS (regression) Δ % EPS (naive)
Exclusion Criteria			
(1) Financial year end	31/12 only	Non - 31/12 only.	N/A
(2) Dividends & Announcements	N/A	If simultaneous, exclude.	N/A
(3) More than 20 Ann. p.y.	N/A	Exclude	N/A
Period of Residual Analysis	Month -11,0,+6	Week -8,0,+8	Week -50,0,+24
Residual estimates	3 phase	3 phase	2 phase.

market index may be affected in a week of many announcements. If the 31 Dec. shares and non-31 Dec. shares are generically different, the BB and B results are not comparable. The current study includes firms of all year ends (see Appendix I) and announcements in all months are included (see Appendix II).

There is a certain clustering of announcements in months August and February which may tend to suppress information content, but this effect is likely to be slight. While the exclusion of announcements accompanied by dividend announcements seems reasonable, in the context of the JSE virtually all the announcements are accompanied by a dividend announcement. It was necessary, therefore, to ignore the dividend aspect as did the B & B study. An attempt will be made in Chapter 7 to distinguish the earnings and dividend effects. It is submitted that the exclusion of firms with a large number of announcements from the B study may have seriously reduced the generality of the conclusions. One would expect firms with fewer announcements to have a relatively higher information content in the earnings announcements. This contention seems to have been confirmed by Grant (1980) in a comparative study of NYSE and OTC firms. In employing a similar approach to Beaver, little information content was evident in the

announcements of NYSE firms selected without this exclusion criterion.

The other specification differences, e.g. the different time interval studied, the analysis of different periods surrounding the announcement and the use of different return intervals may also have had distortive effects in the aforementioned studies.

Finally, certain departures from both the B & B and B approaches were necessary in the current study to ensure a consistency between the two methods. These are :

- (1) All residuals and forecast errors were estimated over the full eight year period.
- (2) In both approaches, 50 weeks before the announcement and 24 weeks after the announcement are analysed.
- (3) As a result of (2), the estimation of the variances of residuals in the ARA approach were necessarily based on all data.

While these factors should not significantly affect the inferences drawn in the ensuing study, they do, however, render the two approaches compatible.

FOOTNOTES : CHAPTER 4

- (1) See Financial Accounting Standards Board (1978).
- (2) See American Accounting Association (1977).
- (3) See Chambers (1964).
- (4) See Ashley (1962), O'Donnell (1965) and Staibus (1965).
- (5) Only studies reported in English have been reviewed.
- (6) See Theil (1967).
- (7) This is known as the semi-strong form of Efficiency; see Fama (1970).
- (8) This exposition draws heavily from Beaver (1981), Chapters 4 and 5.
- (9) An exception is Knight and Affleck-Graves (1983).
- (10) The evidence on the weak form efficiency of the JSE is conclusive and this assumption is well supported empirically; see Affleck-Graves and Money (1975).
- (11) The Durbin-Watson test was applied to the residual estimates of each share. No significant autocorrelation was detected.
- (12) See Ball and Brown (1968) and Beaver and Dukes (1972).
- (13) The alternative naïve model of expectations (viz. investors expect earnings in a year to be the same as the previous year), yielded very similar results to those reported.
- (14) The Chi-squared tests used by Ball and Brown (1968) are not reported here. The conclusion from these support their overall interpretation.
- (15) The pattern was very similar for the other two variables.
- (16) See Benston (1976).

CHAPTER 5THE INFORMATION CONTENT OF ANNUAL EARNINGS
RELEASES : THE EVIDENCE

5.1 CHAPTER SUMMARY

This chapter tests the hypotheses set in Chapter 4 on some 261 annual earnings announcements of quoted South African companies.

The major conclusions, naturally subject to the adequacy of the methods employed, are :

- (1) Unlike the U.S. reactions *à la* Ball and Brown (1968), there seems to be an asymmetrical reaction to 'good news' and 'bad news' earnings releases.
- (2) However, in both the 'good news' and 'bad news' cases, there is a significant positive reaction during the week of the announcement although larger in magnitude for 'good news' releases.
- (3) Results similar to those obtained by Beaver (1968) are reported, thus indicative of a significant information content in all three

statutory reports investigated. It appears that the preliminary report is more informative than the interim report which, in turn, is more informative than the annual report.

- (4) There seems to be an association between the sign of the forecast error and the sign of the annual abnormal return.

The results in support of these tentative conclusions are presented in this chapter which concludes with a section on alternative research designs for future research aimed at testing the sensitivity of the results to design issues.

5.2 DATA

5.2.1 Preliminary Announcement Dates

The most prominent financial newspaper in South Africa (the Financial Mail) is the most common medium through which quoted firms report their preliminary announcements. An attempt was made to establish the exact date of earnings releases, but, unlike the Wall Street Journal in the U.S., advertisements in the Financial Mail are not indexed. The exact dates were

established by requesting each firm for which share price data were available to furnish these dates. The response rate was over 50%, 47 firms out of 95. However, six of the firms which replied could only supply approximate dates and were therefore excluded. The dates for the remaining firms were checked against the medium indicated for accuracy. The unavailability of this date data was a considerable constraint in this study. The 261 announcements examined should, however, be sufficient to extract any general trends. The preliminary announcement was chosen since it is the first time that the earnings number is publicly available. Appendices I - III present data which are an interesting by-product of this research. The analysis of the time lags between year end and preliminary report and between preliminary report and annual report may prove interesting if differential lags are discovered between audited/unaudited reports and between good news/bad news. The results of such an analysis will not be reported in this dissertation, but may be a fruitful avenue for future research.

5.2.2 Share Price Data

Weekly share prices were available continuously for the 405 week period, 2 February 1973 through 14 November 1980 for 95 industrial shares quoted on the JSE. The

weekly value of the RDM 100 industrial index was available for the same period. These data are available at the University of Cape Town (UCT) computer centre.

5.2.3 Earnings Data

Annual earnings data were obtained from the University of Stellenbosch Graduate School of Business data bank. The forecast errors were computed over a similar period to the price residuals. An index of average industrial earnings was obtained from the Johannesburg Stock Exchange data bank.

5.3 RESULTS

The results and interpretations of the two approaches will be presented separately in Sections 5.3.1 and 5.3.2 below.

The overall conclusions and suggestions for future research, presented in Section 5.4 will synthesize the results of both approaches.

5.3.1 The API Method - Results and Interpretations

The results of the API approach are presented numerically and graphically in Table 5.1 and Figure 5.1 respectively (pages 115 and 114 respectively). For the major part the following discussion will focus on both forms of the results.

The most startling feature of the API plots (Figure 5.1) is that the pre-announcement pattern is asymmetrical for the two portfolios.

The results reported by Ball and Brown (1968) on NYSE announcements (Figure 4.2) are similar only for the negative forecast error ('bad news') announcements of the current study.

Two other features worth noting, before proceeding, are :

- (1) In week 0 the positive forecast error ('good news') portfolio shows a positive cumulative abnormal return for the year (2,9%) whereas the 'bad news' portfolio suffered a negative return for the year (-8,2%); and
- (2) Both portfolios earned a substantial positive return during the week of the announcement,

TABLE 5.1

SUMMARY STATISTICS BY WEEK RELATIVE TO PRELIMINARY ANNOUNCEMENT DATE (PA)

Week relative to preliminary announcement.	*API _W ⁺ 'GOOD NEWS'	API _W ⁻ 'BAD NEWS'	API _T (TOTAL SAMPLE)
Week 0 = PA			
- 50	1.006	1.001	1.003
- 49	1.010	1.006	1.008
- 48	1.014	1.010	1.012
- 47	1.019	1.013	1.016
- 46	1.022	1.015	1.018
- 45	1.021	1.017	1.019
- 44	1.021	1.012	1.016
- 43	1.019	1.019	1.018
- 42	1.021	1.023	1.022
- 41	1.026	1.021	1.023
- 40	1.030	1.021	1.024
- 39	1.025	1.013	1.018
- 38	1.029	1.009	1.017
- 37	1.021	1.002	1.010
- 36	1.018	1.005	1.010
- 35	1.017	1.000	1.007
- 34	1.014	.997	1.004
- 33	1.014	.992	1.001
- 32	1.008	.990	.997
- 31	1.017	.986	.999
- 30	1.019	.985	.999
- 29	1.023	.984	1.000
- 28	1.022	.978	.997
- 27	1.022	.971	.993
- 26	1.028	.966	.993
- 25	1.032	.963	.993
- 24	1.034	.960	.992
- 23	1.032	.963	.993
- 22	1.031	.960	.991
- 21	1.031	.963	.992
- 20	1.035	.955	.989
- 19	1.033	.949	.985
- 18	1.035	.944	.983
- 17	1.032	.940	.980
- 16	1.028	.939	.978
- 15	1.030	.938	.978
- 14	1.017	.930	.968
- 13	1.008	.929	.953
- 12	1.006	.925	.960
- 11	1.007	.928	.962
- 10	1.006	.924	.959
- 9	1.002	.921	.956
- 8	1.006	.917	.955
- 7	1.011	.915	.956
- 6	.999	.907	.946
- 5	1.002	.904	.946
- 4	.994	.906	.944
- 3	.999	.901	.944
- 2	1.002	.899	.944
- 1	.998	.903	.944
0	1.029	.918	.966
+ 1	1.029	.926	.971
+ 2	1.039	.928	.976
+ 3	1.036	.935	.979
+ 4	1.042	.933	.980
+ 5	1.053	.930	.983
+ 6	1.057	.937	.989
+ 7	1.059	.941	.993
+ 8	1.051	.945	.992
+ 9	1.050	.951	.995
+ 10	1.052	.950	.994
+ 11	1.054	.947	.994
+ 12	1.057	.944	.994
+ 13	1.055	.947	.995
+ 14	1.052	.944	.991
+ 15	1.048	.940	.987
+ 16	1.045	.937	.985
+ 17	1.043	.934	.982
+ 18	1.041	.936	.982
+ 19	1.041	.934	.981
+ 20	1.039	.931	.978
+ 21	1.039	.927	.976
+ 22	1.046	.932	.982
+ 23	1.049	.925	.979
+ 24	1.052	.923	.979

* Abnormal Performance Index - firms and years in which the annual income forecast error was positive (+) or negative (-)

3,1% for the 'good news' announcements and 1,5% for the 'bad news' announcements.

Focusing firstly on the 'bad news' announcements, it readily can be seen that, despite the upward drift to 1.021 in weeks -50 to -40, the API decreases continuously until week -1. The API value in week -1 is 0.903, indicating that the information in the 'bad news' announcements had already been reflected in share prices. This pattern is consistent with the interpretation that the market expectations were changed by alternative sources of information throughout the year in a similar direction to the unexpected element in reported earnings. These alternative sources are difficult to identify, but would be likely to range from interim (half year results) reports to rumours. The definite increase in API on the week of the announcement would imply that there was an incremental information content in the preliminary report despite the competing sources. It seems that the market systematically overestimates the impact of 'bad news', the subsequent release of a 'hard number' appears to result in a positive residual. The average increase in the week of the announcement of 1,5% is, however, less than half as large as the +3,1% return observed in week 0 for the 'good news' portfolio. The pre-announcement API pattern is, furthermore, very different

for this latter portfolio. There seem to be six discernible phases which are summarised as follows :

Phase	Duration (Weeks)	Start Week	Finish Week	Return for Phase	Return Accumulated for Year to Date
1	13	-50	-38	+2,9%	+2,9%
2	6	-37	-32	-2,1%	+0,8%
3	8	-31	-24	+2,6%	+3,4%
4	9	-23	-15	-0,4%	+3,0%
5	3	-14	-12	-2,4%	+0,6%
6	11	-11	- 1	-0,4%	-0,2%

Phases in Pre-Announcement Pattern of 'Good News' Portfolio

Although it is difficult to interpret this pattern, it seems that whatever firm specific information is impounded, the effect is reversed by other information which becomes available. Consequently, the different phases counteract each other almost exactly so that the net abnormal annual return the week before the announcement is effectively zero (-0,2%). This implies that the market expectations are not changed in any sustained way prior to the release of the preliminary report. As indicated, there is a considerable change in the API during week 0 as the abnormal return for that week is 3,1%! Not only was this the largest change in any one week, but it was larger

than any one of the above phases. Quite obviously, the market perceives the preliminary report to have considerable information content. In fact, in the case of the positive forecast error portfolio, the preliminary report appears to be the only credible source of firm specific information.

The 'good news' and 'bad news' announcements are both associated with an increase in the API, i.e. a positive price residual in week 0. Although in both portfolios week 0 marked the highest weekly residual of all 75 weeks observed, the size of the residual was at least twice as high in the 'good news' portfolio.

The interpretation of this from the information content point of view, would be that in the case of 'good news' the market is particularly cautious and only reacts to 'hard' sources of information, i.e. confirmed by an official announcement. Consequently, the release of this information has a considerable effect on market expectations. Conversely, in the case of 'bad news', the market anticipates the content of the 'hard' information by responding to alternate signals. The information content of these alternative signals seems consistent with the information content of the forecast error, i.e. 'bad news'. The impounding of information content of other signals will result in

an increasing misspecification of the proposed expectations model as the year progresses, so that in week -1 it is impossible to ascertain the model of market income expectations. It does seem, however, that on average the market is pleasantly surprised.

It could be concluded from the above that the market is unduly pessimistic in that it appears to selectively differentiate 'good news' and 'bad news' signals and only impound the latter. This conclusion would imply an informational inefficiency in the market *vis à vis* the 'good news' signals (if they exist).

It is difficult to establish why this condition exists; presumably, it is reflective of the information market structure which will be a function of a complex institutional arrangement. Another possible interpretation which would support these results would be that in view of the paucity of firm specific information in South Africa, much of the abnormal price behaviour observed may reflect the impounding of inside information. The downward drift in the API for the 'bad news' announcements would thus reflect the leakage of 'inside' information to the market. Why would bad news have a higher propensity to leak out than good news? Perhaps because the 'bad news' is less traceable to specific events to which the insider is privy

than good news and consequently the insider would be at less risk when trading on the former.

The dramatic increase in the API for both groups reflects a certain efficiency in the sense that once the information became available, the market responded swiftly. This swift reaction may indeed be caused by the trades of insiders who, prior to the announcement, were restrained from trading. This interpretation of efficiency is fairly weak since it does assume that there were no other sources of information.

Directing the focus onto the post-announcement period is unlikely to provide much insight since the portfolios are likely to be a random sample of 'good news' and 'bad news' announcements of the subsequent year. Nevertheless, the upward drift for six weeks in the case of the good news portfolio (nine weeks for the bad news announcements) may imply a market inefficiency. Although the reaction was swift in the week of the announcement, not all the information seems to have been impounded. The upward drift (not all of which is sustained) may reflect further information being impounded, of which an obvious source may of course be the annual report which is released some weeks after the preliminary report.

It is clear from these results that there is an association between the sign of the forecast error and the sign of the annual abnormal performance of the portfolios in the year preceding the announcement. To ensure the statistical validity of this conclusion, the Chi-square (χ^2) test was carried out, based on a 2 x 2 classification of announcements by the sign of the forecast error and the sign of the abnormal return to week 0.

The table and results are reported in Table 5.0(a) (overleaf).

Briefly, the Chi-square test measures the statistical association between factors and is computed as follows :

$$D^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where

O_{ij} = observed number of cases with a j sign forecast error and an i sign of abnormal return

E_{ij} = expected number of cases for each cell

r = number of rows

c = number of columns

TABLE 5.0

SUMMARY OF CHI SQUARE TESTS

- (a) Sign of forecast error (+/-) and sign of abnormal performance in week 0

	$(\hat{e}_t > 0)$	$(\hat{e}_t < 0)$	
$API_0 > 1$	60	29	89
$API_0 < 1$	50	122	172
TOTAL	110	151	261

$$D^2 = 35.369$$

$$\chi_2^2 (0,01) = 6.64 \quad \therefore \text{Reject } H_0 \text{ of independence}$$

- (b) Sign of forecast error (+/-) and sign of price residual in week 0.

	$(\hat{e}_t > 0)$	$(\hat{e}_t < 0)$	
$\hat{\epsilon}_0 > 0$	67	96	163
$\hat{\epsilon}_0 < 0$	43	55	98
TOTAL	110	151	261

$$D^2 = .1930$$

$$\chi_2^2 (0,01) = 6.64 \quad \therefore \text{Cannot reject } H_0 \text{ of independence.}$$

Under the null hypothesis (H_0) of independence, D^2 has an χ^2 distribution with $(r - 1) \times (c - 1)$ degrees of freedom. The higher the D^2 statistic, the greater the association. As reported in Table 5.0(a), the D^2 has a value of 35,369 and since this is greater than the critical value for $\chi^2_{(0,01)}$ of 6,64, the null hypothesis of independence is rejected.

The results presented are thus generalizable and not the result of a few dominant announcements. In this respect, the result is similar to that obtained by Ball and Brown (1968) on the NYSE. The dramatic positive return on both portfolios is, however, a departure from the NYSE results. Whereas on the NYSE there is a significant association between the sign of the earnings forecast error and the sign of the price residual in the week of the announcement, such an association was not discerned on the JSE. Using an χ^2 test similar to that employed by Ball and Brown (1968) (not reported in this dissertation), this independence is confirmed. The D^2 value reported in Table 5.0(b) of 0,1930 is significantly lower than the critical $\chi^2_{(0,01)}$ value of 6,64 and thus the H_0 of independence cannot be rejected. The Chi-square test is, however, incapable of detecting an association between the following two pairs of factors :

- (1) The magnitude of the price residuals in the week of the announcement and the sign of the earnings forecast error; and
- (2) The magnitude of the price residual in the week of the announcement and the magnitude of the forecast error.

As indicated above, the average value of the 'good news' residual in week zero was larger than that for the 'bad news' announcements. The potential, therefore, exists for an association between the above two pairs of factors. A recent paper by Beaver *et al.* (1979) reports a positive association between the magnitude of the earnings forecast errors and the magnitude of the API in the month of the announcement.

Ball and Brown (1968), present a method to measure the proportion of total information impounded into a share that is sustained (net information) and the proportion of this net information that is captured in the income number.

Their approach is not reviewed as it is considered inappropriate for two reasons :

- (1) Due to the asymmetrical use of information by the market, the assessment of the relative

importance of the preliminary report must be confined to the partitions created for analysis above; and

- (2) It is considered appropriate to base all analysis on average residuals rather than on individual residuals.

The following definitions are used in order to determine the relative importance of the preliminary report. The 'good news' and 'bad news' portfolios are analysed separately as the relative importance of the announcement seems different in these two cases.

- (1) Total Information

$$= \sum_{t=-50}^0 |\bar{\epsilon}_t|$$

This measures the value of the total information which changed expectations during the year.

- (2) Net Information

$$= \sum_{t=-50}^0 \sum_{i=1}^{261} |\hat{\epsilon}_{it}| = \text{Absolute Cumulative Average Abnormal Residual } (|CAR_0|)$$

This measures the value of the total information which is not reversed by week 0.

(3) Preliminary Announcement Information

$$= \frac{|CAR_0| - |CAR_{-1}|}{|CAR_0|}$$

This measures that portion of net information contributed by the preliminary report.

The results obtained are summarised as follows :

	'Good news'	'Bad news'
Total information	19,1%	18,9%
Net information	5,0%	6,3%
PA information	62,0%	27,0%

The result is extremely interesting. It appears that both portfolios do have similar amounts of total information impounded during the year (including the preliminary report), viz. 19,1% and 18,9%. However, the percentage sustained net information up to week 0 (net information/total information) is 26% for the good news portfolio and 33% for the bad news portfolio. The other significant difference is the proportion of this net information attributable to the respective preliminary reports. For the positive error port-

folio the preliminary report provides approximately 62% of the net information compared to the 27% for the negative error portfolio. In both cases the preliminary report has significant news value.

In order to provide insights into two aspects of the API plots presented, the following preliminary tests were carried out.

In order to investigate the potential source of information in the pre-announcement period, the behaviour of price residuals in the weeks surrounding interim announcements was analysed. Based on the same set of data and the same portfolios, the residuals were re-aligned on the date of the interim announcement. The interim report is the only official communication between the firm and the market other than the preliminary report and the annual report. The interim report has a similar format to the preliminary report; the former reports the earnings for the first half of the financial year and must be published within three months of that date. The preliminary report announces earnings for the full financial year and must be published within three months of the year end (unless the annual report is released during the three month period after the financial year end). Neither the interim nor

preliminary report is required to be audited.

The results of this investigation are presented in the same format as for the preliminary announcements. These will be found in Table 5.2 and Figure 5.2 (pages 132 and 131 respectively). Note that, as with the preliminary announcement results, the total sample API are presented for completeness, but are not plotted. The only feature of interest is that for the 'good news' announcements (Note : based on the annual earnings forecast errors) there is a significant positive residual in week 0 which is the highest of the 50 weeks surrounding the announcement. This implies that where the subsequent preliminary announcement has a positive forecast error, the interim announcements have a certain information content. The same does not appear to apply for the other portfolio. This aspect will not be pursued any further in this chapter, but Chapter 6 reports the results of an empirical investigation into the incremental information content of half-yearly earnings.

Another aspect to be investigated is the possibility that the upward drift in residuals, after the preliminary report, is attributable to the information content of the Annual Report. The procedure above is repeated holding everything constant, but

re-aligning on the date of the release of the annual report.

It is not apparent from the results presented (Table 5.3 and Figure 5.3, pages 134 and 133 respectively) that the annual report contains any incremental information. The random behaviour of residuals, manifesting as an upward drift in the API in Figure 5.1, may, therefore, be due to either a slight market inefficiency or to informal announcements made by company officials between the date of the preliminary announcement and the release of the annual report.

To summarise, the following tentative conclusions are drawn :

- (1) There is an association between the sign of earnings forecast errors and the sign of annual unsystematic returns.
- (2) There is no association between the sign of earnings forecast errors and the sign of unsystematic returns in the week of the preliminary report release week.
- (3) There appears to be a potential association between the sign of the forecast errors and the magnitude of unsystematic returns in this week.

- (4) The preliminary report appears to contain significant information content; in fact, in the case of the positive forecast errors portfolio, the preliminary report may be the only source of firm specific information impounded.
- (5) The market appears to be pessimistic in that competing information sources are employed, selectively differentiating between 'good news' and 'bad news'. It seems that 'good news' requires the confirmation of 'hard information' whereas 'bad news' is impounded. In most cases the market expectations are revised upwards with the release of 'bad news'.
- (6) The market seems fairly efficient in that the information content of the preliminary report is impounded swiftly. However, a non-random drift for a number of weeks after the announcement may reflect a certain inefficiency.
- (7) The Annual Report does not seem to provide any incremental information.
- (8) There seems to be an information content in interim reports, but that information does not appear to have a lasting effect and in general is reversed.

Avenues for further research which are suggested from these results will be reviewed in Section 5.4 below.

FIGURE 5.2: ABNORMAL PERFORMANCE INDICES RELATIVE TO THE INTERIM ANNOUNCEMENT DATE

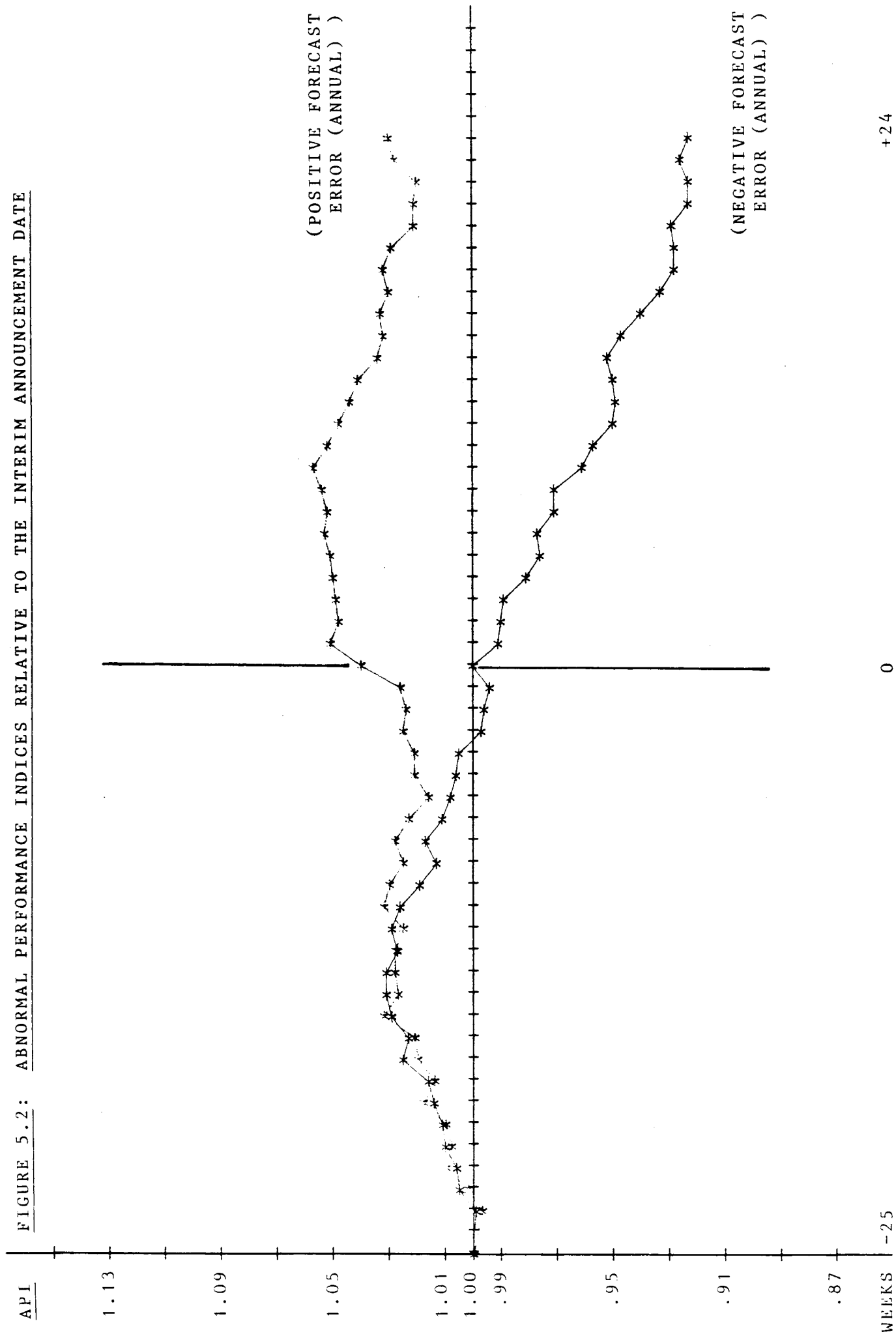


TABLE 5.2

SUMMARY STATISTICS BY WEEK RELATIVE TO INTERIM ANNOUNCEMENT DATE (IA)

Week relative to interim announce- ment. Week 0 = IA	*API _W ⁺	API _W ⁻	API _T (TOTAL SAMPLE)
- 25	.997	.999	.998
- 24	1.002	1.005	1.004
- 23	1.010	1.006	1.008
- 22	1.008	1.010	1.010
- 21	1.010	1.011	1.010
- 20	1.018	1.014	1.015
- 19	1.014	1.016	1.015
- 18	1.020	1.025	1.023
- 17	1.021	1.023	1.022
- 16	1.032	1.029	1.031
- 15	1.027	1.031	1.029
- 14	1.028	1.031	1.030
- 13	1.028	1.027	1.027
- 12	1.025	1.029	1.027
- 11	1.032	1.026	1.029
- 10	1.030	1.019	1.024
- 9	1.025	1.013	1.018
- 8	1.028	1.017	1.021
- 7	1.023	1.011	1.016
- 6	1.016	1.008	1.012
- 5	1.021	1.006	1.012
- 4	1.021	1.005	1.012
- 3	1.025	.997	1.009
- 2	1.024	.996	1.008
- 1	1.026	.994	1.008
0	1.040	1.000	1.017
+ 1	1.051	.991	1.017
+ 2	1.048	.990	1.015
+ 3	1.049	.989	1.015
+ 4	1.050	.981	1.011
+ 5	1.051	.976	1.008
+ 6	1.053	.977	1.010
+ 7	1.052	.971	1.006
+ 8	1.054	.971	1.007
+ 9	1.057	.961	1.002
+ 10	1.052	.957	.997
+ 11	1.048	.950	.992
+ 12	1.044	.949	.990
+ 13	1.041	.950	.989
+ 14	1.034	.952	.987
+ 15	1.032	.947	.984
+ 16	1.033	.940	.980
+ 17	1.030	.933	.975
+ 18	1.032	.928	.973
+ 19	1.029	.928	.972
+ 20	1.021	.929	.969
+ 21	1.021	.923	.965
+ 22	1.020	.923	.965
+ 23	1.028	.926	.970
+ 24	1.030	.923	.969

* Abnormal Performance Index - firms and years in which the annual income forecast error was positive (+) or negative (-)

SUMMARY STATISTICS BY WEEK RELATIVE TO ANNUAL REPORT (AR) RELEASE DATE.

Week relative to Annual Report re- lease date	* API _W ⁺	API _W ⁻	API _T (TOTAL SAMPLE.)
Week 0 = AR			
- 50	1.000	.999	1.000
- 49	1.006	1.002	1.003
- 48	1.009	1.001	1.004
- 47	1.015	.997	1.004
- 46	1.022	.998	1.008
- 45	1.021	.999	1.008
- 44	1.019	.994	1.004
- 43	1.018	.997	1.006
- 42	1.016	.994	1.003
- 41	1.014	.990	1.000
- 40	1.016	.989	1.000
- 39	1.012	.985	.996
- 38	1.011	.986	.996
- 37	1.010	.979	.992
- 36	1.011	.976	.990
- 35	1.017	.976	.994
- 34	1.017	.974	.993
- 33	1.017	.969	.990
- 32	1.021	.970	.992
- 31	1.031	.961	.991
- 30	1.045	.959	.996
- 29	1.037	.961	.994
- 28	1.035	.959	.992
- 27	1.035	.950	.987
- 26	1.035	.945	.984
- 25	1.039	.942	.984
- 24	1.038	.937	.981
- 23	1.044	.932	.981
- 22	1.043	.933	.981
- 21	1.045	.930	.980
- 20	1.042	.925	.975
- 19	1.032	.923	.970
- 18	1.031	.918	.967
- 17	1.023	.910	.959
- 16	1.025	.913	.961
- 15	1.018	.910	.957
- 14	1.017	.908	.955
- 13	1.018	.907	.955
- 12	1.024	.902	.954
- 11	1.020	.896	.950
- 10	1.017	.896	.948
- 9	1.015	.894	.945
- 8	1.015	.889	.943
- 7	1.019	.894	.948
- 6	1.021	.895	.949
- 5	1.033	.892	.953
- 4	1.034	.896	.955
- 3	1.038	.907	.963
- 2	1.041	.906	.964
- 1	1.039	.910	.966
0	1.043	.921	.973
+ 1	1.046	.923	.976
+ 2	1.052	.924	.979
+ 3	1.060	.927	.985
+ 4	1.058	.925	.982
+ 5	1.061	.927	.985
+ 6	1.068	.924	.986
+ 7	1.071	.929	.990
+ 8	1.068	.931	.990
+ 9	1.062	.938	.992
+ 10	1.061	.933	.988
+ 11	1.055	.929	.984
+ 12	1.053	.928	.982
+ 13	1.060	.924	.983
+ 14	1.057	.925	.982
+ 15	1.055	.922	.980
+ 16	1.056	.917	.977
+ 17	1.051	.922	.978
+ 18	1.052	.922	.978
+ 19	1.048	.924	.978
+ 20	1.058	.915	.977
+ 21	1.059	.919	.979
+ 22	1.067	.916	.982
+ 23	1.069	.912	.980
+ 24	1.063	.911	.977

* Abnormal Performance Index - firms and years in which the annual income forecast error was positive (+) or negative (-)

In view of the results obtained, the hypotheses formulated in Chapter 4 (page 94) may be restated as follows :

$$H_o : E(\tilde{\epsilon}_{it} | \hat{\epsilon}_{it} = 0) = E(\tilde{\epsilon}_{it}) = 0 \quad (\text{null hypothesis of no association})$$

$$H_a : E(\tilde{\epsilon}_{it} | \hat{\epsilon}_{it} \neq 0) \neq E(\tilde{\epsilon}_{it})$$

and the null hypothesis is rejected.

5.3.2 The Absolute Residual Method - Results and Interpretations

The results for the preliminary announcement are presented in Table 5.4 and graphically in Figure 5.4 (pages 139 and 138 respectively).

The shape of the plot on Figure 5.4 provides unambiguous evidence of the information content of the preliminary announcement. During the week of the announcement there is a 78,4% higher than normal residual variation! This is indisputably the highest in the total 75 weeks examined. Interestingly, if the 17 weeks surrounding the announcement are viewed in isolation and compared to Beaver's results (see Figure 4.3) the pattern is not dissimilar. Beaver reports a higher than normal variation of 67%. It is tentatively concluded that the preliminary report in South Africa is perceived to be relatively more informative than the U.S. counterpart. This is not surprising, given the richer information markets in the U.S. which pre-empt the news value of company releases. Notice that Figure 5.4 includes all weeks in the period of interest.

The second highest abnormal residual behaviour (52,5%) occurred in week -19 which may coincide with the week of the interim report. This suspicion was investigated and the above procedures were repeated relative to the week of the interim report. This was achieved by aligning the residuals of each announcement on the week of the interim report before averaging through time and across firms.

The results are presented in Table 5.4 and these are plotted in Figure 5.5 (pages 139 and 140 respectively). It must be noted that the week of the preliminary report was omitted in this test. The result again is clear : the interim report has significant information content. Excluding the preliminary report, the week of the interim report exhibits the highest abnormal price residual behaviour (45%). These results are perfectly consistent with those of the previous section and it is concluded that the preliminary report is the most important source of firm specific information and the interim report ranks second in importance.

The third highest week in Figure 5.4 is week +5. It is possible that this is due to the information content of the Annual Report.

This indeed was found to be the case when the above procedures were applied to the Annual Report. These results appear in Table 5.4 and are plotted in Figure 5.6. Excluding the preliminary report week and the interim report week, the week of the release of the annual report is the week with the highest abnormal residual behaviour.

To summarise, it is concluded that the preliminary report, the interim report and the Annual Report all possess information content, in that order of importance.

Rank	Report	Abnormal Absolute Residual
1	Preliminary	78,4%
2	Interim	45,0%
3	Annual	38,8%

The results are consistent with those presented in Section 5.3.1 except for the inference drawn on the information content of the annual report. Whereas in Section 5.3.1 it was concluded that the annual report possessed no incremental information content, it is implied above that this report appears to induce expectations changes which are manifested in an above normal price variation in the week of the report's

TABLE 5.4

SUMMARY STATISTICS OF ABSOLUTE (RESIDUALS/VARIANCE OF RESIDUALS) BY WEEK
 RELATIVE TO INFORMATION ANNOUNCEMENTS

Week relative to announcement.	Preliminary Announcement	Interim Announcement	Annual Report
Week 0 = announce- ment			
- 50	1.121		1.045
- 49	1.075		1.137
- 48	1.177		1.139
- 47	1.386		1.071
- 46	1.100		.920
- 45	.865		.900
- 44	1.208		.984
- 43	1.129		.813
- 42	.999		.964
- 41	.941		1.048
- 40	.833		.957
- 39	.975		.941
- 38	1.252		.928
- 37	1.072		.963
- 36	.953		.857
- 35	.885		.851
- 34	.739		1.010
- 33	.911		1.226
- 32	.942		1.173
- 31	.932		1.192
- 30	1.055		.871
- 29	1.176		1.253
- 28	1.083		.889
- 27	1.369		.856
- 26	1.115		.852
- 25	.829	.833	.902
- 24	.805	.908	1.278
- 23	.971	1.045	.962
- 22	.937	1.187	.922
- 21	.929	1.032	.853
- 20	.982	1.097	.985
- 19	1.525	.866	1.180
- 18	.853	1.321	.774
- 17	.690	1.040	1.205
- 16	.898	1.132	.747
- 15	.834	.900	.837
- 14	1.380	.843	.991
- 13	.896	1.086	.926
- 12	.906	1.046	1.035
- 11	1.031	.934	.922
- 10	.814	.886	1.252
- 9	.947	.876	1.102
- 8	.913	.840	1.144
- 7	.741	1.016	.954
- 6	.872	.923	.908
- 5	1.013	.836	1.185
- 4	.943	.869	1.136
- 3	1.156	1.104	1.245
- 2	1.105	.974	1.163
- 1	1.063	1.198	1.017
0	1.784	1.455	1.388
+ 1	1.356	1.204	1.070
+ 2	1.175	.989	1.067
+ 3	1.204	.918	1.059
+ 4	1.009	.783	1.071
+ 5	1.388	.866	1.065
+ 6	.954	.774	.908
+ 7	.986	1.242	.779
+ 8	1.290	.875	.833
+ 9	.972	.904	.801
+ 10	.845	.921	.785
+ 11	.698	.894	.832
+ 12	1.011	.885	.859
+ 13	.807	.978	.837
+ 14	.896	.770	1.035
+ 15	.862	1.134	.929
+ 16	.886	.871	.826
+ 17	.943	1.107	1.063
+ 18	.824	1.056	.834
+ 19	1.020	.885	1.148
+ 20	.917	.842	1.068
+ 21	.937	.830	1.137
+ 22	1.015	.834	.882
+ 23	1.238	1.199	.974
+ 24	.880	—	.936

* Absolute Residual index - for 261 announcements.

release. This conflict is analogous to that between the results of Ball and Brown (1968) and Beaver (1968) and can probably be resolved in the same way. The expectations model of earnings used with the API method may be considerably misspecified by the week of the release of the report. Consequently, the information content cannot be detected using the API method and by basing the partition on the misspecified model.

5.4 OVERALL CONCLUSIONS, IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The results of the two approaches were mutually supportive and indicative of the fact that the preliminary earnings release is a significant source of price sensitive information.

A number of issues remain unresolved and should provide a meaningful base for future research :

- (1) Why should there be an asymmetrical consumption of 'good' and 'bad' news?
- (2) Is there an association between the magnitude of forecast errors and the magnitude of unsystematic returns? (see Chapter 7).
- (3) What is the effect of dividends? To what

extent is the inference on the information content of earnings confounded by simultaneous dividend announcements? (see Chapter 7).

- (4) Is there an association between the sign of half-yearly forecast errors and unsystematic returns? (see Chapter 6).
- (5) Which information sources compete with accounting releases in the production of price sensitive information?
- (6) Is the market efficient in terms of speed of adjustment to new information?

As indicated, certain of these issues (2, 3 and 4) will be addressed in this dissertation.

A by-product of this research was the collection of data on the lags between financial year end and preliminary report and between preliminary report and annual financial statements. These are summarised in Appendices I to III. These data would provide a useful base to investigate the effect of the sign (and magnitude) of forecast errors on the time lag between year end and the first release, i.e. are companies slower at disclosing bad news; does the auditing of the preliminary report significantly delay the reporting of this important information; and are the audited

reports presumed to have more information?⁽¹⁾

Answers to these research issues should be of considerable value to the accounting profession.

This study may have raised more issues than answered questions, yet it is hoped that it has established the considerable importance of the preliminary report as an information source.

An implication for the financial reporter is to ensure the timeous production of the information and in view of the apparent paucity of alternative information sources, firms should increase the level of communication to investors. In other words, two official releases *per annum* are likely to be insufficient. Moreover, there is a lesson for reporters who would attempt to delay the release of 'bad news' - the market is likely to overdiscount the 'rumours' - therefore, all information should be reported timeously.

5.5 RESEARCH DESIGN ISSUES AND FURTHER RESEARCH

Before finally concluding this chapter, it is necessary

(1) Footnotes appear at the end of the chapter (page 149).

as with any empirical study, to reconsider the research design and models employed.

Focusing primarily on the 'anomalous' results of the API approach (Section 5.3.1) the asymmetry of 'good news' and 'bad news' is open to three possible interpretations :

- (1) The earnings forecast model is misspecified;
- (2) The price residuals model is misspecified; and
- (3) There is some fundamental difference between the South African data and the U.S. data, e.g. the S.A. market may be informationally different, perhaps inefficient.

It would be interesting in future research to repeat the current study with different earnings models and test the sensitivity of the results to alternative specifications. It is submitted, however, that a misspecification of the current model is not likely to be confounding the interpretations presented. Aside from the econometric issues addressed in Chapter 4, a necessary (albeit not sufficient) condition for a correctly specified model was present, viz. the sign of the forecast error partitioned the universe of announcements into approximately equally sized groups.

A more likely misspecification is that of the derivation of price residuals. It may be that the results are sensitive to the deletion/non-deletion dilemma. Recall, that the residuals were derived from data for the full period.

An interesting extension of the current research would be to repeat the study deleting data surrounding the announcements, in the original regressions. A number of different deletion periods could be experimented with, say deletion periods from five to 20 weeks before and after the announcements.⁽²⁾ In the case of the current data, a deletion of 20 weeks before and after each announcement would leave approximately 96 observations for each regression which would be sufficient.

This would be a three phase approach as defined in Section 4.3.2. If any of these alternative designs resulted in a symmetry (as *per* Ball and Brown (1968)) such a study would be a considerable contribution to research on the sensitivity of results to alternative research designs. Studies of this kind have not appeared in the literature to date.

Subject to these caveats on the research design, interpretation (3) is tentatively accepted.

5.6 CONCLUSION

This chapter employed a dual approach to investigate the information content of earnings releases in South Africa. The results indicate that the preliminary report has significant information content and appears to be the most important source of firm specific information. Moreover, the interim report and the annual report appear to display information content although to a lesser extent than the preliminary report.

A certain asymmetry in the market's reaction to various types of 'news' was detected. It appears that the market has a greater propensity to impound bad news.

It is possible that a certain inefficiency in the market reaction to information exists. This conclusion is, however, rather tentative and open to alternative interpretations.

The results suggest that the South African information market is rather undeveloped in the sense that company releases (which occur only biannually) seem to monopolise firm specific information.

An important contribution of this study was to illustrate that it is not possible to transfer research from other

markets into the South African context. The uniqueness of the South African institutional framework and its level of development requires the establishment of our own research facilities. This is particularly important for accounting policy makers, within and outside firms. In order to properly achieve the objectives of financial reporting it is imperative that we understand the peculiarities of our own environment.

Finally, it is hoped that the differences between these results and those obtained on markets in other countries may provide generalised insights into the process of information dissemination and consumption.

FOOTNOTES : CHAPTER 5

- (1) A brief look at Appendix II indicates that the audit process delays the release of the preliminary report. Given the importance of the announcement, it is hoped that the cost of this delay is exceeded by the additional credence attributed to audited figures. A research study on this issue is currently in progress, but is not reported in this dissertation.
- (2) This suggestion was made by William H. Beaver.

CHAPTER 6THE INCREMENTAL INFORMATION CONTENT OF
HALF-YEARLY EARNINGS RELEASES BY
SOUTH AFRICAN COMPANIES6.1 INTRODUCTION

As described in Chapter 3, the primary objective of financial reporting is to provide information useful to economic decision making. In order to establish whether the issuance of half-yearly earnings reports achieves this objective, an attempt is made to evaluate the information content of these reports. This chapter reports a significant statistical association between the release of the reports and unusual share price behaviour, which condition is consistent with the reports possessing information content.

Chapter 5 reports that the preliminary report has significant information content. In fact, it was suggested that this medium was the most important source of firm specific information. The current chapter aims to extend the analysis presented in Chapter 5. Whereas the latter viewed the earnings

process as an annual one, i.e. the preliminary announcement reports annual earnings, this chapter will view the process as being biannual. In other words, a more detailed model of earnings expectations is defined based on half-yearly earnings.

The results indicate that half-yearly reporting has an incremental information content over annual reporting.

A certain market informational inefficiency is detected in that the reaction to the information content by the market is fairly sluggish and may persist for up to nine weeks in some cases.

6.2 BACKGROUND

South African companies provide only half-yearly interim information and thus studies of South African half-yearly reports are analogous to the American studies of quarterly reports.

No previous work on half-yearly earnings has been done in South Africa and, consequently, the following American studies are briefly reviewed to provide a background to the issues.

The interim reports (quarterlies) have attracted a lively research interest in the United States. It is convenient to trichotomise this work into the following categories :

- (1) Time Series Research
- (2) Predictive Ability Research
- (3) Share Return Research.

The time series behaviour of quarterly earnings has been an important aspect of many issues in accounting and finance, such as the 'smoothing' of income (Gonedes (1972)) and the estimation of the cost of capital (Miller and Modigliani (1966)).

The predictive ability research has concentrated on the ability of a quarterly earnings series to predict the following quarter's earnings or the annual earnings.

Examples of such research are Brown and Niederhoffer (1968), Brown and Rozeff (1979), Coates (1972) and Foster (1977). Generally, these results indicate that the quarterlies improve the predictive ability of the annual earnings. This would be consistent with the interim report providing incremental information.

The final category of work has concentrated on the

contemporaneous association between the release of quarterly earnings announcements and the behaviour of share returns.

In expanding the Ball and Brown (1968) approach to quarterly announcements, Brown and Kennelly (1972) report an increased information content in the quarterly earnings relative to the annual series. Kiger (1972) reports a significant price and volume reaction to the release of quarterly reports which is consistent with information content. May (1971) extended the Beaver (1968) approach to quarterly announcements and reports a significant information content in these. His study was based on 105 American Stock Exchange shares over a three year period and employed minor variations to the Beaver (1968) technique.

It should be noted that the Brown and Kennelly (1972) approach used the API metric which requires a specification of earnings expectations whereas the absolute residuals approach of May (1971) avoids such a specification.

The reaction of share returns to quarterly reports has been the centre of a significant academic controversy in recent years. A paper by Joy, Litzenberger and McEnally (1977), using the API metric employed by Ball

and Brown (1968), reported a sluggish adjustment of share prices to the announcement of unanticipated changes in quarterly earnings. This non-random behaviour of price residuals immediately after the announcements was interpreted by the authors as reflecting a market inefficiency *vis à vis* the information content of these reports. Ball (1978) indicates that such behaviour could equally be attributed to a misspecification of the model from which the residuals were derived and recommends procedures to avoid such misspecifications. Watts (1978), in implementing these procedures, presents evidence of systematic abnormal returns after the quarterly earnings announcements which supports the conclusion of the Joy *et al.* (1977) study.

The efficiency issue is not to be central in this chapter. However, as reported below, a certain systematic drift in weekly residuals is observable for a number of weeks after the half-yearly announcements.

The above summary of research is by no means exhaustive, but the studies mentioned are the prominent ones and provide good examples of the various categories of research identified. A paper by Foster (1977) tends to defy classification along the lines here suggested and presents results on all three aspects referred to. The relevance of the Foster (1977) paper to the current

study is that it reports a significant association between the sign of the quarterly forecast error and the sign and magnitude of the annual cumulative abnormal return (CAR).⁽¹⁾

The current study would be classified in the third category mentioned above in that its objective is to measure the contemporaneous association between the release of half-yearly reports and abnormal changes in share prices. Changes in share price are interpreted as being the observable result of a change in market expectations. As information content is defined as the potential to change expectations, the release of a signal with information content should be associated with a change in share price. The semi-strong form of the Efficient Market Hypothesis requires that information is impounded instantaneously and, thus, the information induced price change is expected to occur immediately the report is admitted to the public domain.

This chapter attempts to evaluate the usefulness of interim reports while investigating the following :

- (1) Price reaction to half-yearly announcements.

(1) Footnotes appear at the end of the chapter (page 184).

- (2) The association between the sign of the half-yearly earnings forecast error and the sign of the abnormal return over a similar period.
- (3) The additional information content of the half-yearly earnings series versus the annual earnings series.
- (4) The efficiency of the JSE with respect to any information content contained in the half-yearly reports.

6.3 EMPIRICAL PROCEDURES

Similar procedures to those described in Chapter 4 were employed based on the same data. These are briefly reviewed within the new context. Weekly residuals were computed over the 404 week period, 2 February 1973 through 14 November 1980, as follows :

$$\hat{\epsilon}_{it} = R_{it} - (\hat{\alpha}_i + \hat{\beta}_i R_{mt}) \quad \begin{array}{l} t = 1 \dots 404 \\ i = 1 \dots 41 \end{array} \quad (1)$$

where

$\hat{\alpha}_i, \hat{\beta}_i$ = estimates of the intercept and slope obtained from the linear regression specific to share i

$\hat{\epsilon}_{it}$ = an estimate of the unsystematic return on share i in week t

$$R_{it} = \log_e \frac{P_{it} + D_{it}}{P_{it-1}}$$

D_{it} = cash dividends on share i in week t

P_{it} = share i closing price at the end of week t

R_{mt} = the return on the market in week t . The RDM 100 industrial index was used as a surrogate. The return is calculated analogously to the return on share i .

(Note: Prices are adjusted for all capitalisation issues and share splits in week t .)

The usual OLS conditions must prevail in order to achieve consistent estimates of α_i and β_i . These should not constrain the application of the OLS technique in this study and are dealt with adequately in Chapter 4.

The API metric was then employed to pool the residuals through time and across firms according to the following form :

$$API_{w}^S = \frac{1}{N} \sum_{n=1}^N \prod_{k=-25}^w (1 + \hat{\epsilon}_{nk}) \quad (2)$$

where

N = the number of announcements examined

$\hat{\epsilon}_{nk}$ = residual in week k relative to the n th announcement.

s = the sign of the earnings forecast error announced in week 0.

The API may be interpreted as having the value of one Rand in equal amounts in all shares in the portfolio of interest at the end of week -26 (i.e. 26 weeks prior to the release of the half-yearly report) and held to the end of an arbitrary period (say week w).

The gains and losses are considered abnormal since they are above or below what would be expected after risk adjustment. The API thus has an expected value of zero in all weeks.

As indicated by Patell (1979), the API methodology is dependent upon an assumption of an expectations model of earnings. In this study portfolios are classified as being 'good news' or 'bad news' depending on the sign of the forecast error derived as follows :

$$\Delta I_{it} = \hat{a}_i + \hat{b}_i \Delta I_{mt} + \hat{e}_{it} \quad i = 1 \dots 41 \quad (3)$$

where

ΔI_{it} = percentage change in EPS in the six month period t relative to the corresponding six months $(t-1)$ in the previous year

ΔI_m = percentage change in the EPS of all industrial firms in the six month

period t relative to the corresponding six month period $(t-1)$ in the previous year

\hat{a}_i, \hat{b}_i = estimates of the intercept and slope obtained from the linear regression specific to share i

\hat{e}_{it} = an estimate of the unsystematic accounting return

Again the OLS conditions apply and are not constraints on the application of the OLS technique to these data.

The amount of new information conveyed in a firm's income in a particular half-year is assumed to be the difference between the actual change in income and the change conditional upon the expectation implied in

(3) :

$$\begin{aligned} \hat{\Delta I}_{it} &= \hat{a}_i + \hat{b}_i \Delta I_{mt} & i &= 1 \dots 41 \\ & & t &= 1 \dots 9 \end{aligned}$$

$$e_{it} = \Delta I_{it} - \hat{\Delta I}_{it}$$

where

$\hat{\Delta I}_{it}$ = the expected change in income for firm i in half-year t

ΔI_{it} = the actual change in income for firm i in half-year t

ΔI_{mt} = the actual change in market earnings in half-year t

e_{it} = the earnings forecast error for firm i
in half-year t

The half-year earnings forecast errors (\hat{e}_{it}) were computed over a similar time period as the price residuals ($\hat{\epsilon}_{it}$) although half-yearly data were used for the former. As with the price residuals, it is considered to be more efficient to compute the forecast errors over the full data set.⁽²⁾ This restricts a literal interpretation of the error as a signal, since it is based to some extent on events after the earnings of a particular half-year are released.

All announcements were thus classified as 'good news' or 'bad news'. Four hundred and twenty announcements were analysed using the API metric according to the following plan (see Table 6.1 overleaf).

The first partition permits an analysis of half-yearly announcements generally. Thereafter, the various announcements are split into sub-groups to analyse the trends making up the general pattern. Firstly, the portfolios are partitioned between first and second half announcements. The positive and negative error portfolios are further partitioned for each half-year depending on the sign of the previous half's earnings error in the case of second half results and that of the subsequent half's earnings error in the case of first half announcements. A (+-) in a second

TABLE 6.1

Reference to Portfolios analysed in this chapter.

Portfolio Announcement : Forecast error		No. of Announcements	Figure	Table	Colour Code
1. First half and second half (pooled)	positive	210	6.1	6.2	Blue red
	negative	210			
2. First half	positive	97	6.2	6.2	Blue red
	negative	113			
3. Second half	positive	93	6.3	6.2	Blue red
	negative	117			
4. First half	++	44	6.4	6.3	Blue green purple red
	+-	53			
	-+	49			
	--	64			
5. Second half	++	44	6.5	6.3	Blue green purple red
	+-	49			
	-+	53			
	--	64			

half portfolio indicates a current half negative forecast error in a firm which had a positive forecast error in the first half. Whereas a (+-) in the first half portfolio indicates a current half positive forecast error which was followed by a negative forecast error, in the subsequent half.

In total, the performance of 14 portfolios was monitored over the 50 week period surrounding the announcements, i.e. 25 prior to and 24 weeks after the week of the announcement.

6.4 DATA

The report announcement dates were established by direct communication with all companies for which share price data were available. The response to this request for data was just over 50% and this constrained the study to 41 quoted companies on the JSE.

Half-yearly earnings data were obtained from the JSE data bank.

Share price data were obtained from a share price data bank available at the University of Cape Town.

6.5 RESULTS AND INTERPRETATIONS

Part 1 : All Half-Yearly Announcements

Initially the API analysis was based on a pooling of all half-yearly announcements, i.e. first half announcements and annual announcements. The announcements were partitioned into those with positive half-yearly earnings forecast errors and those with negative errors. These two groups formed two hypothetical portfolios constructed 25 weeks before the relative announcement.

The weekly API's for the 50 week period surrounding the announcement were plotted in Figure 6.1 (overleaf). (For the summary statistics see Table 6.2, page 172.)

The most striking feature of Figure 6.1 is the sharp increase in the API during the week of the announcement. For both portfolios over the entire 50 week period, the change in API is greatest during this week. The change is much larger for the 'good news' portfolio. This implies that in general the half-yearly announcements are informative. Moreover, there appears to be an association between the sign of the earnings forecast error and the sign of the abnormal return in the 25 weeks preceding the announcement. With a 25 week foreknowledge of the sign of the forecast error, an

investor would have been able to earn an abnormal return of 4% on the 'good news' portfolio and an abnormal return of 3,7% on the 'bad news' portfolio (if sold short). This implies that the information reported in the announcements is consistent with the information set on which shares are priced. The question of exactly which medium transmits this information remains open.

The downward drift in API, in the case of the 'bad news' portfolio, suggests that the market anticipates the 'news' value of the report - presumably from alternative media. This does not appear to be the case for the 'good news' portfolios. During the ten weeks -25 through -15 a slight upward drift is discernible, however the pattern seems random, thereafter culminating in an API value of 1,018 in week -1. The conclusion to be drawn is similar to that drawn in Chapter 5 in respect of annual announcements: the market appears to anticipate 'bad news' to a much greater extent than 'good news'. However, the results do not display the same degree of asymmetry as that reported in Chapter 5.

In order to validate the inferred positive association between the sign of the forecast error and the sign of the abnormal return to the week of the announcement, a Chi-square test was carried out on the 2x2 classification presented below :

	API ₀ > 1	API ₀ < 1	
Forecast error > 0	118	72	190
Forecast error < 0	79	151	230
	197	223	420

$$D^2 = 32,9$$

$$\chi^2_2(0,01) = 6,64 \quad \therefore \text{Reject } H_0 \text{ of independence}$$

The test supports the conclusion that there is an association between the sign of the forecast error and the sign of the abnormal return.

Part 2(a) : Second-Half Announcements

In Chapter 5 it was indicated that there was a differential market reaction to first half and second half announcements. In order to investigate this phenomenon, the 'good news' and 'bad news' portfolios were split into first half and second half announcements. The second half portfolio will be analysed in this section. The API plots are presented in Figure 6.3 (summary statistics Table 6.2) (pages 171 and 172, respectively). The pattern differs from that of Figure 6.1 in two distinct ways : (1) the change in API during week 0 is much larger for the second half announcements, and (2) the API₋₁ values are significantly smaller than the total group. It may be concluded for the 'good news' second half announcements that

virtually no alternative sources of information are exploited by the market. The same is not true for the 'bad news' announcements, the information content of which is apparently anticipated by the market.

A feature of the second half announcements which may be significant is the non-random upward drift in the API for about nine weeks. This drift was identified in Chapter 5 using annual forecast errors and interpreted as being indicative of an informational inefficiency *vis à vis* the information contained in the report.

Part 2(b) : First Half Announcements

Attention will now be focused on the market reaction to the release of first half earnings reports in order to complete the comparative analysis.

Before proceeding, it must be emphasised that the behaviour of the abnormal residuals before and after the announcements are not likely to be biased by the sign of the previous or subsequent half's earnings. A 2x2 Chi-square test was performed on the following to test for the association between the sign of the forecast error of first and second half earnings :

		First Half Forecast Error		
		+	-	
Second Half Forecast	+	44	49	93
Error	-	53	64	117
		97	113	210

$$D^2 = 0,084$$

$$\chi^2 = 6,64 \quad \therefore \text{Cannot reject } H_0 \text{ of independence}$$

The API's for the first half announcements are plotted on Figure 6.2 (summary statistics Table 6.2) (pages 170 and 172 respectively).

The results appear, at first glance, to be very different from the second half announcements. Firstly, the API for the 'good news' portfolio is considerably higher in the week prior to the announcement; 1,05 versus 0,990 for the equivalent second half portfolio. This implies that the market receives information through more timely media. Consequently, by the time the first half report is released, there is a smaller surprise element. It is cautioned against this interpretation since all of the increase in API occurs between weeks -25 and -18 and thereafter remains reasonably constant. Furthermore, this upward drift in weeks -25 and -18 is apparent for the 'bad news' portfolio as well. This must be due to the upward drift in the API's of both the second half portfolios (as reported above) in the weeks after the

announcement. If the weeks -25 to -18 are omitted and the portfolios formed in week -17, the pattern elicits an alternative interpretation. From week -17 through week -1 the API remains constant for the 'good news' announcements, implying no anticipation of the information contained in the announcements. The increase in API during week 0 would be consistent with the 'good news' announcements possessing information. Conversely, mapping the API for the 'bad news' portfolio from week -17 onwards, reveals a continual downward drift which persists to the end of week +25. There is no patent reaction to the half-yearly report.

The non-random behaviour of the residuals after the second half earnings announcements which were tentatively interpreted as indicating an informational inefficiency may be re-interpreted in the light of the market reaction to first half earnings. The annual announcement of a firm's earnings may be followed by a series of information releases about the firm. The most significant of these is the release of the annual report which generally is a time when various company officials make press statements regarding performance, etc. The upward drift in the weeks after the announcement may thus be due to new information rather than sluggish reaction to the report. This interpretation

TABLE 6.2

Summary Statistics by Week Relative to half-yearly earnings announcement dates

Week relative to ½ yearly Announcement	All Announcements (pooled 1st and 2nd half)		First half Announcements			Second half Announcements		
	API ⁺	API ⁻	API ⁺	API ⁻	API ^T	API ⁺	API ⁻	API ^T
-25	1.006	.995	1.007	.998	1.002	1.003	.995	.999
-24	1.011	1.000	1.014	1.004	1.009	1.004	.995	.999
-23	1.017	1.000	1.023	1.003	1.013	1.006	.997	1.001
-22	1.014	1.000	1.023	1.006	1.014	1.003	.996	.999
-21	1.017	1.001	1.021	1.011	1.016	1.007	.995	1.001
-20	1.022	1.003	1.030	1.014	1.022	1.008	.993	1.000
-19	1.022	1.001	1.028	1.017	1.022	1.008	.987	.997
-18	1.025	1.002	1.040	1.023	1.031	1.004	.986	.994
-17	1.026	.998	1.040	1.021	1.030	1.006	.980	.992
-16	1.030	.998	1.049	1.027	1.037	1.004	.975	.988
-15	1.032	.995	1.049	1.023	1.036	1.005	.972	.987
-14	1.027	.992	1.050	1.022	1.036	.993	.967	.979
-13	1.025	.989	1.051	1.019	1.034	.991	.961	.975
-12	1.023	.989	1.050	1.021	1.035	.990	.959	.973
-11	1.027	.987	1.055	1.017	1.035	.995	.959	.975
-10	1.023	.981	1.048	1.011	1.029	.994	.953	.972
-9	1.018	.976	1.042	1.007	1.024	.992	.949	.968
-8	1.025	.973	1.048	1.005	1.026	.995	.946	.968
-7	1.024	.973	1.045	1.001	1.022	1.001	.947	.972
-6	1.018	.963	1.042	.993	1.017	.991	.937	.962
-5	1.017	.963	1.041	.995	1.017	.992	.936	.961
-4	1.015	.962	1.044	.993	1.017	.988	.936	.960
-3	1.014	.955	1.041	.986	1.012	.990	.931	.958
-2	1.013	.956	1.045	.987	1.015	.985	.933	.957
-1	1.018	.953	1.051	.980	1.014	.990	.933	.959
-0	1.040	.963	1.066	.985	1.023	1.020	.948	.981
+1	1.043	.966	1.066	.982	1.022	1.027	.954	.987
+2	1.043	.968	1.064	.981	1.021	1.030	.961	.993
+3	1.050	.965	1.069	.976	1.021	1.037	.962	.996
+4	1.048	.965	1.065	.971	1.016	1.038	.964	.997
+5	1.051	.961	1.066	.965	1.014	1.044	.959	.998
+6	1.053	.968	1.069	.967	1.016	1.046	.971	1.005
+7	1.057	.967	1.071	.960	1.013	1.050	.975	1.009
+8	1.059	.965	1.073	.959	1.013	1.050	.974	1.009
+9	1.055	.964	1.071	.952	1.009	1.047	.978	1.009
+10	1.052	.962	1.066	.947	1.004	1.051	.978	1.011
+11	1.046	.960	1.056	.942	.997	1.048	.977	1.010
+12	1.050	.958	1.059	.942	.998	1.054	.974	1.010
+13	1.047	.960	1.054	.945	.997	1.054	.975	1.011
+14	1.046	.959	1.051	.945	.995	1.054	.973	1.010
+15	1.050	.952	1.055	.937	.994	1.053	.966	1.006
+16	1.045	.952	1.049	.934	.989	1.050	.966	1.004
+17	1.041	.947	1.044	.930	.984	1.047	.950	1.000
+18	1.042	.944	1.043	.925	.982	1.048	.951	1.001
+19	1.038	.945	1.042	.924	.981	1.040	.963	.998
+20	1.032	.944	1.032	.925	.976	1.038	.961	.996
+21	1.030	.940	1.028	.921	.972	1.035	.955	.991
+22	1.034	.943	1.030	.920	.973	1.042	.962	.999
+23	1.036	.941	1.037	.926	.979	1.043	.956	.996
+24	1.039	.941	1.037	.925	.979	1.047	.953	.996

is supported by the absence of a drift in the API after the first half 'good news' announcements. Considerably less new information is provided immediately after the first half report.

The 'bad news' first half portfolio API pattern after the announcement is difficult to interpret in terms of efficiency. While there is a non-random downward drift, it is not obvious that the reports have an information content to which the market is able to react, albeit inefficiently.

To conclude Part 2, it is submitted that the second half announcements do appear to provide more information than the first half announcements.

Part 3 : Further Analysis

To further investigate the difference between first half and second half and between 'good news' and 'bad news' announcements, the following portfolios were constructed. The announcements for each firm for each year were paired and these pairs were grouped according to the number of half-yearly reports with 'good news' and 'bad news', viz.

2 'good news'	(++)
1 'good news', 1 'bad news'	} (+-) (first half 'good news') (-+) (second half 'good news')
2 'bad news'	

The performance of each portfolio was then monitored separately (using the API metric) in the period surrounding the first and second half announcements.

The 50 week API plots are presented in Figure 6.4 (first half) and Figure 6.5 (second half) (pages 175 and 177 respectively) for these four portfolios. Summary statistics are presented in Table 6.3 (page 178).

Attention will initially be focused on the performance of the portfolios in the six months surrounding the first half announcements. The pattern in Figure 6.4 is quite clear and the performance of these portfolios is highly associated with the number of 'good' and 'bad news' reports received. As indicated above, the initial upward drift in all four API's in the period week -50 through -40 may be distortive and is thus ignored. Thereafter, the (++) portfolio provides little abnormal return until the week of the announcement. After an abnormal return of 2,4% in week 0, the API reverts to a random pattern. The two portfolios

with conflicting first half and second half signals (+- & -+) behave similarly except in the week of announcement when the first half positive portfolio generated a larger positive return.

The (--) portfolio displays a dramatic downward drift in API throughout the period ($API_{+24} = 0,884$).

The performance of the portfolios for the 50 week period surrounding the second half announcement provides a valuable insight into the market's reaction to accounting earnings.

The most striking feature of Figure 6.5 is that there appears to be an association between (1) the sign of the abnormal return and the sign of the forecast errors, and (2) the magnitude of the week 0 return and the sign of the forecast errors. The classification of portfolios according to the sign of their half-yearly forecast errors is a useful explanation of this abnormal performance.

It is interesting to note that the non-random drift in API detected after second half earnings announcements is not evident in the (++) portfolio. It appears that, where the second half report is contrary to the first half report, or negative, the information content

TABLE 6.3

Summary Statistics by week relative to half-yearly earnings announcement dates

Week relative to 1/2 yearly Announcement	First half Announcements				Second half Announcements			
	API ⁺⁺	API ⁺⁻	API ⁻⁺	API ⁻⁻	API ⁺⁺	API ⁺⁻	API ⁻⁺	API ⁻⁻
-25	1.011	1.007	1.006	.990	1.012	.997	.993	.993
-24	1.022	1.012	1.020	.995	1.011	.999	1.002	.988
-23	1.033	1.020	1.016	.994	1.012	1.003	.999	.995
-22	1.028	1.020	1.015	.998	1.011	.998	.994	.994
-21	1.025	1.022	1.022	1.000	1.023	.999	.996	.990
-20	1.031	1.034	1.026	1.004	1.025	.997	1.000	.986
-19	1.036	1.030	1.028	1.007	1.035	.989	.998	.976
-18	1.042	1.044	1.029	1.015	1.027	.988	.995	.976
-17	1.045	1.041	1.030	1.011	1.026	.993	.992	.966
-16	1.050	1.055	1.045	1.009	1.023	.992	.981	.964
-15	1.052	1.059	1.039	1.006	1.021	.998	.980	.964
-14	1.048	1.061	1.037	1.006	1.009	.989	.975	.959
-13	1.044	1.060	1.028	1.009	1.008	.984	.967	.957
-12	1.046	1.055	1.034	1.007	1.007	.981	.967	.956
-11	1.055	1.056	1.035	.999	1.017	.980	.972	.950
-10	1.056	1.041	1.026	.995	1.024	.973	.969	.944
-9	1.052	1.033	1.021	.991	1.017	.975	.960	.939
-8	1.062	1.039	1.017	.990	1.020	.990	.960	.935
-7	1.058	1.029	1.014	.986	1.023	.990	.960	.939
-6	1.056	1.024	1.006	.978	1.023	.971	.947	.930
-5	1.056	1.020	1.013	.977	1.027	.970	.952	.921
-4	1.058	1.019	1.016	.969	1.010	.978	.945	.927
-3	1.053	1.014	1.015	.956	1.011	.981	.940	.922
-2	1.053	1.017	1.015	.957	1.011	.975	.936	.926
-1	1.064	1.017	1.000	.959	1.008	.987	.938	.924
-0	1.088	1.021	1.006	.961	1.053	1.008	.957	.935
+1	1.084	1.021	1.018	.952	1.054	1.019	.961	.944
+2	1.078	1.026	1.026	.945	1.056	1.019	.957	.947
+3	1.084	1.032	1.020	.941	1.068	1.022	.957	.954
+4	1.086	1.022	1.010	.939	1.066	1.026	.968	.954
+5	1.087	1.021	1.005	.935	1.072	1.034	.966	.949
+6	1.093	1.018	1.008	.937	1.071	1.039	.977	.959
+7	1.104	1.015	1.002	.928	1.070	1.049	.984	.963
+8	1.108	1.021	.995	.930	1.070	1.046	.990	.958
+9	1.107	1.015	.994	.919	1.068	1.041	.989	.964
+10	1.096	1.008	.988	.915	1.072	1.042	.991	.964
+11	1.088	.999	.988	.908	1.072	1.038	.986	.967
+12	1.089	1.003	.992	.904	1.080	1.040	.983	.965
+13	1.088	.995	1.003	.900	1.077	1.041	.983	.967
+14	1.085	.993	1.006	.896	1.075	1.043	.979	.970
+15	1.093	1.001	.996	.890	1.077	1.040	.969	.967
+16	1.087	.993	.997	.884	1.077	1.036	.964	.973
+17	1.092	.980	.989	.883	1.070	1.035	.956	.969
+18	1.093	.981	.987	.874	1.075	1.034	.953	.971
+19	1.094	.977	.975	.882	1.072	1.023	.957	.975
+20	1.085	.966	.976	.882	1.068	1.025	.952	.974
+21	1.091	.960	.977	.875	1.066	1.020	.948	.969
+22	1.085	.965	.979	.873	1.084	1.021	.953	.976
+23	1.091	.966	.977	.876	1.087	1.019	.945	.972
+24	1.101	.959	.978	.884	1.091	1.025	.938	.969

appears to be sluggishly impounded. This is extremely difficult to interpret, but is consistent with a certain market inefficiency. Two caveats are necessitated. Firstly, as indicated by Ball (1978), the abnormal returns may be due not to an inefficiency in the market, but rather to a misspecification of the market model, and, secondly, as indicated above, other information releases may occur soon after the preliminary announcement.

The salient features of the foregoing analysis are summarised in the following table :

Portfolio		First Half		Second Half		Performance Rank
		API _o	RES _o	API _o	RES _o	
1.	++	1,088	2,45%	1,053	4,6%	1
2.	+ -	1,021	0,4%	0,957	2,0%	2
3.	- +	1,006	0,6%	1,008	2,0%	3
4.	--	0,961	0,2%	0,935	1,1%	4

In order to evaluate whether the provision of interim reports is of any value to investors, an investment strategy based on a foreknowledge of half-yearly forecast errors is compared with a strategy based on a foreknowledge of annual forecast errors.

If the half-yearly reports are of any value, the strategy based on half-yearly forecast errors should

yield a higher annual abnormal return than the strategy based solely on the annual forecast errors.

Strategy based on half-yearly forecast errors

Portfolio	Strategy	Abnormal Return
1. (++)	Buy and hold for full year	13,0%
2. (+-)	Buy and hold for first six months. Sell short for second six months	6,8%
3. (-+)	Sell short for first six months. Buy and hold for second six months	0,2%
4. (--)	Sell short for full year	10,5%
	Average annual abnormal return	7,625%

Strategy based on annual forecast errors

Portfolio	Strategy	Abnormal Return
1. (+)	Buy and hold for full year	2,9%
2. (-)	Sell short for full year	8,2%
	Average abnormal return	5,5%

This result indicates that the half-yearly reports provide approximately 33% more information than would otherwise be available. This result is consistent with that reported by Brown and Kennelly (1972) using a similar methodology. Before concluding, it must be

noted that all transaction costs have been ignored which, if accounted for, would reduce the performance of the strategy based on half-yearly data.

6.6 CONCLUSION

This chapter provides evidence of the market reaction to half-yearly earnings reports. It seems that second half reports are more informative than the first half reports. The provision of half-yearly reports does, however, provide significant incremental information. The asymmetrical behaviour of the API plots to 'good news' and 'bad news' reported in Chapter 5 persists in the reaction to half-yearly reports. The half-yearly forecast errors appear to be more highly associated with abnormal price behaviour which indicates that the half-yearly model of income expectations may be more descriptive.

A certain market inefficiency may exist in that there is significant non-random price behaviour for a period after the release of the preliminary report in certain cases.

It is re-emphasised that the results may be a function of model misspecification as described in Chapter 5.

The research design issues apply equally to this study.

Furthermore, it must be stressed that the simultaneous disclosure of dividends may be responsible for the results presented. Almost all the earnings announcements were accompanied by a dividend announcement. In mitigation, it must be added that dividend expectations will to an extent vary randomly across the portfolios examined in this study.

Further research would require that the potentially confounding effect of simultaneous dividend announcements be controlled. The confounding effect of simultaneous dividend announcements is dealt with in an empirical study, the results of which are presented in Chapter 7.

Taken in conjunction with the results reported in Chapter 5, it seems clear that the rôle of published accounting information is significant in the pricing of South African shares. It is, therefore, imperative that accounting policy makers ensure that these reports are presented timeously. Moreover, a strong case exists to introduce more frequent reporting in South Africa, which would be achieved by the provision of quarterly reports, provided, of course, that such provision be cost effective. The challenge to those

opposed to quarterly earnings announcements is to prove the extent of cost; this study has shown the benefits of increased interim reporting.

FOOTNOTES : CHAPTER 6

- (1) Certain aspects of this study are extended and presented in Foster (1978: p.341).
- (2) It should be noted that two earnings regressions were carried out for each firm : (1) a regression of first half earnings, and, (2) a regression of second-half earnings. This avoids any confounding effect of seasonality of the data.

CHAPTER 7THE INFORMATION CONTENT OF DIVIDENDS7.1 INTRODUCTION

The primary purpose of this chapter is to examine whether any potential information content of dividend announcements confounds the interpretation of the results reported in Chapters 5 and 6. More than 90% of the earnings announcements examined in those chapters were accompanied by a dividend announcement. Consequently, the price reaction detected during the week of the announcements and in the period immediately thereafter, may be attributable, to some extent, to the information content of dividends.

The evidence, presented here suggests that there is little information content in dividend announcements and thus the previously drawn conclusions on the information content of earnings remain. This result is consistent with the evidence available on the NYSE.

The chapter proceeds with a brief background on
(1) the need to consider the dividend question in

this context, (2) the 'Dividend Information Hypothesis' and (3) the NYSE evidence.

The information hypothesis is then tested using three different research designs. The chapter concludes with a brief description of two pilot research studies which were a by-product of the current study and seem fruitful avenues for further work.

7.2 BACKGROUND

7.2.1 The Need to Test the Information Content of Dividends

Share price reaction contemporaneous with earnings announcements cannot be entirely attributed to the earnings *per se* when dividends are announced simultaneously (and *vice versa*). In such situations an attempt must be made to distinguish the information content of the dual events.

In attempting such a distinction in an earnings study, one naturally simultaneously tests the information content of dividends.

The major studies reviewed in Chapter 4 have, by and

large, ignored this dimension of the problem. Although the 'two classics', viz. Ball and Brown (1968) and Beaver (1968) were able to cope with the potential confounding effect of dividend information without measuring the information content of dividends directly.

Beaver (1968) dealt with the problem by construction. He merely excluded all earnings announcements accompanied by dividend announcements. The abnormal price residual behaviour he reports is, therefore, a pure earnings reaction.

In the Ball and Brown (1968) study the issue is not addressed directly. Their result, which indicates no abnormal residual from the month of the announcement onwards, is, however, fairly insensitive to the potential confounding effect of dividend announcements. It is extremely unlikely that the information content of dividends would exactly offset the information content of earnings which would be implied in the context of their results. Furthermore, although it is likely that earnings and dividends may be positively correlated, there is no reason to suppose that unexpected earnings and unexpected dividends are similarly associated. Portfolios formed on the basis of unexpected earnings are likely to consist of a random collection of dividend announcements (i.e. both 'good news' and 'bad news') and

therefore any potential confounding effects would be set off as the residuals of the portfolio constituents were aggregated in the way reported by Ball and Brown (1968). The dividend effect, then, is likely to have been 'washed out'. It is worth noting that Ball and Brown (1968) did not indicate the extent to which simultaneous dividend announcements were included in their study.

It is not possible in the current study to ignore the potential confounding effect of dividends, for the following two reasons. Firstly as indicated, virtually all earnings announcements are accompanied by dividend announcements so that the dividend exclusion option is not feasible for the South African earnings researcher. Secondly, a significant positive abnormal return was detected on the date of earnings/dividend announcements for both the 'good news' and 'bad news' portfolios. Recall that the magnitude of the abnormal residual for the former was the larger. Clearly, this reaction may be attributable to either of the two events - earnings or dividends. Without attempting to control for either one, no statement can be conclusively made on the information content of the other. It may be possible to assume a maintained hypothesis of no information content of the variable not tested, however the ambiguity would remain. Being intolerant of ambiguity, an attempt is made in

the following section to control the earnings variable in order to isolate any confounding effect of dividend information.

7.2.2 The Dividend Information Hypothesis

Lintner (1956) first suggested that current dividends were dependent on future as well as current and past earnings. This allows for the possibility of current dividends reflecting information on the expected future well being of the firm which is not reflected in current earnings. In this sense, dividends have a potential informational content, but would only have a marginal informational content if this information were not available to the market from other sources (assuming market efficiency).

It has been strongly argued by Modigliani and Miller (1958 & 1959) that the value of the firm is independent of the dividend policy adopted. Thus, they argue that any observed association between dividends and value is likely to be a result of a 'dividend surrogate' effect whereby dividends are highly correlated with the real determinants of value rather than being due to the importance of dividend policy *per se*. Clearly, the only concern in earnings information content studies is the extent to which the individual

dividend announcements transmit information rather than the dividend payment *per se*. Modigliani and Miller (1959) suggest that to the extent that dividends reflect management's expectations of long-run earnings not reflected in current earnings (and other information sources) the current dividend payment may provide informative signals to the market.

In effect, the Dividend Information Hypothesis implies that dividends are determined to some extent by hitherto inside information. Dividend information is, therefore, defined as being that information provided by the dividend announcement incremental to that information provided by earnings, i.e. information conveyed by both dividends and earnings is considered earnings information. In this study, dividends are deemed only to confound the earnings information study to the extent that the dividend announcement provides the market with new and unique information.

7.2.3 The NYSE Evidence

The dividend information hypothesis was first tested directly by Petit (1972) in a study simultaneously testing the informational content of dividends and the efficiency of the market's response to such. Using the familiar API approach, Petit reports the price

residual behaviour for the six months surrounding some 1 000 dividend announcements.

Petit attempted to control the earnings variable by partitioning the sample into two groups based on the sign of an earnings forecast error derived from an expectations model of quarterly earnings. Both these groups were categorised into seven sub-groups according to the magnitude of the percentage change in period to period dividend payments.

In principle, he argued that the earnings partition effectively controls any confounding earnings information. Petit reports a significant information content in dividends evidenced by the price residual behaviour contemporaneously associated with the announcements thereof. Furthermore, he argues that as the dividend sub-groups exhibit similar characteristics regardless of the earnings group, the potential confounding effects of earnings were adequately controlled and that the information content of dividends tends to dominate that of earnings. He maintains that this is not inconsistent with the Ball and Brown (1968) result since it does not infer zero earnings information, but rather the greater information content of dividends. Petit (1972) also reports the daily abnormal performance of the various dividend

groups (in total) for the 20 days surrounding the dividend announcements.

He concludes that the market impounds the information content of dividends efficiently.

Petit's approach has been severely criticised (see Watts (1976) and is generally considered deficient in two major respects:⁽¹⁾

Firstly, his earnings expectation model is considered to be dramatically misspecified and consequently, the partitioning does not adequately control the earnings variable.

Secondly, Petit assumes that it is the change in dividend levels that is informative. However, it is not obvious that the market will be surprised by a change in dividend level on the announcement date. No attempt was made to establish the market's expectations of dividend levels and consequently, it is not possible within the Petit research design to establish the extent to which the dividend announcement revised the market's expectation of long-run earnings. It

(1) Footnotes appear at the end of the chapter, page 228.

is unlikely that the implicitly assumed naïve model (i.e. the market expects dividend levels to remain constant) is sufficiently powerful in a test of this nature.

It should be noted that the majority of dividend announcements in the Petit study were not accompanied by an earnings announcement, but were generally preceded by one. As a result, the alignment of API's on the dividend announcement date will tend, on average, to dissipate the earnings effect over the pre-dividend announcement period.

The most conclusive evidence on the information content of dividends was reported in a study by Watts (1973). There were two major sections to the Watts paper. Firstly, he investigated the necessary (although not sufficient) condition for the dividend information hypothesis to hold, viz. the ability of dividends to predict future earnings. Secondly, the association between unexpected changes in dividends and abnormal share price behaviour was investigated.

For both aspects of the study, the Fama and Babiak (1968) model of dividend changes was used which attempts to explain these changes in terms of earnings and past dividends.⁽²⁾ This model is of the following

form⁽³⁾ :

$$\Delta D_{it} = \beta_{1i} D_{it-1} + \beta_{2i} E_{it} + \beta_{3i} E_{it-1} + Z_{it} \quad (\text{FB})$$

where

ΔD_{it} is the difference in the dividend of firm i in years t and $t-1$

D_{it} is the dividend of firm i in year t

E_{it} is the earnings of firm i in year t

Z_{it} an error term representing the unexpected element in dividends

The error term Z_{it} would thus represent that element in dividend changes not associated with or explained by the previous year's earnings and dividends and the current year's earnings. It is this property of Z_{it} which makes it a feasible measure of the information content of dividends.

This residual series was used in two different ways in the Watts study :

- (1) In the prediction of future earnings changes. Using Ordinary Least Squares regression (OLS), changes in the following year's earnings (E_{it+1}) were regressed on the residuals derived from the FB model :

$$E_{it+1} = Y_i + \Theta_i Z_{it} + \omega_{it+1}$$

The average value of the coefficient Θ was positive, suggesting a positive association between Z_{it} and E_{it+1} , but was not positive for all firms. Watts concluded that the unexpected element in dividends was generally not a good predictor of future earnings changes and as such had little informational content.

- (2) In a test of the association between the sign of Z_{it} (the dividend forecast error) and unsystematic share returns around the time of the announcement. It is this second approach which is considered to be more relevant and thus this method is applied in the current study.

In a test analogous with the Ball and Brown (1968) earnings study, Watts employed the sign of the error to classify firms into two portfolios 11 months in advance of the end of the last month in the fiscal year after which the dividends were announced.

Although firm/years were not aligned on announcement dates, it is clear from the results that there was no abnormal price movement throughout the 24 month period

surrounding fiscal year ends. The conclusion, therefore, is that dividend changes have little informational content and the null hypothesis of no information is accepted. Clearly, if dividends had information content, a certain abnormal reaction in share price residuals would be expected in the period immediately after the announcement. Alternatively, if the pattern of API's had been similar to the Ball and Brown results (see Chapter 4), it could have been concluded that dividends provided information, not provided by earnings, consistent with the information set used by the market. Yet, in such a setting, it could have been implied that the dividend announcements were not a timely source of information, subject to the misspecification issue addressed in Chapter 4 in the context of the Ball and Brown results.

There was some criticism of the Watts paper in the literature, but Watts adequately defended himself. It is thus felt that the issues raised need be pursued no further (see Watts, 1976 and 1976(a)).

The conclusion in the context of the NYSE is that dividends *per se* have little or no information content over and above the information content of earnings.

7.3 AN EMPIRICAL EVALUATION OF THE INFORMATION
CONTENT OF DIVIDENDS

7.3.1 Hypotheses

The hypotheses to be tested are in general terms :

$$H_0 : E(\tilde{\epsilon}_{it} | \delta_{it} < 0) = E(\tilde{\epsilon}_{it} | \delta_{it} > 0) \quad \text{no information content}$$

$$H_a : E(\tilde{\epsilon}_{it} | \delta_{it} < 0) \neq E(\tilde{\epsilon}_{it} | \delta_{it} > 0) \quad \text{information content}$$

where

$$\tilde{\epsilon}_{it} = \text{a measure of abnormal performance in share returns}$$

$$\delta_{it} = \text{a dividend forecast error conditional on earnings}$$

The evidence presented in Chapter 5 suggests that the abnormal return on a share is positive in the week of the announcement of earnings and dividends regardless of the sign of the earnings forecast error. Thus, in a test holding earnings constant, in an attempt to evaluate the dividend effect, one would expect to observe a positive abnormal return in the same week. However, what would be of interest is any discernible differential reaction to different dividend signals.

Recall from Chapter 5 the hypothesis accepted was :

$$E(\tilde{\epsilon}_{it} | e_{it} < 0) \neq E(\tilde{\epsilon}_{it} | e_{it} > 0) \quad (A)$$

However, due to the simultaneous announcement of dividends the hypothesis actually accepted in expanded form was :

$$E(\tilde{\epsilon}_{it} | e_{it} < 0, \delta_{it}) \neq E(\tilde{\epsilon}_{it} | e_{it} > 0, \delta_{it}) \quad (B)$$

Thus, the hypothesis was that the earnings have information content; yet any incremental information content in the simultaneous dividend announcement (δ_{it}) may be responsible to some extent for the inequality in (B). It is possible to assume away the effect of δ_{it} by claiming a lack of association between δ_{it} and e_{it} and thus the effect of δ_{it} would be 'washed out' of portfolios formed conditional on the sign of e_{it} only. However, it is considered more rigorous to explicitly control this factor and, moreover, the informational content of δ_{it} is in itself of interest.

Thus the hypotheses H_0 and H_a above may be reformulated as :

$$H'_0 \quad E(\tilde{\epsilon}_{it} | e_{it}, \delta_{it} < 0) = E(\tilde{\epsilon}_{it} | e_{it}, \delta_{it} > 0)$$

$$H'_a \quad E(\tilde{\epsilon}_{it} | e_{it}, \delta_{it} < 0) \neq E(\tilde{\epsilon}_{it} | e_{it}, \delta_{it} > 0)$$

Clearly, if H_0' is accepted, Hypotheses A and B are equivalent as the informational content of δ_{it} would be zero and thus have no confounding effect in B. An acceptance of H_a' would imply that δ_{it} did have a certain informational content. However, in such a setting it would be difficult to establish the extent of the mutual confounding of e_{it} and δ_{it} .⁽⁴⁾

Three methods will be used to test these hypotheses with various definitions of e_{it} and δ_{it} . The analysis will be confined to the week of the announcements and the subsequent nine weeks. It must be re-emphasised that in all cases an attempt is made to define δ_{it} as the incremental information content of dividends.

(1) The API Method Using the Fama & Babiak Model

In this test abnormal performance will be measured using the API metric and δ_{it} will be defined in terms of the error term of the Fama and Babiak dividend model.

(2) The ARA Method Using the Fama & Babiak Model

The absolute residual analysis described in Chapter 4 will measure information content and δ_{it} will be defined as in (1) above.

(3) The API Method Using the Earnings Forecast Error Model

As in (1) above, abnormal performance will be measured using the API metric. δ_{it} will be defined as the error term from a regression of change in dividend on the earnings forecast error used in Chapter 5.

7.3.2 Empirical Procedures

The same data as those employed in Chapter 5 were used, but approximately 40 earnings announcements not accompanied by dividend announcements were excluded.

Weekly price residuals were computed over the 404 week period, 2 February 1973 through 14 November 1980, as follows :

$$\hat{\epsilon}_{it} = R_{it} - (\hat{\alpha}_{it} + \hat{\beta}_{it}R_{mt}) \quad \begin{array}{l} t = 1 \dots 404 \\ i = 1 \dots 41 \end{array} \quad (1)$$

where

$\hat{\alpha}_i, \hat{\beta}_i$ = estimates of the intercept and slope obtained from the linear regression specific to share i

$\hat{\epsilon}_{it}$ = an estimate of the unsystematic return on share i in week t

$$R_{it} = \log_e \left(\frac{P_{it} + D_{it}}{P_{it-1}} \right)$$

D_{it} = cash dividends on share i in week t

P_{it} = share i closing price at the end of week t^*

R_{mt} = the return on the market in week t .
The RDM 100 industrial index was used as a surrogate. The return is calculated analogously to the return on share i .

(*Prices are adjusted for all capitalisation issues and share splits in week t .)

The usual OLS conditions must prevail in order to achieve consistent estimates of α_i and β_i . These should not constrain the application in this study and are dealt with adequately in Chapter 4.

In the cases of methods (1) and (3) above, the API metric was employed to pool the residuals through time and across firms according to the following form :

$$CAR_w = \frac{1}{N} \sum_{n=1}^N \sum_{k=0}^w \hat{\epsilon}_{nk} \quad (1)$$

where

N = the number of announcements included

w = weeks relative to the announcement
(week 0)

$\hat{\epsilon}_{nk}$ = price residual for announcement n in
week k.

Note : Announcements are aligned on week 0.

Attention is now focused on the week of the announcement and subsequent nine weeks since any confounding effect will occur during this time interval.

An alternative API metric to the multiplicative variation, previously described, was used. ⁽⁵⁾

In the case of method (2), the residuals were pooled through time and across firms after the following transformation.

(1) Square residuals ($\hat{\epsilon}_{it}$) :

$$\hat{\epsilon}_{it}^2$$

(2) Estimate the variance of residuals over the full 404 week period :

$$\hat{\sigma}^2(\hat{\epsilon}_{it})$$

(3) Divide (1) by (2) :

$$u_{it} = \frac{\hat{\epsilon}_{it}}{\hat{\sigma}^2(\epsilon_{it})}$$

(4) Average (3) across announcements aligning announcements relative to week 0 :

$$\bar{u}_t = \frac{1}{N} \sum_{i=1}^N u_{it}$$

\bar{u}_t thus represents an absolute residual index with an expected value of 1. A value greater than 1 is indicative of an abnormal return behaviour consistent with an information reaction. (See Chapter 4, Section 4.3.2.2 for a more extensive explanation of this index.)

Method 1

All earnings announcements accompanied by a dividend announcement were partitioned into two groups depending on the sign of the annual dividend forecast error derived from the following regression for each firm.

$$\Delta D_{it} = \beta_{1i} D_{it-1} + \beta_{2i} E_{it} + \beta_{3i} E_{it-1} + Z_{it} \quad (2)$$

$$i = 1 \dots 41$$

$$t = 1 \dots 9$$

(The symbols have been defined in Section 7.2.3.)

The incremental informational content of a dividend announcement is assumed to be the difference between the actual change in dividends and the change conditional upon the expectation implied in (2) :

$$\Delta D_{it} = \beta_{1i} D_{it-1} + \beta_{2i} E_{it} + \beta_{3i} E_{it-1} + Z_{it}$$

$$i = 1 \dots 41$$

$$t = 1 \dots 9$$

$$Z_{it} = \Delta D_{it} - \hat{\Delta D}_{it}$$

where

$\hat{\Delta D}_{it}$ indicates an estimate

Z_{it} = the annual dividend forecast error for firm i in year t .

As in the Watts' study, the use of an annual model is justified in terms of the fact that most dividend changes occur with the announcement of final dividends. (6)

Where the actual change in dividends exceeds the estimated change, the forecast error is positive which would indicate a 'good news' component in the potential informational content of the announcement. The opposite applies in the case of a negative forecast error.

Summary statistics of this model are presented in Table 7.1. The parameters derived seem very similar to those of Watts (shown in parentheses). The mean R^2 for the current model is, however, considerably higher than that reported by Watts which is consistent with the model being a better explainant of dividend changes than the Watts version. Yet, too much significance should not be attached to this difference as the Watts' model was based on a higher number of observations and, therefore, a lower R^2 would be expected. Nonetheless, it is fair to say that the current model is at least as useful as the Watts' model.

The two groups of announcements were treated as hypothetical portfolios formed at the beginning of the week of the announcement and held for 10 weeks. The residuals of each portfolio were pooled in accordance with (1). The resultant ten CAR's for each portfolio are plotted on Figure 7.1 (page 207) and tabulated in Table 7.2 (page 208).

The result is fairly easy to interpret. It seems quite clear that there is no real difference between the residual behaviour of the two portfolios in the time interval studied. The negative forecast error portfolio (red) does exhibit a fractionally higher

TABLE 7.1

SUMMARY STATISTICS FOR THE PARAMETERS OF THE REGRESSION MODEL*

$$\Delta D_{it} = \beta_{1i} D_{it-1} + \beta_{2i} E_{it} + \beta_{3i} E_{it-1} + Z_{it}$$

Parameter ρ	Mean $\hat{\rho}$	Standard Deviation σ
R^2	.887 *(.584)	.12 (.187)
β_1	-0.381 (-0.321)	.60 (.334)
β_2	.272 (.227)	.174 (.206)
β_3	-.088 (.017)	.206 (.247)

* Parameters of Watts' model in parentheses

TABLE 7.2

CUMULATIVE ABNORMAL RETURNS (CAR)
RELATIVE TO DIVIDEND/EARNINGS ANNOUNCEMENT
DATE (WEEK 0)

Week	$*CAR_w^+$	Z_{it}	CAR_w^-
0	102.0		102.4
+1	101.8		103.8
+2	103.1		104.0
+3	103.7		104.1
+4	103.8		104.4
+5	103.7		104.6
+6	104.4		105.0
+7	104.8		105.1
+8	104.7		105.5
+9	105.3		105.9

* CAR - firms and years in which Z_{it} positive (+) or negative (-). (See Figure 7.1).

jump in week 0; thereafter very little difference is manifest, bearing in mind the cumulative nature of the plot and the fact that the difference between the two in week +9 is similar to the difference in week 0.

The null hypothesis of no incremental information content of dividend announcements is thus accepted. The implication, therefore, is that the interpretation of Chapters 5 and 6 are not confounded by a dividend effect. Clearly this interpretation is dependent on the validity of the models used.

Method 2

An average absolute abnormal residual index (\bar{u}_t) as described above was computed for each portfolio formed in Method 1 for the 17 week period surrounding the dividend announcement (week -8 through week +8). That is, the absolute abnormal residual indices for the individual announcements were averaged across announcements aligned on the week of the dividend announcement. The values for the 17 \bar{u}_t 's are presented in Table 7.3 (page 211) and plotted in Figure 7.2 (page 210).

Two features of Figure 7.2 are important. Firstly, the week of the most abnormal behaviour is week 0 and

TABLE 7.3

ABSOLUTE ABNORMAL RETURNS (AAR)
RELATIVE TO DIVIDEND/EARNINGS ANNOUNCEMENT
DATE (WEEK 0)

Week	$*AAR_w^+$	Z_{it}	AAR_w^-
-8	.94		.92
-7	.83		.70
-6	.79		.95
-5	1.25		.71
-4	1.05		.84
-3	1.14		1.36
-2	1.22		1.09
-1	1.17		1.01
0	1.77		1.76
+1	1.36		1.31
+2	1.41		1.00
+3	1.47		.89
+4	1.14		.88
+5	1.51		1.30
+6	1.27		.71
+7	.77		1.17
+8	1.33		1.23

*AAR - firms and years in which Z_{it} positive (+) or negative (-). (See Figure 7.2).

secondly, the magnitude of this abnormal behaviour index is virtually identical in each group. This lends further credence to the conclusion drawn above.

It should be noted that this method is not strictly applicable since absolute residuals are examined and reactions of different direction are therefore not observable. Nevertheless the result is consistent with the null hypothesis.

It should be noted that the inference, again, depends on the validity of the models employed in Method 1. However, the ARA approach avoids the setting off of residuals of opposite sign permitted in that method. This test, therefore, improves our insight into the behaviour of the residuals.

Method 3

The final test of the dividend information hypothesis aggregates the residuals in an identical manner to Method 1 (i.e. CAR). However, δ_{it} are re-defined in terms of model (i) below. The sign of W_{it} in (i) was used as the criterion by which the total sample of dividend/earnings announcements were partitioned.

$$\Delta D_{it} = \alpha_i' + \beta_i' e_{it} + W_{it} \quad \begin{array}{l} i = 1 \dots 41 \\ t = 1 \dots 9 \end{array} \quad (i)$$

where

e_{it} is the annual earning forecast error for firm i in year t

W_{it} is an error term.

The e_{it} were derived using the OLS regression technique of the following form : (7)

$$\Delta I_{it} = \hat{a}_i + \hat{b}_i \Delta I_{mt} + \hat{e}_{it} \quad i = 1 \dots 41 \quad (4)$$

where

ΔI_i = year to year % change in reported EPS

ΔI_m = year to year % change in the average reported EPS of all industrial firms

\hat{a}_i, \hat{b}_i = estimates of the intercept and slope obtained from the linear regression specific to share i

\hat{e}_{it} = an estimate of the unsystematic accounting return!

The usual OLS conditions apply (see Chapter 4).

Due to the significant level of residual autocorrelation where absolute income levels were used in the regression, first order changes were employed which significantly reduced this phenomenon.

While no previous work has been done in South Africa on the behaviour of earnings, studies in the U.S. (see

Ball and Brown (1967)) indicate that about half of the variability in the level of earnings of the firms is attributable to economy wide effects. The results of the 41 regressions on earnings carried out in this study indicated a similar proportion.

The possibility of a bias in estimates being introduced by a correlation between e_{it} and ΔI_{mt} does exist, but it is unlikely to impinge on the inferences here drawn. (8)

The amount of new information conveyed in a firm's income in a particular year is assumed to be the difference between the actual change in income and the change conditional upon the expectation implied in (4) :

$$\begin{aligned} \hat{\Delta I}_{it} &= \hat{a}_i + \hat{b}_i \Delta I_{mt} & i &= 1 \dots 41 \\ & & t &= 1 \dots 9 \end{aligned}$$

$$e_{it} = \Delta I_{it} - \hat{\Delta I}_{it}$$

where

$$\hat{\Delta I}_{it} = \text{the expected change in income for firm } i \text{ in year } t$$

$$\Delta I_{it} = \text{the actual change in income for firm } i \text{ in year } t$$

$$\Delta I_{mt} = \text{the actual change in market earnings in year } t$$

e_{it} = the earnings forecast error for firm i
in year t .

The forecast errors (\hat{e}_{it}) were computed over a similar time period to that of the price residuals ($\hat{\epsilon}_{it}$), although yearly data were used for the former. As with the price residuals, it was considered unnecessarily inefficient to compute the forecast errors in two stages and thus the errors were estimated directly using the data during the full period. Moreover, due to limited data and in order to include at least nine observations in each regression, the inclusion of all data was necessary. This should not constrain the research in any way since the OLS requires an assumption of the constancy of a_i and b_i and the forecast error estimates on both the full inclusion and post-data inclusion methods should consequently be similar.

Unlike the Fama and Babiak model employed in Method 1, the model proposed in this section does not purport to explain changes in dividend. It is not a model to forecast dividend changes nor is it a description of the stochastic process generating dividend changes.

It is merely proposed as a research tool designed to hold constant the information content of earnings in

order to isolate the incremental information content of dividends.

The incremental information content of dividends over earnings will clearly be unrelated to the information content of earnings. Model (i) presents a method of removing from the changes in dividends series that element associated with the earnings forecast error (e_{it}). W_{it} , therefore, contains the effect of δ_{it} . It is accepted that W_{it} may be a fairly 'noisy' series in that it will also reflect expected elements of changes in dividends including those associated with expected earnings. Obviously, expected changes in dividends are not relevant as they do not have the potential to change investor expectations. It is hoped, therefore, that W_{it} is a suitable surrogate for δ_{it} . This model is constructed in such a way that W_{it} is unassociated with e_{it} which is a necessary condition for it to be a surrogate for δ_{it} .

The two CAR plots based on the sign of W_{it} and derived similarly to the CAR plots of Method 1 are presented in Figure 7.3 (page 217). (The results are presented numerically in Table 7.4, page 218).

The conclusions to be drawn are identical to those of the previous methods and the null hypothesis of no

TABLE 7.4

CUMULATIVE ABNORMAL RETURNS (CAR)
RELATIVE TO DIVIDEND/EARNINGS ANNOUNCEMENT
DATE (WEEK 0)

Week	$*CAR_w^+$	W_{it}	CAR_w^-
0	1.025		1.024
+1	1.030		1.029
+2	1.038		1.036
+3	1.035		1.042
+4	1.035		1.046
+5	1.036		1.045
+6	1.046		1.051
+7	1.048		1.054
+8	1.052		1.055
+9	1.057		1.057

*CAR - firms and years in which W_{it} positive (+) or negative (-). (See Figure 7.3).

dividend information and therefore no confounding dividend effect is accepted.

Clearly, there is only a trivial difference in the week 0 residual for the W_{it}^+ and W_{it}^- plots. Furthermore, the ten week cumulative returns for both portfolios are identical.

It must be emphasised that the conclusion accepting the null hypothesis is jointly conditional on the earnings expectations model and the model deriving W_{it} .

The conclusion across all three methods was similar and it can therefore be concluded (subject to the usual validity issues) that

- (1) The incremental information content of dividends is low; and
- (2) The results of studies in Chapters 5 and 6 can be accepted as not being confounded by a dividend factor.

7.4 FURTHER RESEARCH

There were two by-products of the research reported in

this chapter which are considered to be worth highlighting. It is emphasised that while neither purports to conclusively test the relevant hypothesis, the preliminary results do seem to indicate fruitful avenues for further research.

7.4.1 The Association Between the Magnitude of Earnings Forecast Errors and the Magnitude of Unsystematic Returns

In Chapter 5 a study was discussed that tested the association between the sign of the earnings forecast errors and the sign of unsystematic share returns. It was suggested in that chapter that an extension of this research to the association between the magnitude of the earnings forecast error and that of the unsystematic share return would be appropriate. Indeed, this association has been investigated in the context of the NYSE by Beaver *et al.* (1979) and found to be positive.

A similar, although only preliminary, test was conducted as part of the research for Method 3 above. All announcements were ranked firstly, according to the magnitude of the annual forecast error (e_{it}) and secondly, according to the magnitude of the individual annual API value in week 0. The announcements were

ranked in descending order of magnitude and a rank correlation coefficient was then computed according to the following statistic.

$$R_s = 1 - \frac{6 \sum_{i=1}^{261} (d_{1i} - d_{2i})^2}{N(N^2 - 1)}$$

where

R_s = paired rank correlation coefficient

d_{li} = rank assigned announcement i using variable l

N = number of ranked pairs

R_s had a value of +0,32. Clearly, the association is weak, but it is positive and statistically significant.

Beaver *et al.* (1979) report a coefficient of +0,38.

It should be emphasised, however, that the rank correlation coefficient is likely to be more significant at a portfolio level. Note, that this test ranked individual announcements whereas in the Beaver *et al.* (1979) study a coefficient of rank correlation of 0,74 was estimated at a portfolio level. No attempt has been made here to test at the portfolio level.

This indication of a significant positive association between the magnitudes is extremely encouraging and

would call for further research.

7.4.2 The Performance of Various 'Dividend Change' Portfolios in the Year Prior to Their Announcement

In the early stages of the research reported in the first part of this chapter on the information content of dividends, a number of potential research designs were considered. One such design was to categorise all announcements into five groups dependent on the magnitude of the change in dividend payments. These groups were formed into five hypothetical portfolios, aligned on the date of the announcement and the residuals pooled using the API metric for the 50 weeks before and 24 weeks after the announcement.

The results are reported graphically on Figure 7.4 (page 223) and numerically in Table 7.5 (page 224). It should be noted that the vertical axis (API) in Figure 7.4 is not on the same scale as previous API plots in this dissertation.

Clearly, at the extremes, i.e. $\Delta D_t > 50\%$ and $\Delta D_t < 0$ there seems to be a high association between pre-announcement performance and change in dividends. The no change group fared poorly, while the other

TABLE 7.5

SUMMARY STATISTICS BY WEEK RELATIVE TO DIVIDEND ANNOUNCEMENT (DA)

Week relative to Dividend Announcement	TOTAL SAMPLE				
	* API _W ⁻	API _W ⁰	API _W ⁰⁻¹⁹	API _W ²⁰⁻⁴⁹	API _W ⁵⁰⁺
Week 0 = DA					
- 50	.992	.995	1.009	1.008	.995
- 49	1.007	.990	1.011	1.020	.994
- 48	1.019	.992	1.019	1.015	1.006
- 47	.970	1.001	1.024	1.022	.997
- 46	.975	1.011	1.017	1.036	.998
- 45	.963	1.017	1.018	1.038	.984
- 44	.955	1.008	1.016	1.042	.987
- 43	.959	1.005	1.024	1.044	.981
- 42	.979	1.001	1.025	1.053	.984
- 41	.964	.999	1.025	1.057	.998
- 40	.970	.998	1.028	1.058	1.006
- 39	.982	.992	1.021	1.042	1.002
- 38	.951	.996	1.020	1.036	1.034
- 37	.950	.980	1.011	1.034	1.035
- 36	.980	.975	1.013	1.031	1.042
- 35	.966	.972	1.015	1.023	1.037
- 34	.969	.963	1.009	1.020	1.052
- 33	.950	.958	1.006	1.015	1.062
- 32	.944	.952	1.004	1.009	1.070
- 31	.938	.950	1.007	1.011	1.082
- 30	.924	.948	1.001	1.021	1.091
- 29	.905	.942	1.005	1.022	1.091
- 28	.904	.934	1.003	1.019	1.107
- 27	.880	.920	1.007	1.013	1.110
- 26	.862	.907	1.009	1.016	1.137
- 25	.839	.902	1.008	1.020	1.162
- 24	.827	.897	1.008	1.024	1.151
- 23	.832	.898	1.013	1.021	1.143
- 22	.828	.898	1.010	1.019	1.136
- 21	.814	.898	1.015	1.015	1.138
- 20	.799	.889	1.012	1.014	1.149
- 19	.752	.893	1.006	1.020	1.145
- 18	.750	.891	1.005	1.018	1.141
- 17	.739	.889	1.002	1.016	1.137
- 16	.751	.871	1.002	1.021	1.120
- 15	.753	.854	1.007	1.020	1.129
- 14	.742	.857	.992	1.007	1.131
- 13	.734	.850	.985	1.006	1.129
- 12	.726	.841	.982	1.005	1.136
- 11	.722	.849	.979	1.009	1.140
- 10	.707	.851	.978	.998	1.145
- 9	.716	.840	.974	.995	1.147
- 8	.708	.836	.973	.994	1.174
- 7	.712	.835	.976	.993	1.175
- 6	.708	.827	.966	.980	1.169
- 5	.673	.830	.966	.987	1.153
- 4	.672	.830	.969	.985	1.125
- 3	.667	.826	.968	.985	1.142
- 2	.664	.823	.973	.982	1.135
- 1	.680	.828	.970	.983	1.129
0	.688	.839	.992	1.004	1.186
+ 1	.683	.847	.994	1.015	1.183
+ 2	.672	.851	1.002	1.023	1.192
+ 3	.674	.854	1.002	1.035	1.165
+ 4	.686	.857	1.005	1.027	1.169
+ 5	.644	.860	1.010	1.029	1.184
+ 6	.638	.867	1.020	1.031	1.195
+ 7	.629	.862	1.028	1.037	1.192
+ 8	.625	.869	1.025	1.033	1.197
+ 9	.632	.872	1.027	1.038	1.197
+ 10	.626	.878	1.026	1.038	1.193
+ 11	.625	.874	1.024	1.039	1.199
+ 12	.632	.874	1.023	1.032	1.219
+ 13	.645	.880	1.022	1.030	1.213
+ 14	.627	.882	1.022	1.026	1.208
+ 15	.641	.873	1.018	1.021	1.201
+ 16	.651	.872	1.012	1.021	1.210
+ 17	.635	.872	1.011	1.024	1.175
+ 18	.642	.877	1.013	1.018	1.168
+ 19	.629	.873	1.013	1.014	1.168
+ 20	.605	.873	1.009	1.018	1.171
+ 21	.595	.874	1.003	1.018	1.175
+ 22	.612	.871	1.007	1.026	1.196
+ 23	.592	.875	1.002	1.024	1.201
+ 24	.589	.875	.999	1.028	1.204

* Abnormal Performance Index - firms and years categorised by year on year change in Dividend.
 0 = no change. 0 - 19 = increase between 0 and 19%. 20 - 49 = increase between 20 and 49%.
 50+ = increase over 50%.

two groups did not exhibit significant abnormal performance.

The implication of this configuration is merely that the information content of the signal transmitted by management *via* the change in dividend level is available from other sources and in certain cases there is little information content at all. This interpretation is consistent with the evidence of no marginal information reported above.

It must be emphasised strongly that no significance should be attached to the differential changes in the API during week 0. ⁽⁹⁾ The change in dividend is not an indicator of market expectations and, therefore, is not amenable to testing the marginal information content of dividend announcements.

In conclusion, therefore, these results do not really portray more than the *ex post* performance of certain dividend groups and that changes in dividends are highly associated with earnings.

The importance of dividend policy in the valuation of South African shares is an area that is likely to be extremely fertile for future studies.

7.5 CONCLUSIONS

This chapter presents a tri-lateral approach to the investigation of the information content of dividends. It has been fairly conclusively demonstrated that any marginal information content of dividends is unlikely to be significant enough to confound the interpretation of the studies reported in this dissertation on the information content of earnings. Furthermore, the study on the market reaction to LIFO reported in the following chapter is, therefore, likely to be invulnerable to the confounding effect of simultaneous dividend announcements and thus this issue will not be pursued.

Although a variety of designs were used to support the preliminary conclusion of no incremental information content of dividends, it is important to conclude by emphasising that the conclusion of each method was dependent on the validity of the models employed.

The final empirical study to be reported in this part of the thesis will be an empirical evaluation of the market's reaction to a change to LIFO.

FOOTNOTES : CHAPTER 7

- (1) The technical details of the exchange between Watts (1976) and Petit (1976) will not be dealt with in great detail.
- (2) See Fama and Babiak (1968).
- (3) The summary statistics for the Watts model are reported in Table 7.1.
- (4) It is, of course, possible by coincidence that the confounding effect of e_{it} exactly offsets the information content of δ_{it} and results in an erroneous acceptance of the null hypothesis H_0 .
- (5) This additive variant should in no way affect the results and conclusions. This method was used purely for the sake of time efficiency. It is also the variant used in the LIFO study reported in Chapter 8.
- (6) The choice of changes in dividends, as opposed to dividend levels, is explained in Section 7.2.3 above.
- (7) The model was described in Chapter 4. However, it is fully described here for convenience.
- (8) See Chapter 4, Footnote (13).
- (9) This factor was the source of much criticism of the Petit (1972 and 1976) studies. See Section 7.2.3.

CHAPTER 8MARKET REACTIONS TO THE ANNOUNCEMENT OF AN
ACCOUNTING CHANGE TO LIFO8.1 OBJECTIVES AND SUMMARY

This chapter reports empirical findings on the share market reaction to the announcement of a change to LIFO.⁽¹⁾ It is intended to provide further evidence of the association between accounting data and share prices. As set out in Section 8.3 the test may be seen as a test of semi-strong form market efficiency.

The results indicate that the change to LIFO has a negative impact on share prices which is contrary to the U.S. evidence using a similar methodology (Sunder (1973)).⁽²⁾

Furthermore, the negative reaction seems to be impounded rather sluggishly.

These two aspects are interpreted as reflecting a

(1) Footnotes appear at the end of the chapter (page 274).

certain market inefficiency or naïvety *vis à vis* LIFO.

It seems that the magnitude of the negative reaction is proportional to the magnitude of the negative impact on reported earnings and the relative riskiness of the firm (measured by β). However, it appears that the more recent announcements were received less negatively and less sluggishly which would be consistent with an increasing efficiency with respect to LIFO.

Another important aspect of this study is that it provides collaborative evidence of the conclusions drawn in the previous chapters. In the earnings studies, a positive price reaction was detected on the date of earnings announcements. Based on a completely different data set, using different computer programs and with a slightly different research design, this same positive reaction is detected. The majority of LIFO changes were announced simultaneously with the preliminary announcements. In view of the results in Chapters 4 through 7, it can safely be concluded that the sharp positive reaction in week 0 in all the graphs of this chapter is attributable to the information content of earnings and not the LIFO change, *per se*.

The chapter is concluded with some suggestions for

further research.

8.2 INTRODUCTION

LIFO refers to the 'last-in, first-out' cost flow assumption of inventory valuation whereby it is assumed that the costs of the most recent purchases of merchandise should be charged to the most recent sales of such. Thus, in times of rising prices a lower earnings figure results. This is the converse of the FIFO approach which refers to the 'first-in, first-out' cost flow assumption of inventory valuation whereby year end inventory is valued at the most recent purchase price.

LIFO is given an economic significance by virtue of the fact that if applied to tax reporting, a reduced liability for tax is incurred. Thus, the present value of future cash flows is increased because the present value of future tax payments decreases. The result is an increase in economic well being in times of rising prices.

With the increase in price levels witnessed in recent years, this characteristic has enticed a number of South African companies to change to LIFO to improve

their inflation squeezed cash positions. There are certain immediate implications of a switch to LIFO of which the more important are listed below :

- (1) Section 22(5) of the Income Tax Act No. 58 of 1962 requires that if a company uses the LIFO system for tax purposes, it must use LIFO for financial reporting purposes. However, this section does not prohibit the simultaneous footnote disclosure of FIFO information.
- (2) The reported book value of the firm diminishes as inventory is valued at older prices.
- (3) The equity of the company reduces and based on book value the firm may seem more highly geared.
- (4) If there is a reversal of current trends and the price level falls, earnings will be inflated above the FIFO figures and an increased tax will become payable.
- (5) LIFO removes the unrealised holding gains reported on a FIFO system and thus the difference between the two earnings figures (LIFO and FIFO) may measure, to a degree, the firm's exposure to inflation.

It is noted that it is, of course, possible for a firm

to report LIFO and not take it for tax purposes, in which case a change to LIFO would have no economic significance whatsoever. However, no such case has been encountered on the JSE (Knight (1981)).

Thus, a change in accounting method from FIFO to LIFO may be classified as a translatable change which has an economic impact and a negative impact on earnings. Moreover, this negative impact on earnings is counter-directional to the economic impact which is positive. Hence, a study of the effect of such a change should be of great interest as it should indicate which impact (earnings or economic) has the dominant influence on the share price.

In addition, by examining the length of time it takes the JSE to adjust to the informational content implied by the change, the efficiency of the market can be tested. More specifically, a test of the semi-strong form of the Efficient Market Hypothesis (EMH) can be made.

The purpose of the study will therefore be to :

- (1) Indicate to both the management and the investing public what impact a change to LIFO HAS had on share prices;

- (2) Provide investors with some information on the likely impact of future changes to LIFO;
- (3) Provide the management (report preparers) of companies considering a change with information on the likely impact on their share price; and
- (4) Test the efficiency of the JSE in the semi-strong form.

8.3 RESEARCH METHODOLOGY

The effect on a company's share price of a change to LIFO is examined using the two-stage time series methodology. This approach was first employed by Fama, Fisher, Jensen and Roll (1969) in the first direct test of the semi-strong form of the Efficient Market Hypothesis. This method has now become firmly established in the finance literature and is briefly summarised below in the context of the LIFO problem.

Consider a company which decides to change from FIFO to LIFO. The raw data required comprise the weekly returns on the share price which is defined as :

$$R_t = \frac{P_t + D_t - P_{t-1}}{P_{t-1}}$$

where

R_t is the return on the share in period t ;

P_t is the price of the security at the end of period t ; and

D_t is the dividend paid during period t .

The first stage of the methodology involves the removal of those movements in share prices which are attributable to market-wide or common factors. Such factors are common to all shares and King (1966) has shown that for the NYSE approximately 50% of the variability in share prices is due to such common factors. The effect of these market-wide influences must be removed so that the effects of a change to LIFO can be clearly observed and not obscured or confounded with broad market movements.

The market related return can be removed as follows : estimate the α and β coefficients in the well known market model :

$$R_t = \alpha + \beta R_{M;t} + \epsilon_t \quad (1)$$

where

R_t is the return on the security in period t ;

$R_{M;t}$ is the return on the market in period t ;

ϵ_t is the residual or non-market related return in period t ;

α and β are the regression parameters estimated using ordinary least squares.

In estimating α and β , it is customary to omit several periods around the date of the announcement of a change to LIFO so that any unusual price behaviour in this period will not obscure the long-term relationship between R_t and $R_{M;t}$.

The difference between the actual return on the security and the return expected if relationship (1) holds can then be determined for each of the omitted periods around the date of announcement. This difference is called the abnormal return :

$$\text{i.e. } \hat{\epsilon}_t = R_t - \hat{R}_t$$

where

R_t is the actual return observed in period t ;

\hat{R}_t is the return predicted for period t by equation (1) (i.e. $\hat{R}_t = \hat{\alpha} + \hat{\beta}R_{M;t}$); and

$\hat{\epsilon}_t$ is the residual return in period t .

Note that $\hat{\epsilon}_t$ is often referred to as the abnormal return on the share because it is the return over and

above the market return.

The second stage in the methodology seeks to examine the residual returns which may be attributable to the event being examined. To further reduce the effect of any price changes not caused by the announcement of a change to LIFO, an average residual is established for each time interval as follows :

$$\bar{u}_t = \frac{1}{N} \sum_{j=1}^N \hat{\epsilon}_{jt} \quad t = -(x-1) \dots, 0, \dots, x$$

where

N is the number of securities examined;

$(x-1)$ is the number of periods before the announcement of a change to LIFO which were omitted in the estimation of α and β ;

x is similarly the number of periods after the announcement which were omitted; and

$\hat{\epsilon}_{jt}$ is the estimated residual of the j^{th} company in period t .

Thus, for example, \bar{u}_{-4} is the average, over all the securities examined in the study, of the residuals in the 4th week before their announcement of a change to LIFO. This helps further remove any market or industry effects because, for example, $\hat{\epsilon}_{1;-4}$ (the residual of the first company four weeks before its announcement of a change to LIFO) and $\hat{\epsilon}_{2;-4}$ (the residual of the second

company four weeks before its announcement) are calculated at completely different calendar dates.

Finally, the average residuals are cumulated as follows :

$$Z_k = \sum_{t=-(x-1)}^k \bar{u}_t \quad \text{for } t = x-1; \dots; 0; \dots x$$

\bar{u}_t and Z_k both have expected values of zero and hence any movements away from zero in a plot of Z_k can be attributed to the announcement of a change to LIFO. It is important to note, however, that some random variation around zero is to be expected and it is only persistent or very marked deviations from zero that should be further examined.

The product of such an analysis is therefore 2x values of cumulative average residuals (CAR's) which are plotted graphically. If the event being studied (in this case the announcement of a change to LIFO) has any informational value, a movement away from zero would be expected at period 0 (the actual date of announcement). Hence, the plot of the CAR's can be used to test both the efficiency of the JSE and the informational content of the accounting change. This is best illustrated by reference to Figures 8.1 to 8.5 (overleaf).

Figure 8.1 would occur if the market were efficient and

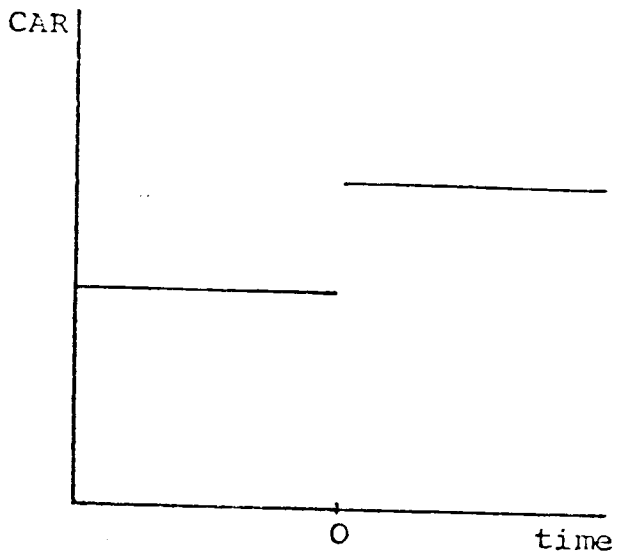


Figure 8.1

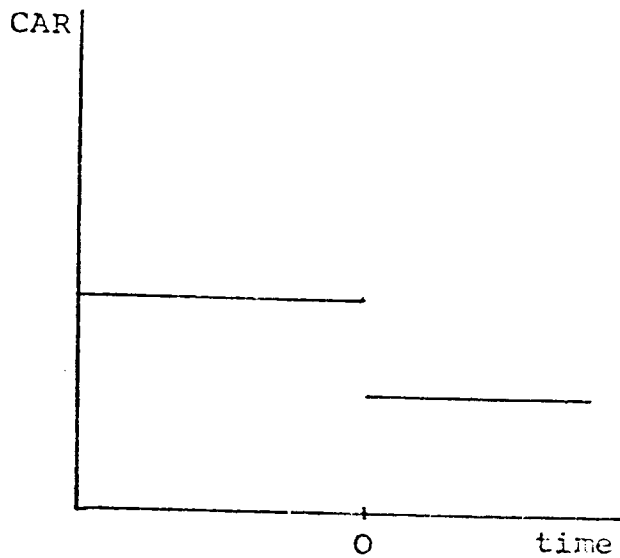


Figure 8.2

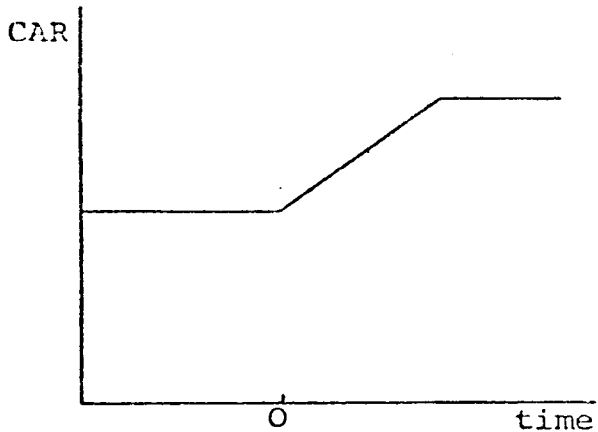


Figure 8.3

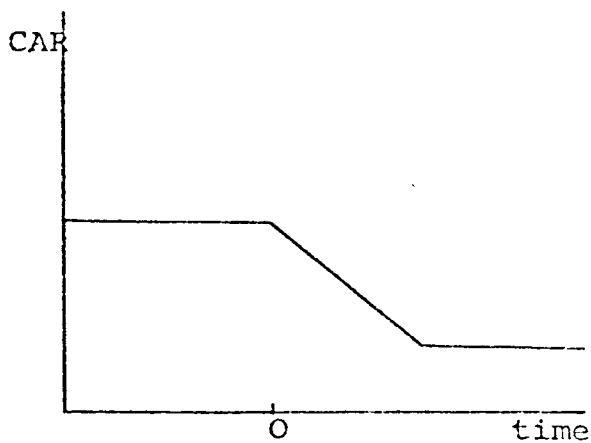


Figure 8.4

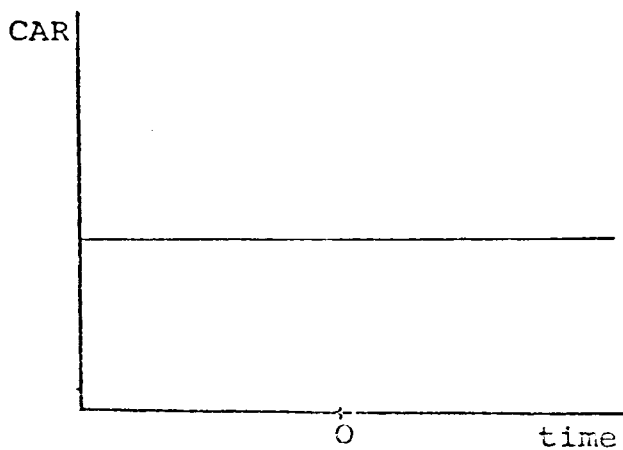


Figure 8.5

there were positive informational value in the announcement. This follows, since the CAR's are constant before the announcement and after the announcement they remain constant, but at a higher level than previously. The market is clearly efficient because it adjusts to the informational content immediately and the informational content of the announcement is positive because the jump is upwards. Figure 8.2 has an identical interpretation except that the informational content is negative.

Figure 8.3 indicates a situation in which the informational content is positive (the CAR's rise after the announcement), but the market is inefficient. This follows since there is a gradual adjustment over several periods to the new equilibrium level resulting from the announcement. Thus the market is inefficient. Figure 8.4 displays the identical reaction except that the informational content is negative.

Finally, Figure 8.5 represents the situation where the informational content of the announcement is zero. This is the only case in which nothing can be said about the efficiency of the market.

It must be noted that Figures 8.1 to 8.5 indicate theoretical behaviour. In practice, the plots of the

CAR's will have some random variation around the straight lines. However, the informational content of the announcement and the efficiency of the JSE can be ascertained from the general shape of the CAR's.

8.4 THE DATA

A survey was undertaken to establish all the firms quoted on the JSE which employed LIFO at 14 November 1980. This resulted in the selection of some 32 firms (see Appendix V). However, only those firms meeting the following criteria were retained in the study :

- (1) All shares must have been quoted continuously from 18 July 1969 to 14 November 1980 (590 weeks).
- (2) The firms must not have undergone substantial changes at any particular time.
- (3) The firm must not only have announced a switch to LIFO, but the effect must also have been quantified. Any reversals on consolidation of LIFO effects would disqualify a firm.
- (4) Because the RDM 100 index was employed as a surrogate for the market, non-industrial firms

were ignored.

- (5) The announcement must have been made at least 35 weeks after the 18 July 1969, i.e. since 20 March 1970 and before 35 weeks prior to the 14 November 1980, i.e. before 14 March 1980.

These criteria resulted in a reduction of the population to 21 shares (see Appendix V).

Even firms making only partial changes to LIFO were considered, for it is the first change to LIFO that is of interest in this study of the accounting change. For example, a firm which converts 50% of its stocks from FIFO to LIFO in one year and the rest in the following year can be viewed as having had an accounting change in the first year only. The change of method in the second year is merely an application of a method already in use. This is further justified when it is considered that the initial change reflects management's partiality to the method.

The Timing of the Announcement

Unlike Sunder (1973) and Brown (1980) who used an arbitrary date of announcement in their studies of the NYSE, an attempt was made in the current study to

establish unequivocally the exact timing of the release. This was achieved by direct contact with the board of directors of each company in the study. The date supplied by the company official was the date on which the firm had released an announcement of the change to the public. This varied from the date the interim results were released to Reuters (press) to the date of posting the annual financial statements. This date was then verified by reference to the source as claimed by the company and the date of the announcement (zero week in this study) was deemed to be the following Friday. Appendix V lists the firms in the study and the date of the announcement. Although it is acknowledged that all market participants will not have received the information simultaneously, by allowing a lag until the following Friday, it is considered reasonable that the information can then be deemed to be publicly available. Clearly, the problem of leakages should be borne in mind, but unfortunately, this factor could not be controlled in the current study.

In order to ensure that the CAR configuration of the study group is peculiar to that group, a number of earlier studies have constructed a control group of firms which were not exposed to the event under consideration. The objective of such control groups is to

establish the randomness of the residuals in periods of non-occurrence of any particular event.

In order to overcome the problems of a non-equivalent control design the current study presents what it refers to as a "quasi-equivalent" control design. Acknowledging the difficulty in matching firms directly, the design addresses the problem of implicit matching. Thus, the control group of non-changers were selected by matching each change firm with a non-change firm according to the following :

- (1) The selection of a shadow firm from the same industry; and
- (2) Employing the selection method of choosing the firm in the industry with the closest valuation of inventories at the date of the change firm's switch to LIFO.

This procedure does not purport to suggest that an equivalent level of inventory holding will result in a similar impact of a change to LIFO if the shadow firm made the change. The implications of a change to LIFO depend on a number of factors including the extent of the change, the stock mix, the rate of price increase for various combinations of stock, etc. As a result, no attempt is made to match equivalent firms and the

level of inventory holding is really a random selection technique. Thus, the selection procedure must be emphasised as being random within the industry. Nevertheless, this approach should eliminate some of the inconsistencies of a non-equivalent control design.

A group of non-change firms was selected and the data collected in the same way as in the case of the study group. The shadow group was subject to the same procedures as the study group and the cumulative residuals were derived. The deletion period for each shadow firm was determined by the deletion period used for each partner in the study group.

Thus, the data used in the study consisted of the weekly closing prices of the 42 selected shares (21 which changed to LIFO and 21 control group securities) from 18 July 1969 to 14 November 1980. As only industrial shares were considered in the study, the RDM Industrial Index was used as a surrogate for the market.

8.5 INITIAL RESULTS

Having selected the firms and constructed the data file, the method of ordinary least squares was used to

estimate the parameters α and β in the market model

$$R_{jt} = \alpha_j + \beta_j R_{M;t} + \epsilon_{jt}$$

where

R_{jt} is the return on the j^{th} security in period t ;

$R_{M;t}$ is the return on the RDM industrial index in period t ; and

α_j and β_j are the regression parameters for the j^{th} security

The data used in the study comprised all weekly returns between 18 July 1969 and 14 November 1980 (590 observations) less 70 weeks around the announcement date which were deleted. The deletion period of 70 weeks consisted of 34 weeks before the announcement, the week of the announcement, and 35 weeks after the announcement. These 70 weeks are omitted from the estimation data lest any unusual price behaviour in the weeks surrounding the announcement obscure the long-term relationship between R_t and $R_{M;t}$.

The actual weekly returns observed in the deletion period were then used to derive 70 residuals for each firm as follows :

$$\hat{\epsilon}_{jt} = R_{jt} - (\hat{\alpha}_j + \hat{\beta}_j R_{M;t}) \quad t = -34; \dots, 0, \dots, 35$$

where $\hat{\alpha}_j$ and $\hat{\beta}_j$ are the OLS regression estimates of α_j and β_j for share j . These residuals were aggregated and averaged cross-sectionally throughout the sample so that 70 average residuals denoted by \bar{u}_t were derived for the entire group of 21 LIFO companies :

$$\bar{u}_t = \frac{1}{21} \sum_{j=1}^{21} \epsilon_{jt} \quad t = -34, \dots, -1, 0, 1, 2, \dots, 35$$

Finally, 70 cumulative average residuals (CAR's) defined by Z_t were derived for the group :

$$Z_t = \sum_{i=-34}^t \bar{u}_i \quad t = -34, \dots, -1, 0, 1, 2, \dots, 35$$

The CAR's were plotted and are presented in Figure 8.6 overleaf.

The interpretation of a cumulative graph is not easy and the approach adopted in this analysis is set out below. The model employed and the aggregation of CAR's should distil confounding events so that the final CAR graph is likely to represent the impact of LIFO only. However, the assumption of the methodology may not be a complete description of reality and thus some of the CAR movement may be due to various other non-random effects albeit diluted on aggregation. In view of this possibility, although the full deletion period will be presented and analysed, the

detailed interpretation and conclusion will concentrate on the 21 weeks surrounding the announcement of the change. Thus the graph will be reproduced with only 22 observations - the CAR's for weeks -11 through +10 (Figure 8.7, page 252). It is submitted that this time period is the most accurate description of the impact. Although arbitrary, the reduced period of examination further diminishes the possibility of confounding events disturbing the expected residuals.

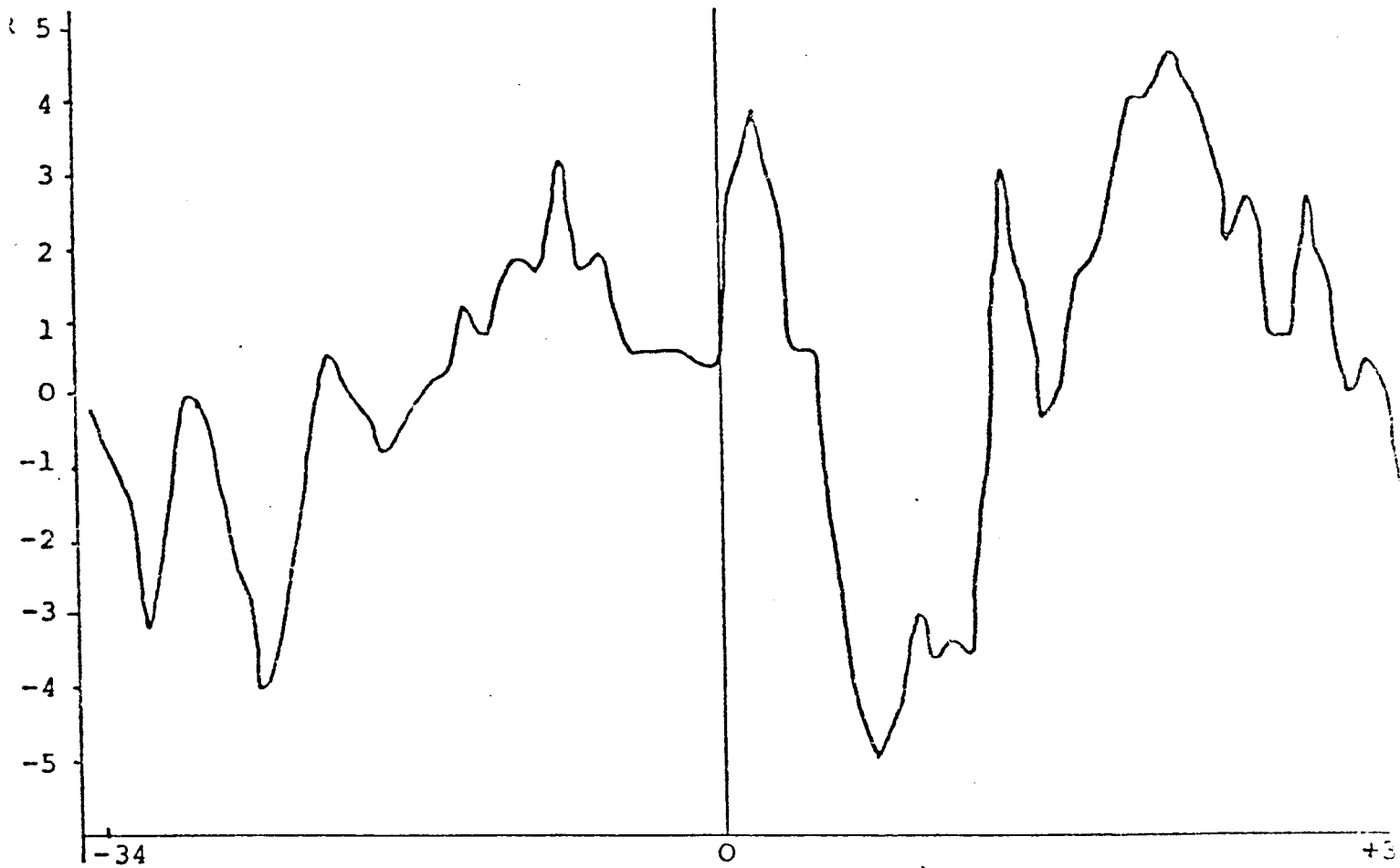
Little time will be devoted to trying to explain in detail the fluctuations observed during weeks -34 through -12 and weeks +11 and +35 as these may be due to spurious confounding events. The full deletion period is presented to give a full perspective only.

As the graphs are cumulative, the absolute position of an observation in any particular week is irrelevant. What is of importance in a week by week analysis is the relative position to the previous week's observation because this measures the CAR for a particular week. Further, in this particular study the period after week 0 (the week of the announcement) is the most interesting. These two factors taken together justify the use of a sliding scale in the analysis of the reduced period graphs. Thus each category's CAR value was equated to zero for week -1.

In order to test the efficiency of the JSE and to ascertain the informational content of a change to LIFO only the graphs of the 21 LIFO firms need be studied. The graph of the quasi-control group in Figure 8.7 is presented only to show how the configuration of residuals is different for the change firms and the non-change firms. That is, the control group clearly shows through Figure 8.7 that the LIFO change group behaves differently on aggregate to the rest of the market. Thus, the announcement of a change to LIFO definitely does have an impact on share price and this is studied below.

Figure 8.6 indicates that initially the CAR's fluctuate between 0 and -4% settling back to 0 in week -15. These fluctuations are fairly random and the cumulative average residual at week -15 is at the expected zero level.

However, for weeks -14 through -9 there does appear to be a certain non-random behaviour. It seems that the change firms experienced a positive abnormal return for six weeks of cumulative value 3%. This is rather difficult to interpret. It may, however, be due to leakages of the impending announcement. Thus, the trading activities of investors with prior knowledge of the switch to LIFO may be responsible for this non-



WEEKS RELATIVE TO THE DATE OF ANNOUNCEMENT

Figure 8.6

random behaviour. It may also, however, be an inexplicable confounding event. This cumulative abnormal return is lost in the following three weeks and the CAR's settle back to the expected zero value for the six weeks up to the week of announcement.

After the announcement there is a definite occurrence of abnormal positive return so that week +1 has a cumulative value of 3,4%; yet, this is immediately followed by a number of successive weekly negative abnormal returns so that the CAR for week +12 is -3,8%! This indicates a very negative impact of a LIFO change, considering the negative abnormal return of -7,2% for the period +1 through +12. Thereafter, there follow rather volatile, although random, fluctuations of the cumulative residuals. It is considered inappropriate to interpret extensively the behaviour of the CAR's beyond week +12.

Turning now to Figure 8.7, attention will be directed to the 11 weeks before the announcement and the 11 weeks after the announcement (including the week of the announcement). Effectively, this assumes the fluctuations before week -11 and after week +10 to be random and not a function of the announcement. Obviously, the longer the period of the analysis the greater the chance of confounding effects, obscuring the reaction to the announcement.

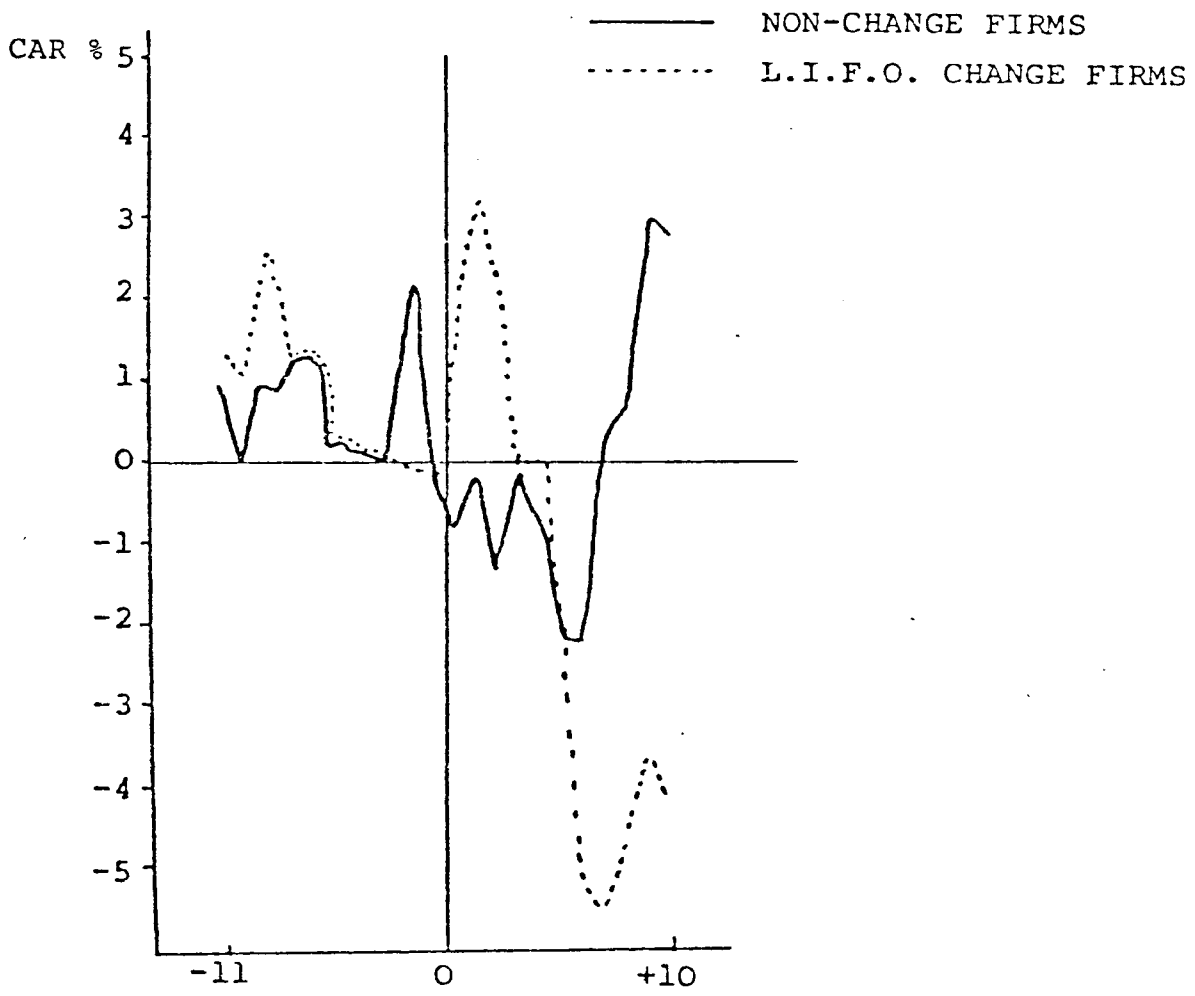


Figure 8.7

Apart from the possibility of a leakage effect, the behaviour of the residuals immediately prior to the announcement is as expected, i.e. a random movement along the zero line.

There is a definite positive reaction in the week of the announcement which is not evident in the control group. It should be noted that the majority of LIFO announcements coincide with the preliminary announcement date and that the alignment date in the control group is in no case the preliminary announcement date. Thus, in view of the results presented in previous chapters, it can be safely concluded that the positive jump in week 0 is associated with the earnings announcements and not with the LIFO announcement. Even if there is a selection bias and LIFO announcements are made only in 'good years' (i.e. coincident with positive forecast error years) or only in 'bad years', the residual pattern does not seem to be systematically affected. The downward drift after week +1 is not really apparent in either 'good news' or 'bad news' announcements (see Chapter 5).

Thus, it would appear that, although there is an initial positive reaction to the earnings information, it seems that there is an overall negative reaction to LIFO of about -4%. Further, it seems that the downward

adjustment has taken at least eight weeks.

This interpretation is not intended to be dogmatic. However, it appears that the potential efficiency exhibited by the rapid initial upward movement is likely to be due to the information content of simultaneous earnings announcements. This is subsequently reversed by an overriding negative reaction to LIFO which seems to be sluggishly impounded. The implication then appears to be that the market is inefficient in respect to this piece of information for two reasons :

- (1) The market appears to be deceived by the negative impact on earnings despite the improved cash position; and
- (2) This negative impounding seems to take a long time.

The obvious implication of this is that an individual who sells short shares of a LIFO switcher would have earned an abnormal return of 4% based on publicly available information.

The movement of the residuals of a quasi-equivalent group of non-change firms followed a random pattern. Although a week by week comparative analysis between

the two would be meaningless, the trend is apparent.

Finally, it must be stressed that the *raison d'être* of the shadow group was merely to ensure that the results of the study were not a function of the model (see Section 8.7 for further suggestions on control group design).

8.6 FURTHER ANALYSIS BY PARTITIONING

The results presented in the previous section were aggregate results for all of the 21 securities examined in the study. However, there may be numerous other factors which might cause the share price of an individual company changing from FIFO to LIFO to behave somewhat differently. Therefore, to examine the effect of a change to LIFO more closely further tests were carried out.

The study group was thus partitioned into pairs according to the following criteria :

- (1) High Beta risk/low Beta risk
- (2) High earnings impact/low earnings impact
- (3) Pre-1979 changes/1979 and post-1979 changes.

The procedure was to classify all firms with a Beta above 0,75 as high Beta firms and those with Beta below 0,75 as low Beta firms. Firms which reported earnings which were less than 80% of the earnings that would have been reported under the FIFO system were classified as high earnings impact firms. That is, firms whose FIFO earnings were reduced by less than 20% were classified as low earnings impact firms.

Finally, the pre-/post-1979 criterion refers to the date of the announcement and not the financial year of the firms.

The result was :

Two groups in category (1) of 11 (high β) and 10 (low β) firms

Two groups in category (2) of eight (high earnings impact) and 13 (low impact) firms

Two groups in category (3) of 10 (pre-1979) and 11 (post-1979) firms

Appendix V shows the date of the change, the Beta values and the percentage by which FIFO earnings were reduced for all firms in the study group.

8.6.1 Relative Risk

It can be argued that the relative risk of a firm is an exogenous intervening variable in the market's interpretation of a change to LIFO, i.e. an outside factor which effects the extent of the reaction. That is, there will be a differential market reaction to the announcement of a change to LIFO by high risk companies and low risk companies. This hypothesis can be examined with reference to Figure 8.8 overleaf.

Prior to week 0 the high risk firms show a definite non-random pattern. Week -9 to week 0 was an almost continuous period of negative returns resulting in an abnormal negative return of 4,5%. In the same period the low risk firms exhibited fairly random residual behaviour. These differences in the pre-change period are extremely difficult to interpret; suffice to say that the abnormal negative return exhibited by the group as a whole prior to week 0 (Figure 8.7) appears to have been caused by the high risk firms. ⁽³⁾

Immediately after the change (i.e. after week 0) there appears to be a differential reaction with the low risk firms showing an average abnormal return of 5,4% in the two week period comprising the week of change and week +1. During the same two weeks the high risk

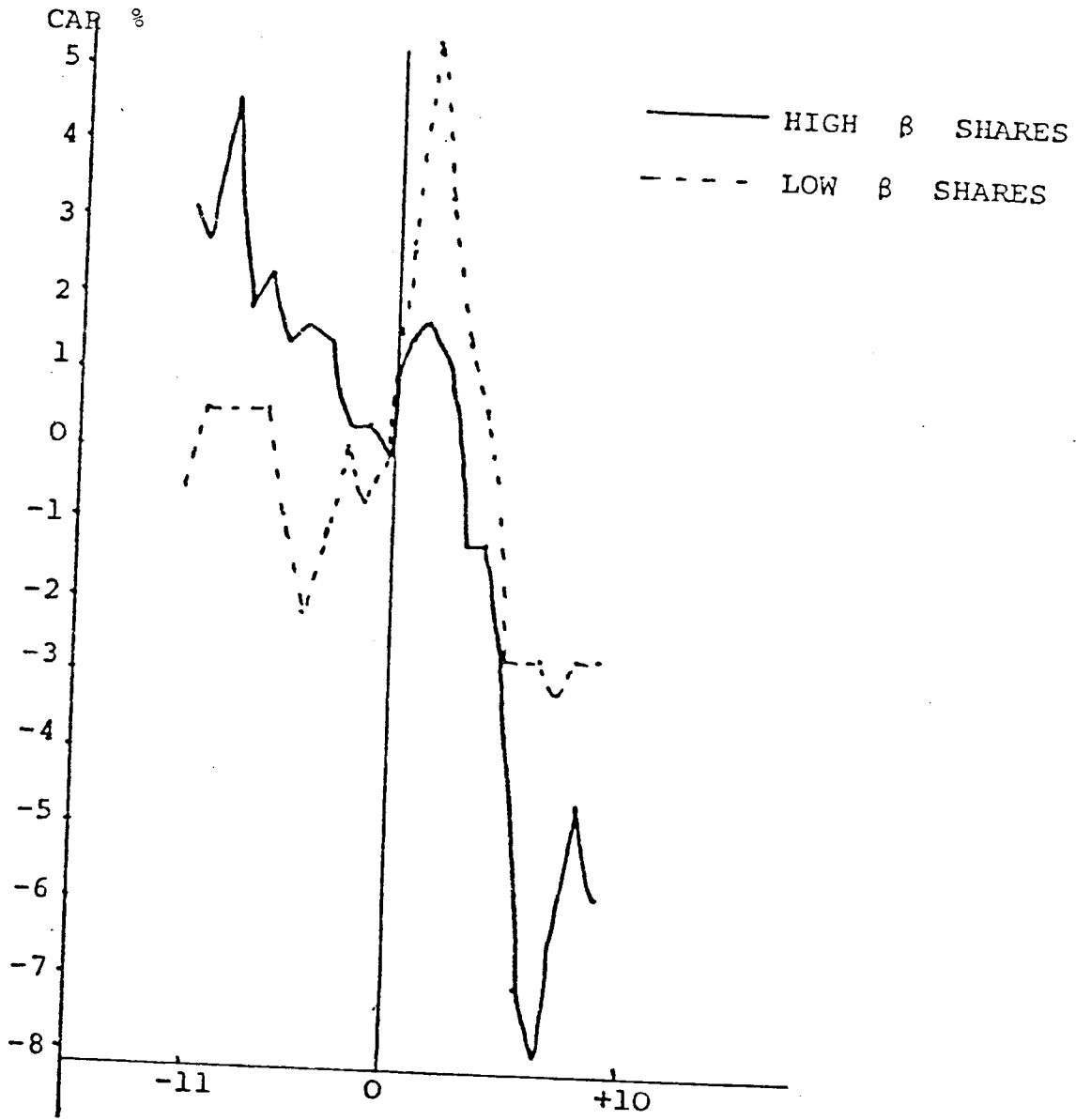


Figure 8.8

firms showed an average abnormal return of 1,6%. Thereafter, there was a period of definite non-random behaviour when abnormal negative returns were earned for six or seven weeks before levelling out.

The reaction in the first two weeks was considerably greater for the low risk firms which suggests that the relative risk is an exogenous intervening variable. This could be explained by the fact that the market is more confident in the management of low risk firms. However, it should be noted that for the next six or seven weeks both firms experience almost identical abnormal negative returns. The interpretation is by no means apparent, but it would appear that although the effect of LIFO was negative on both, the change seems to have had a less severe impact on returns in the case of low risk firms. This may be explained in terms of the market's interpretation of management's motives and expectations. Perhaps the market is sceptical of any changes made by high risk firms. Further, the market may feel the change represents a risky method for an already risky firm to raise extra cash.

It is interesting to note that the market took just as long to impound the information in both cases.

Thus, it is concluded that relative risk seems to be an exogenous intervening variable; however, the impact is negative for both high and low risk firms.

8.6.2 The Effect of Impact on Earnings

It might be hypothesised on the basis of the results presented in the previous section that the market reacts in the direction of the impact on earnings of a change to LIFO and thus the magnitude of the reaction will be directly proportional to the magnitude of the impact on the earnings.

This aspect of the study can be examined with reference to Figure 8.9 (overleaf).

Again, it is difficult to interpret the pre-change pattern and, indeed, it is probably pointless. However, this partition criterion results in two groups which display similar and fairly random configurations of CAR's immediately prior to the week of change. This is to be expected in a period during which no common event with informational value impacted the firms. The pattern after the week of the announcement of a change to LIFO is quite different for each group.

The initial reaction to the announcement was about a

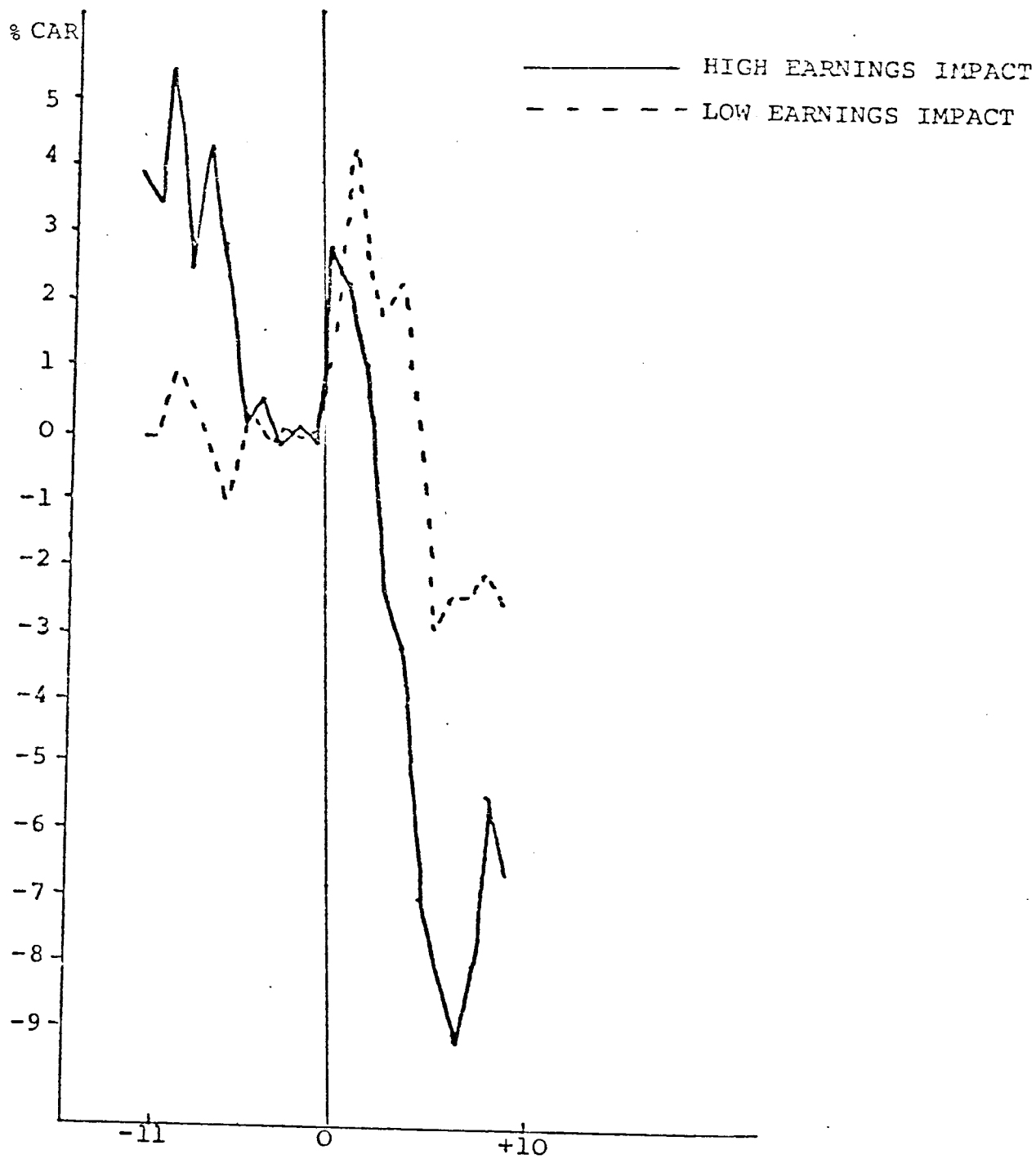


Figure 8.9

4% positive abnormal return in the case of the low impact firms while it was about 3% for the high impact firms. Thereafter, there followed a period of abnormal negative returns for both groups. There was a startling negative abnormal return of approximately 11,5% for the period between week +1 and week +7 for the high impact firms whereas the negative abnormal return for the low impact firms for the same period was only about 7%! Admittedly by week +10 about 2,5% of this had been regained by the high impact firms. It must be emphasised, however, that the returns after week +7 may be part of the expected random return. Week +7 represents the end of a non-random period of abnormal returns, in both cases.

Thus, it appears irrefutable that the market reacts in the direction of the earnings figures and not in relation to the economic implication of the change.

It is interesting to note that in the case of both groups the market once again took the same amount of time to negatively impound its reaction to an announcement of a change to LIFO.

8.6.3 The Effect of Time

The securities examined in this chapter changed from

FIFO to LIFO at different times between 1975 and 1980. As more firms adopted the change so the average investor has become more aware of what the change involves and what it might mean to future dividends. Thus, it is of interest to examine whether there has been any change in the market's assessment as from the early LIFO switches to the more recent switches.

Figure 8.10 (overleaf) presents the plot of the CAR for the pre-1979 change group and the post-1979 group.

As mentioned before, the pre-week 0 period is very difficult to analyse and in the absence of clear proof to the contrary it must be concluded that both groups display fairly similar behaviour. Yet, for the post-week 0 analysis certain differences are apparent.

Both groups had the same initial positive reaction of the same magnitude for the same period. This reversed for both groups in week +2 (CAR +3%). The downward trend, however, persisted considerably longer for the pre-1979 change group and eventually bottomed out in week +11, having experienced a negative cumulative abnormal return of 10,8%. However, the post-1979 change group bottomed in week +7, thereafter a series of positive returns were earned (as there were for the pre-1979 group after week +11).

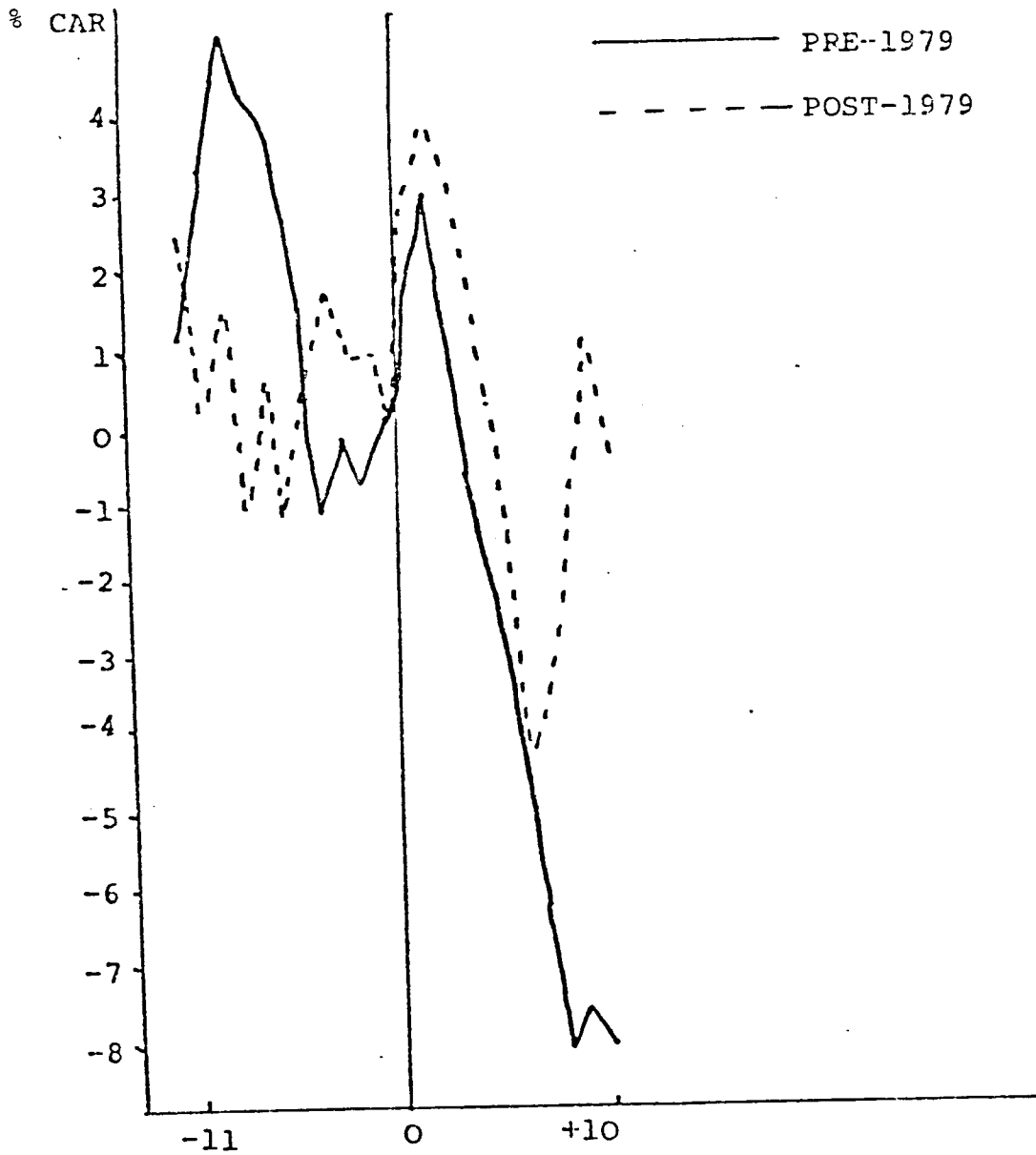


Figure 8.10

This is a very interesting result for it implies that in the case of the most recent changes to LIFO the market reaction has still been negative, but far less severe. The net negative return between week 0 and week +7 for the post-1979 change group was around 4%, while the net negative return for the pre-1979 change group between week 0 and week +11 was 7,8%! This implies that the market reaction has been almost halved in the most recent changes and, furthermore, that the information consumption process may be changing. The other very interesting aspect of this result is that the market impounded the information in the case of the post-1979 change group nearly 40% more quickly than in the case of the pre-1979 change group.

The result is extremely encouraging for it appears as if the market is becoming educated with regard to LIFO and although it still seems to be deceived by the accounting numbers, it is impounding the information more quickly and less severely.

This may be explained by the fact that, as more and more companies start changing to LIFO, the market becomes increasingly aware of the implications of such. However, traditional concern over the accounting earnings figures still seems to prevail.

8.6.4 The Effect of Non-Stationarity in the Market Model

The beta coefficients used in removing the overall market effect were estimated using approximately 10 years of past data. It is possible that if the beta coefficient is not stable over time (which seems to be the case - Affleck-Graves, Money and Carter (1981)), the use of a short-term beta estimate could result in a substantially different configuration of CAR's than that presented in Figure 8.7.

To examine this possibility the beta coefficients were re-estimated and the analysis of the previous section repeated using only short-term periods of data, namely 70 weeks prior to a 70 week exclusion period. No data after the exclusion period were used in view of the potential risk changes that may accompany a change to LIFO. The CAR's so derived are comparatively analysed with the CAR's based on the long-term data and the results presented in Figure 8.11 (overleaf).

It should be noted that the graph of the long-term beta is merely a reproduction of Figure 8.7 for the reader's convenience.

Little formal analysis is required. It is patently obvious that the two graphs are almost identical and

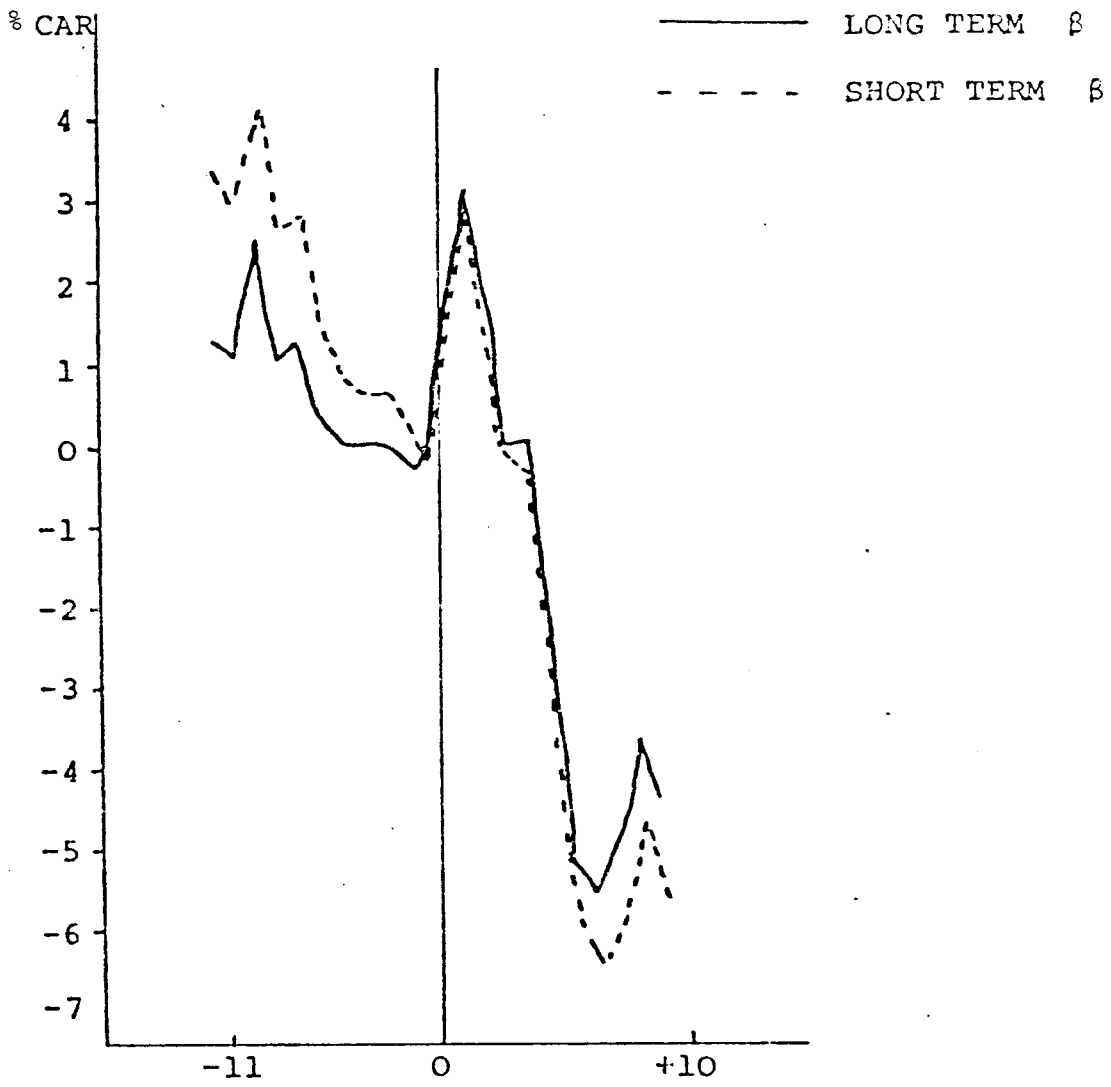


Figure 8.11

would certainly not lead to a different interpretation as to the impact of the announcement of a change to LIFO. Thus, the conclusion drawn is that results based on short-term data would not result in a significantly dissimilar configuration of CAR's. For this reason the potential non-stationarity of beta is not considered to be problematic in the current study.

8.7 CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The results present some very interesting information, and, taken as a whole, provide a certain insight into the process of information consumption by the JSE. To summarise, it appears that the announcement of a switch to LIFO has a substantial negative impact on share returns. This negative impact seems to be directly proportional to the extent to which the FIFO earnings are reduced by the new valuation method. Thus, it would appear that the market reacted to the accounting numbers rather than to the economic message inherent in a change to LIFO.

Further, this negative impact is impounded into prices rather sluggishly. This factor, taken with the reaction to the accounting numbers which was counter-directional to the economic implications, suggests the double

inefficiency of the JSE. Not only was the market unable to see through the accounting numbers, but it took a long time to adjust to the announcement.

However, there is a gleam of hope! The market seems in the case of the most recent changes to be impounding the informational content of a change to LIFO substantially more quickly and although still in sympathy with the earnings figures, the effect has been less drastic. Thus, the market appears to be 'learning' how to interpret the change to LIFO.

It is important to note that an alternative interpretation is possible. The negative abnormal returns observed in the post-announcement period may not be caused by the announcement itself, but may be a function of a selection bias. That is, only a certain type of firm may switch to LIFO, viz. firms in which management anticipate a cash crisis and a change to LIFO represents an effort to avert such. This interpretation implies that the informational value of LIFO cannot be ascertained. Nonetheless, it should be noted that the model was designed to obviate the effects of any confounding events and thus the important conclusion reached by the study is that the announcement of a change to LIFO does have a negative impact on the share price. Whether this is so because of the economic

implications of the change or because the investment public view the announcement of the change as an indication of a possible cash crisis, the model cannot determine.

As far as generalised conclusions on market efficiency are concerned, again a situation specific inference can be drawn, namely that the market is informationally inefficient in respect of the announcement of a change to LIFO. It could be argued that as only 21 firms have been studied, inferences cannot be drawn as to the efficiency of the market as a whole. It is submitted, however, that as the 21 firms represent the universe of LIFO changers (at the cut-off date for this study) and as there are no barriers to the purchase or sale of these shares on the market, the existence of a group of over-valued (according to this naïve market) shares for a number of weeks is unjustified in an efficient market. It is submitted that to be efficient a market must impound all relevant information quickly and unbiasedly so that no shares are over- or undervalued according to the publicly available information set.

Thus, the overall conclusions of this study are two-fold :

Firstly, the efficient market hypothesis is not valid for the JSE. This evidence should be of value to future capital market researchers. However, the market is 'learning' to interpret the change to LIFO, but it cannot be determined whether this is as a result of a growing efficiency in the market itself or of a growing understanding of LIFO.

Secondly, the evidence is that a change to LIFO has a negative impact on share returns directly proportional to the negative impact on earnings. Thus, the investing public appears to be more concerned with the magnitude of the accounting numbers than with the economic benefits which may accompany a change in accounting procedure.

There are three areas in which further research into the market reaction to LIFO changes would be useful :

(1) The Monitoring of Future Changes

Given that the more recent announcements received a less significant negative reaction, it would be of interest to continually monitor the market's reaction to LIFO changes. In the last year there have been a number of such announcements which should provide useful input data to future research.

(2) The Investigation of Any Differential Reaction to
'FLIP-FLOP' Announcements

A number of the more recent changers to LIFO have exercised the so-called 'Flip-Flop' option. That is, they have reversed the effect of LIFO on consolidation by increasing stock values and profits of the group to a FIFO basis, whereas taxable income is based on the LIFO method.

It would be interesting to establish whether the 'flip-floppers' are negatively discounted in view of the fact that reported earnings are not reduced. If this were the case, it would evidence a naïve market which was fooled by purely bookkeeping entries. Alternatively, if there were no differential reaction, it may imply that the market viewed a switch to LIFO as bad news for a reason other than the negative impact on earnings. In such a situation, no inference could be drawn on market efficiency.

(3) The Introduction of a LIFO Control Group

This study (and others) use a control group of FIFO firms as a benchmark against which to measure the

reaction to LIFO. It would be extremely interesting to set up a control group of LIFO firms, i.e. in years other than the year of the change. This may be a more meaningful benchmark since the residual pattern observed may be peculiar to LIFO firms and not to first time users of LIFO.⁽⁴⁾ This would necessitate an entirely different interpretation.

FOOTNOTES : CHAPTER 8

- (1) This chapter is essentially a paper published by the author and his thesis supervisor in the Investment Analysts Journal, June 1983. The paper was based on an aspect of the author's Master of Commerce dissertation (see Knight and Affleck-Graves (1983)).
- (2) In a recent paper, Ricks (1982), using a different research design, reports the announcement of LIFO to have a negative effect on share prices.
- (3) The sign of the simultaneously released forecast error may be responsible for this difference.
- (4) A suggestion by William Beaver.

CHAPTER 9CONCLUSIONS TO PART 2

This chapter serves as a brief synopsis of the conclusions drawn in the four studies reported in this part of the dissertation.

Part 2 has focused on one specific aspect of the relationship between accounting data and the behaviour of share prices, viz. the reaction of share prices to company announcements.

Chapter 4 provided a general background and description of various approaches to investigating the information content of accounting data.

Chapters 5 through 8 report the results of four separate studies, the major conclusions of which are summarised below.

Chapter 5 : Annual Earnings Releases

Using the API approach employed by Ball and Brown (1968), an asymmetrical market reaction to 'bad news' and 'good news' was detected : whereas the 'bad news' portfolio

performed abnormally badly in the year prior to the preliminary report, the converse did not apply to the 'good news' portfolio.

There was evidence of a positive reaction to both types of announcements, although the magnitude of the reaction did seem dependent on the sign of the annual earnings forecast error. The reaction to the positive forecast errors was easily twice as great as that to the negative forecast errors. As with the Ball and Brown (1968) results, there was an association between the sign of the earnings forecast error and the sign of the annual abnormal performance.

Under the Absolute Residual Analysis approach, a significant information content was detected in all three official company releases in the following order of importance : (1) the preliminary report, (2) the interim report, and (3) the annual report.

It was further concluded that the preliminary report provides a significant proportion of the firm's specific information impounded into share prices.

Chapter 6 : Half-Yearly Earnings Releases

Extending the Chapter 5 analysis, earnings expectations

were modelled on half-yearly earnings. The results indicate that the second-half report which is cumulative has a significantly greater information content than the first-half report.

However, pooling all half-yearly announcements, the asymmetry reported in the Chapter 5 API plots was not as apparent. There was, however, an indication of a certain market inefficiency in that there was a certain non-random residual drift in the weeks immediately after the announcements. Comparing the performance of investment strategies based on half-yearly and annual earnings data, it was concluded that the half-yearly reports do provide an incremental information content.

Chapter 7 : The Information Contents of Dividends

An attempt was made in Chapter 7 to determine the extent to which the simultaneous announcement of dividends confounded the analyses of Chapters 5 and 6.

Using the Fama and Babiak (1968) dividend model, a similar result to that reported by Watts (1973) on the NYSE was reported. Dividends appear to transmit little information content and consequently there

will be no confounding effect in the aforementioned studies. These conclusions were supported by tests using two additional research designs.

A by-product of the research reported in this chapter was evidence of an association, albeit weak at the individual share level, between the magnitude of the earnings forecast error and the magnitude of the annual abnormal share performance. This supports the conclusions of Chapter 5.

Chapter 8 : Market Reaction to LIFO Changes

The final study reported in this part concluded that the JSE reacts naïvely to the announcement of an accounting policy change to LIFO. Using a similar methodology to that reported by Sunder (1973), the reaction appears to be significantly negative. Furthermore, the full impact appeared to be spread over a number of weeks. A most significant aspect of these results, however, is that although based on a different data set using different programs, etc., an initial positive reaction in the week of the LIFO announcement was apparent. This result and the result in Chapter 5 are, therefore, mutually supportive. Clearly, the sharp positive reaction in the week of the LIFO announcement is a general phenomenon associated

with all earnings announcements. The LIFO study confirms the Chapter 5 study in so far as a different data set and slightly different research design were used.

A differential reaction to LIFO was, however, detected between high risk and low risk firms. Furthermore, the reaction is proportional to the size of the reduction of FIFO earnings.

Finally, it was concluded that the market may be undergoing a certain learning process *vis à vis* LIFO in that the more recent changes induced a smaller negative reaction and the adjustment period was shorter.

The chapter concluded that the JSE appears inefficient with respect to the informational content of the LIFO earnings announcement.

Overall Conclusions and Implications

It seems clear that the Johannesburg Stock Exchange does not display the same characteristics as the New York Stock Exchange *vis à vis* the association between accounting data and the behaviour of share prices.

The local market seems to exhibit a certain inefficiency as evidenced by the LIFO reaction and the non-random

drift in price residuals after half-yearly earnings announcements.

It seems that Johannesburg prices may not reflect a particularly rich information system and this information system seems significantly dominated by the published accounting data.

The parallel with the NYSE lies in the finding that dividend announcements do not appear to transmit any information.

The major implication of these results, taken as a whole, is that there seems to be a significant responsibility on financial reporters to publish information more frequently (for example, quarterly results) and more timeously, i.e. as soon after the end of the reporting period as possible.

It seems that the informational objectives of financial reporting are being met to the extent that decision useful information is perceived in the accounting data. To what extent the current reporting regime provides the optimal information set is an open issue.

In a sense, the results may be interpreted as an indictment of the Investment Analyst community in

South Africa. One would expect serious analysis to pre-empt the information content of earnings from more timely media than the preliminary report.

A major implication of these results for researchers and policy makers is the necessity for local research. Not all aspects of foreign research results are likely to hold in the South African environment and an excessive reliance on results from abroad could be hazardous.

Finally, it is emphatically emphasised that the results of these studies and the various conclusions drawn are jointly conditional upon :

- (1) The market model from which the various price residuals were derived;
- (2) The earnings and dividend expectations model employed; and
- (3) The specific research designs used to manipulate the data.

The third and final part of this dissertation will investigate another aspect of the association between published accounting data and the behaviour of share prices, viz. information and risk.

P A R T 3

ON INFORMATION AND RISK

The final chapter of this dissertation is presented as a separate part since the subject matter, although concerned with published accounting data and share prices, represents another dimension separate from the empirical work presented in Part 2.

For the convenience of the reader, a certain amount has been duplicated to avoid a repeated reference to Parts 1 and 2. This deals mainly with a description of the models employed which, although described in Chapter 4, are summarised in Section 10.3.2.2.

The objective of this part is to explore the potential relationship between information and market determined measures of risk.

CHAPTER 10ON INFORMATION AND RISK10.1 CHAPTER SUMMARY

This chapter briefly reviews the empirical literature on the relationship between published accounting data and market determined risk measures.

This review is followed by the construction of a research design, centred around the increased disclosure requirements of the 1973 Companies Act, to investigate the possibility that certain non-disclosures may in themselves constitute a determinant of market risk.

The results of an empirical study of the relationship among four market risk measures (σ^2 , β , R^2 , β/R) and two financial information systems, represented by the annual turnover (sales) series and the annual funds statement series reported by individual firms, are presented.

The major tentative conclusions are :

- (1) The voluntary disclosure of sales and a funds statement appears to have reduced the relative risk measured by β , implying that the non-disclosure *per se* resulted in an increased risk.
- (2) The voluntary disclosure of sales alone appears to have reduced the risk measured by the other aforementioned three measures.
- (3) The non-disclosure of sales seems to dominate the non-disclosure of a funds statement as a determinant of risk, although the non-disclosure of both results in a higher level of risk than with either, separately.

10.2

BACKGROUND10.2.1 Objectives

There is a wide body of opinion that the primary purpose of Financial Reporting is the provision of information useful to economic decision making and that a significant constituent of the primary user class is the equity investor.

In the most general single-person setting, useful information must have the potential to change the decisions (actions) that would prevail in its absence. For an information system to have informational value the expected utility of the optimal action in the post-signal setting must exceed that in the pre-signal setting.⁽¹⁾ Only some of the signals emerging from a system need alter only some of the prior probability estimates of potential outcomes.

Mean-Variance Portfolio Theory provides a more specific individual investor setting. It can be shown that in such a setting the only firm specific parameter relevant to the equity investment decision is the systematic risk measure (Beta β). Logically therefore, only information which has the potential to change β estimates can be considered useful.

(1) Footnotes appear at the end of the chapter, page 341.

The primacy of the equity investor among users of accounting information and the uniqueness of β in equity investment decisions highlight the relationship between firm specific information and systematic risk as the most significant in the financial reporting process. Insights into the economic determinants of β , the association between accounting data and β , and the rôle of information in the determination of β should be of interest to all associated with financial reporting.

It is, therefore, not surprising that much research attention, both theoretical and empirical, has focused on these issues.

Financial Economists seem to have been primarily interested in the economic determinants of β , while accounting researchers have tended to concentrate on the association between accounting data and β . This study aspires to contribute to these lines of research by investigating the possible rôle of information non-disclosures as determinants of β .

10.2.2 Literature Survey

The theoretical works on the economic determinants of β have focused primarily on the capital structure of the firm as a significant determinant. Hamada (1969, 1972), Rubinstein (1973), Conine (1980) and Bowman (1979) have

contributed to the development of an analytical framework to describe the relationship between β and capital structure. This framework was first suggested by Hamada (1969) and represents a synthesis of portfolio (and capital pricing) theory with the Miller-Modigliani (MM) propositions on corporate debt policy.

The framework suggests that systematic risk (β) is composed of two elements (1) systematic operating risk (β_{asset}) and (2) financial risk which increases with increased debt. Thus capital structure is a determinant of β in that it determines financial risk. The suggested relationship between β and capital structure is not simple and appears to be positive though non-linear and multiplicative.

Lev (1974) developed an analytical argument which prescribed operating leverage (Fixed costs : Variable costs) as a determinant of systematic risk. Conine (1982) proposes a more general framework for the determinants of operating risk including operating leverage.

The empirical works, however, have to some extent been contradictory. Hamada (1972) presents evidence that capital structure contributes between 21% and 24% of the systematic risk across firms. Rosenberg and McKibben (1973), Logue and Merville (1972), Melicher and Rush (1974), Beaver, Kettler and Scholes (1970), Bildersee (1975), Belkaoui (1978)

and Dhingra (1982) all report evidence of a positive relationship between capital structure and β .

However, the explanatory power of capital structure in the multiple regression-based studies by Thompson (1976), Breen and Lerner (1973) and Lev and Kunitzky (1974) was not significant.

These studies neither support nor refute the proposed analytical relationship between β and capital structure. In fact, no attempt to evaluate directly the Hamada-Rubinstein framework is evident, probably indicating the difficulty of such an exercise.

Lev (1974) provides evidence consistent with his proposed analytical relationship between β and operating leverage, that is, as operating leverage is increased, β increases.

The work of Robichek and Cohn (1974) attests to the dependence of β on the macro economic environment.

The studies on the association of market determined risk and accounting data, have been mainly correlation studies, both univariate and multivariate. Consequently, the works render evidence of the joint hypothesis that the market uses the accounting data in its risk estimation and/or that the market and accounting measures are

being determined independently by, and reflect the same real events.

The accounting datum which has attracted the most attention in the literature is the so-called accounting Beta (β_{acc}). This is a derived datum (i.e. not reported by firms) that measures the covariability of a firm's accounting returns with the accounting returns of all firms, relative to the average variability of the accounting returns of all firms.

In the literature, accounting returns have been defined as either

- (1) Book earnings before interest as a proportion of book assets (β_{acc} asset); or
- (2) Book earnings after interest as a proportion of book equity (β_{acc} equity).

Ball and Brown (1969) were the first to introduce this concept of β_{acc} into the literature, yet their specification of the measure was not a true accounting β at all. They defined "return" as book earnings attributable to common shareholders as a proportion of market capitalisation. Their results, not surprisingly, indicate a high association between this measure and the market β . Beaver, Kettler and Scholes (1970) also found a high association between β and β_{acc} (à la Ball and Brown). Gonedes (1973) pointed out the anomaly of using a hybrid

β_{acc} and having redefined β_{acc} in purely accounting terms reports a significantly weaker association between β and β_{acc} . Beaver and Manegold (1975) criticised Gonedes' measurement errors and in a very comprehensive study tested the association between β and the three accounting β 's mentioned. While they report a significant association between the pure β_{acc} 's and β , these are considerably less associated with β than the Ball and Brown hybrid. The β_{acc} equity appears to be more significantly associated with β than β_{acc} assets.

Beaver, Kettler and Scholes (1970) measured the association between a number of other accounting risk measures and β at both the firm and portfolio levels. All data were associated with β individually (i.e. a univariate approach). As would be expected, the association between portfolio averaged accounting risk measures and portfolio β was more significant than the corresponding association at the firm level.

Bildersee (1975), using a multivariate association approach, reports that accounting data in conjunction with other non-accounting decision variables, are better determinants of β than either category separately.

Belkaoui (1978) and Dhingra (1982) carried out similar association tests on Canadian data and report results coincident

with the American studies.

On the theoretical front, Bowman (1979) has developed an interesting analytical model relating market and accounting β 's. Hill and Stone (1980) use a risk composition approach to explain β in terms of accounting variables.

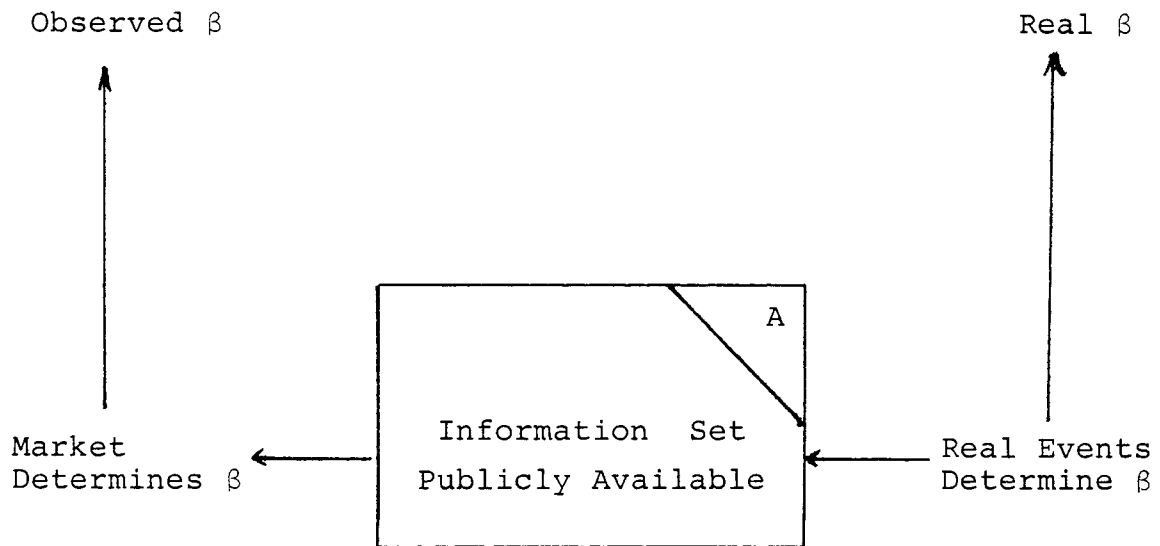
All this research has been carried out in just over a decade and the advances, both theoretical and empirical, have been formidable. However, while the results may provide invaluable insights into the potential use of accounting data in the prediction of β , little insight has been achieved into the rôle of accounting information *per se* in the assessment of β by the market.

10.2.3 Information and Risk - Some Reflections

The theoretical studies implicitly assume away the information aspect in so far as the assumptions of the Capital Asset Pricing Model (CAPM) and the MM propositions are invoked. These include the notion of informationally efficient securities markets: in other words, security prices are said to reflect all relevant information and for this to hold, all incremental information to the set already available would need to be impounded into prices instantaneously and in an unbiased fashion. This hypothesis of efficient securities markets,

known as the Efficient Market Hypothesis (EMH), assumes by implication that there is a market for information which is frictionless. In such a setting, it is obvious that the market estimate of β would be the 'correct' one i.e. the true *ex ante* β estimated by the market in a rich informational setting (see Fama, 1970). Intuitively a real β can be imagined as the β the market would estimate given a total description of all firms in the market. The EMH implies that the observed (*ex post*) market estimates (derived *via* the diagonal model) will perfectly reflect the underlying true β . The real events which determine the true β will be adequately captured by the available information set which in turn will be unbiasedly impounded into share prices. Accounting data occupy only a subset of available information and as indicated above any observed association between this subset and observed β could indicate (1) that the accounting data transmit information about the real events to the market, or (2) that the accounting data reflect the same real events as the data that do transmit information to the market. These intuitive relationships are illustrated in Figure 10.1 (overleaf).

This portrayal of relationships is obviously artificial in the sense that no real β exists separately from the information system describing the real events which determine β . Thus in the extreme case of no information,



A = Accounting Data

Figure 10.1

the market would not price the share and thus no β estimate would be obtained. This extreme example is not really insightful into the relationship between information and risk except in so far as it illustrates the inextricable link between the two.

At the other extremity, in a setting with complete information, the mapping between the real determinants of β and the market estimates is without distortion. It is in this latter setting that most of the empirical and theoretical work has been couched by implication. Given the voluminous evidence supporting the semi-strong EMH on the New York Stock Exchange (NYSE), American accounting researchers have assumed this mapping between real events and market estimates is non distortive. Consequently, the thrust of this research effort has been directed to examining the relation of the accounting subset to the overall set of available information. More specifically, the study of the relationship between accounting risk measures and market determined risk measures, as reviewed, has been concerned with the extent to which the accounting subset captures the real events (and therefore may be useful predictors of β) and the extent to which the market uses the accounting data.

The efficient market's research has provided a clear and rich setting in which to assess the rôle of financial reporting and as such constitutes a most significant line of research

in accounting. If it is accepted that the market will use as wide an information set as possible and that relevant information is impounded into prices efficiently, then what should be of concern to the financial reporter is the relationship between the accounting data and the overall information set. More specifically, the objectives of financial reporting will only be achieved where the accountant has a comparative advantage in information production and accounting represents the most cost-effective alternative to describe the real events impinging on the firm. Thus research into the relationship between the accounting subset and all other information is of interest.

It may also be of interest to consider certain data which are outside the publicly available information set and the extent to which this may distort the market's perceptions of the reality of the firm.

Obviously if the market was unaware of the existence of a potential information system to which it was being denied access, the distortion would constitute the lost unique perspective of real events that affect β , which may never be detected.

An interesting case is the situation in which the market is aware that it is being denied access to the system. Does the market estimate the perspective that would prevail through access to the system? Does the market

rate the firm as being more risky for the lost perspective? Does the market rate the firm more risky for the non-disclosure *per se*?

The balance of this chapter attempts to provide some further insight into these reflections. In contrast to other works in the literature, this study admits the possibility that certain information structures may distort the mapping between the real β and the market estimates.

10.3

EMPIRICAL STUDY10.3.1 Approach and Hypothesis

It is rather difficult to construct experiments to evaluate and answer the questions raised in the previous section and any such experiments are likely to be imperfect for it is not normally possible to observe market reaction (change in risk estimates) to accounting systems from which it is being deprived access. This is so for three obvious reasons; (1) such systems may not exist; (2) given that such systems exist, the researcher is never sure that the market is aware of their existence and its denied access; and (3) having overcome the first two hurdles, it would be almost impossible to control for cross-sectional differences among firms.

The disclosure requirements of the South African Companies Act, Act. No. 61 of 1973 (1973 Act) provides a potentially interesting vehicle to circumvent the problems indicated.

The 4th Schedule of the 1973 Act substantially expanded the mandatory disclosure requirements of its predecessor, the 8th Schedule of the 1926 Act. However, certain listed companies voluntarily disclosed certain of these requirements prior to the passing of the 1973 Act. A natural setting thus prevails to control cross-sectional differences (see Figure 10.2). For reasons indicated in Section 10.3.2.1

below, the information systems chosen were those reflected by annual turnover and the Funds Statement.

The fact that certain firms were voluntarily disclosing information prior to the 1973 Act indicates the market's awareness that it was being denied these data by the non-disclosure firms. The differential disclosure policies of firms with respect to certain items prior to the mandatory disclosure requirement of such information provides a useful control for cross-sectional comparisons of risk estimates. Thus, the impact of the enactment can be monitored by observing any differential risk ratings in the period after enactment. The arrows on Figure 10.2 reflect the cross-sectional and longitudinal comparisons that are possible and, indeed, are attempted in this study.

The approach will be to evaluate changes in risk measures before and after enactment for various categories of disclosure/non-disclosure groups of firms and to compare the significance of any changes across categories.

The following three categories of competing hypotheses are to be tested :

Series A Hypotheses - An Increase in Risk

If non-disclosure firms display an increased risk in the

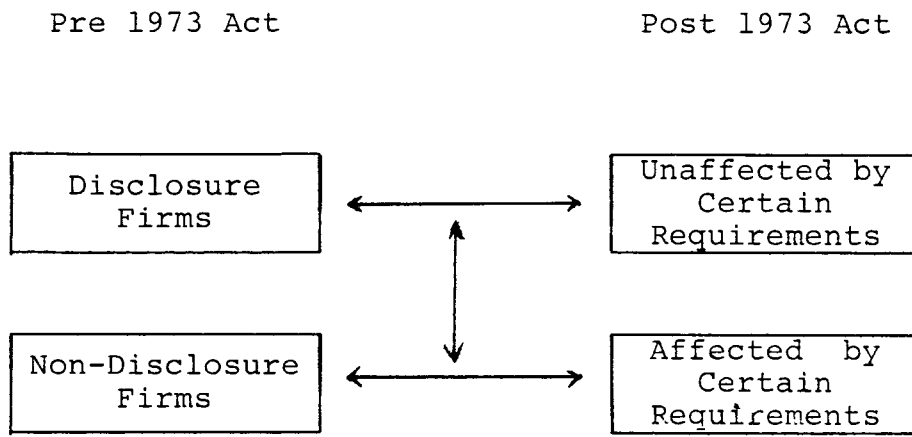


Figure 10.2

post enactment period relative to disclosure firms, the result would be consistent with the following hypotheses :

- (1) The market systematically underestimated the true risk of the firm in the pre-enactment period.
- (2) The market did not attempt to guess the implications of the lost information which, when once revealed, reflected a more risky reality than that described by the pre-enactment information set.
- (3) The non-disclosure *per se* reduced the risk of the firm in the pre-enactment period. It is unlikely that the market would pay a premium for less information.

Series B Hypotheses - No Change in Risk

If there is no change in risk or no difference in the change experienced by the various groups, the following rather uninteresting hypotheses may be supportable :

- (1) The disclosures have no impact on risk.
- (2) The market derives the information from alternative sources.
- (3) The market is efficient in the strong form of the EMH and even inside information is reflected in share prices.

Series C Hypotheses - A Reduction in Risk

If non-disclosure firms are found to be rated as less risky after enactment relative to disclosure firms, the supportable hypotheses would be :

- (1) The market consistently overestimated the real risk prior to disclosures.
- (2) The market did not attempt to guess the implications of the lost information which, when once revealed, reflected a less risky reality than that described by the pre-enactment information set.
- (3) The non-disclosure *per se* resulted in an increased risk rating of firms by the market. That is, the market would be paying a premium for information.

10.3.2 Methodology and Data

10.3.2.1 Choice of Accounting Information Systems

A comprehensive survey was undertaken on the disclosure policies of all companies for which share price data were available for the full 11 year period 1 January 1969 through 31 December 1979 - 95 companies in total. It was apparent from this survey that for most of the specific disclosure requirements of the 1973 Act, the majority of firms had similar disclosure policies in the pre-enactment period. Thus the cross-sectional control feature is lost for these particular items.

The criteria to select a disclosure requirement for inclusion in this study were :

- (1) At least 30 companies must have been disclosing the item voluntarily before the 1973 Act was promulgated (Disclosure firms); and
- (2) At least 30 companies were not disclosing the item during the same period (Non-disclosure firms).

It is necessary to have reasonably sized groups representing the differential disclosure policies in order to remove (by averaging) any non-common distorting characteristics in a group. Although 30 was necessarily arbitrary, it is unlikely to introduce any bias in the selection of disclosure items as for all requirements (other than the two selected) at least 90 of the 95 companies had similar disclosure policies.

The only two items which met the above criteria were :

- (1) The disclosure of annual turnover;⁽²⁾ and
- (2) The presentation of a Funds Statement.⁽³⁾

The following groupings were obtained (see Table 10.1 overleaf) :

TABLE 10.1

	Funds Statement		Total
	(D)	(ND)	
Turnover (D)	28	3	31
(ND)	35	29	64
Total	63	32	95

Key :

D = Disclosed prior 1973

ND = Not disclosed prior 1973

The critical issue in testing the hypotheses seems to be :

- Would the 'information systems' provide a unique perspective of the firm to the market? The two elements to this question are :

- (i) does the variability (co-variability) of turnover (cash flow) affect risk?
- (ii) is the market able to assess the risk implied by these measures (if any) from alternative information sources?

The answers are not obvious. Although little theoretical work has been developed on the relationship between turnover and risk, Bowman (1979) presents an analysis of the relationship between earnings covariability with market earnings and systematic risk (β). He argued that no obvious (direct?) relationship existed between total variability of earnings and β . As turnover is likely to be highly correlated with earnings, there is not likely to be a direct link between turnover variability (or covariability) and β . Earnings were disclosed at all times by all firms in this study and given its relationship with turnover, it is unlikely that the disclosure of turnover would provide any incremental insight on risk.

Although cash flow variability (or covariability) may be a determinant of β , fluctuations in the year to year cash position may well be used by the market as a surrogate where

a full funds statement is not provided.

It is likely therefore, that any observed change in risk associated with a change in disclosure policy is attributable to the prior denial of access *per se*, rather than any new perspectives attained.

10.3.2.2 Choice of Risk Measures

Prior to the development of modern portfolio theory, "risk" was not rigorously defined and tended to be dealt with in many investment texts in a loose, intuitive way. The seminal work of Markowitz (1952) formalised risk and defined the risk of a share as being the variance (σ_1^2) of its return (period to period price change). He showed that variance was a complete measure of risk under certain assumptions. These naturally restrict the use of variance to a setting where these assumptions are valid. It would appear that prices behave as if these assumptions are valid.

Markowitz (1952) showed that the variance of return on a portfolio of assets could be dichotomised into a systematic element (non-diversifiable) and an unsystematic element (diversifiable). If equal weights are given to each asset, then notationally :

$$\sigma^2(R_p) = \underbrace{(1/N) \overline{\sigma^2(R_i)}}_{\text{Unsystematic}} + \underbrace{\left(\frac{N-1}{N}\right) \overline{\sigma(R_i R_j)}}_{\text{Systematic}} \quad (1)$$

where $\sigma^2(R_p)$ is the variance of the return on the portfolio

$\overline{\sigma^2(R_i)}$ is the average variance of the return on N assets in the portfolio

$\overline{\sigma(R_i R_j)}$ is the average covariance of each constituent's return with the return of every other constituent ($i \neq j$)

The unsystematic risk is composed of the variances of the constituents and is diversifiable because the contribution of this element to the total risk of the portfolio can be driven to zero by increasing the number of assets in the portfolio (N).

Systematic risk, on the other hand, cannot be driven to zero and is determined by the covariability among the returns of the constituent assets (i.e. shares).

The total variance of a particular share (σ_i^2) is not of obvious importance to the well diversified investor (i.e. unsystematic risk = 0). Furthermore, the variance of the return on a share is likely to be independent of the covariability of these returns with the returns of all other shares.

These insights provided by Markowitz have been pivotal to the development of modern finance. However, the application of the Markowitz model is severely limited by the formidable extent of parameter estimation - $(N.(N+1)/2)$ estimates are necessary.

Sharpe (1963) introduced a model (the diagonal model) which dramatically simplified the Markowitz approach.

This model dichotomises the return of a share into systematic and non-systematic components, analogous to the Markowitzian decomposition of portfolio risk. These components respectively reflect a common movement with the average return of all shares and a unique movement specific to a particular share.

$$\tilde{R}_i = \alpha_i + \beta_i \tilde{R}_m + \tilde{\epsilon}_i \quad (2)$$

$\alpha_i + \tilde{\epsilon}_i$ represents the individualistic component

$\beta_i \tilde{R}_m$ represents the systematic component

The total variance of a share's return is thus equal to the variance of these two components. (Notice that the variance of $\alpha = 0$.)

Therefore :

$$\sigma^2(R_i) = \sigma^2(\epsilon_i) + \beta_i^2 \sigma^2(R_m) \quad (3)$$

and the total variance of the portfolio return would be

$$\sigma^2(R_p) = \frac{1}{N} \overline{\sigma^2(\epsilon_i)} + \overline{(\beta)^2} \sigma^2(R_m) \quad (4)$$

where for (2), (3) and (4)

$$E(\tilde{\epsilon}) = 0$$

$$\sigma(\tilde{R}_m, \epsilon_i) = 0$$

$$\sigma(\tilde{\epsilon}_i, \tilde{\epsilon}_j) = 0$$

$$\tilde{R}_i = \text{return on share } i$$

$$\tilde{R}_m = \text{return on all shares (market return)}$$

$$\tilde{\epsilon} = \text{a portion of a share's return independent of market return}$$

$$\alpha_i, \beta_i = \text{intercept and slope associated with the linear relationship of (2)}$$

$$\overline{\sigma^2(\epsilon_i)} = \text{mean of the variance of individualistic factors}$$

$$\overline{\beta} = \text{mean of the } \beta \text{'s of each share in the portfolio}$$

$$\sigma^2(R_m) = \text{the variance of market return}$$

As the number of shares in a portfolio increases, the variance of the portfolio's return tends to $\overline{(\beta)^2} \sigma^2(R_m)$. Clearly, the impact of an individual share on portfolio risk is measured by β_i , not $\sigma^2(\epsilon_i)$.

The only firm specific parameter that should be of any concern to the diversified investor is β_i which measures

the covariability of a share's return with the market return, relative to the variance of the market return. Thus, algebraically we can write

$$\beta_i = \frac{\sigma(R_i, R_m)}{\sigma^2(R_m)}$$

From this normative approach in portfolio analysis, Sharpe (1963) and others developed a descriptive (positive) approach to determine how shares are priced. This resulted in the famous Capital Asset Pricing Model (CAPM) which is a model describing how shares are priced in equilibrium :

$$E(R_i) = R_f + \beta_i (E(R_m) - R_f) \quad (5)$$

E = expected value operator

R_f = the riskless rate of interest

Intuitively, the price of a share is determined by expectations on the return on the market as a whole which will be affected by market wide factors and β_i which is firm specific.

Thus, events at two levels would affect, by implication, expected share returns: (1) the economy wide level, and (2) the firm specific level. A clear omission is the industry level, but empirically this does not seem to be a serious misspecification on either the NYSE (King 1966) or the JSE (Visser 1982).

Intuitively, therefore, one would infer the information requirement of an investor in a CAPM world as being descriptive of

- (1) the economy as a whole; that is, information with the potential to change investor expectations of the average return on all investment opportunities; and
- (2) firm specific events which may affect the relationship between the share and the market as a whole, namely β .

It is highly abstractive, but potentially insightful to the accountant to dichotomise firm specific information into β descriptive and β non-descriptive. Clearly, the latter would be of no consequence to decision making and, therefore, redundant. In order to achieve the objectives of financial reporting, the accountant should be prepared to produce only β descriptive information. In fact, it could be argued that, if the errors in β estimates of an uninformed investor are independent across firms, portfolio β estimates may be accurate without any firm specific information. This only implies that certain investors may have no private demand for firm specific information, not that firm specific information is of no value.

It is currently not possible to categorise accounting data as β descriptive and β non-descriptive. An insight into

the exogenous (non-price) variables that change investor expectations, manifested as observable price reassessments resulting in given ex-post β measures, should therefore be of value.

The choice of β as the primary risk measure in this study is well supported theoretically and empirically.

All the risk measures used in this study are founded on the Sharpe approach to portfolio analysis and all estimates are made employing ordinary least squares regression (OLS) which is consistent with the notions behind Sharpe's linear diagonal model (2).

Using weekly price data, the measures all derive from the OLS regression :

$$R_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt} + \hat{\epsilon}_{it} \quad (6)$$

where R_{it} is the return on share i in period t .

R_{mt} is the return on the 'market' in period t ; the RDM 100 industrial index was used as a surrogate

$\hat{\alpha}_i$ and $\hat{\beta}_i$ are the intercept and slope parameters of the linear relationship unique to share i

$\hat{\epsilon}_{it}$ is a disturbance factor or residual at time t

$\hat{}$ indicates an estimate

To achieve a consistent estimation of the α_i and β_i parameters using the OLS technique, the following assumptions need to be validated :

- (1) $E(\tilde{\epsilon}_{it}) = 0$ for all t
- (2) $\sigma(\tilde{\epsilon}_{it}; \tilde{\epsilon}_{it'}) = 0$ for all $t \neq t'$ (zero autocorrelation)
- (3) $\sigma^2(\tilde{\epsilon}_{it}) = \sigma_i^2$ for all t (homoskedasticity)
- (4) $\sigma(\tilde{R}_{mt}; \tilde{\epsilon}_{it}) = 0$

(1) and (2) are unlikely to constrain the application of OLS. Studies on the NYSE, e.g. Fama et al. (1969) have indicated a compliance with these assumptions. Random walk studies on the JSE by Affleck-Graves and Money (1975) indicate similar results to those obtained on the NYSE. Thus the similarity is likely to hold for these two assumptions. The third assumption describes a condition termed homoskedasticity (constant variance of residual errors) and when contravened, a condition of heteroskedasticity is said to prevail. A violation of the independence assumption of (4) is often evidenced by a condition of heteroskedasticity. Fama et al. (1969) conclude that the homoskedastic condition is well supported empirically on the NYSE. Affleck-Graves (1977) reports that the heteroskedasticity problem may render the market model (i.e. OLS) inapplicable on the JSE and, furthermore, shows that the condition tends to result in underestimates of β using OLS and that R (the correlation coefficient R) and thus R^2 tend to be over-

estimated where this condition prevails. For this reason, Affleck-Graves suggests that the S.D. ratio or Beta quotient may be a useful surrogate for measuring systematic risk on the JSE.

In addition to $\hat{\beta}$, total variance was chosen since this was the first definition of risk and may be of some interest to certain undiversified investors. In terms of the OLS approach, a measure of $\hat{\beta}$ and total variance taken together would provide a derived view of the variance of individualistic factors. Thus, if no change in $\hat{\beta}$ is induced by various information structures however total variance is affected, it can be assumed that the information affects the unsystematic portion of a share's return. Total variance may, therefore, provide an interesting insight.

The other statistic which should be of interest is the coefficient of determination (R^2). The R^2 statistic measures the proportion of the variation in share returns to the variation in market returns and consequently indicates the proportion of total variance that consists of systematic risk. It is possible that this proportion is affected by informational factors.

Returning to Affleck-Graves' suggestion that the $\hat{\beta}$ and R^2 estimations may be distorted by the contravention of OLS assumptions (3) and (4), it was decided to use the Beta quotient as an alternative risk measure in this study.

Clearly, there is a structural relationship between $\hat{\beta}$ and R and therefore any informational effects on $\hat{\beta}$ or R would be impounded trivially into the $\hat{\beta}/R$ statistic. Nonetheless, as developed below, the Beta quotient can be interpreted as an interesting 'stand alone' risk measure.

As indicated above, under the acceptable assumption of normal distribution of share returns

$$\hat{\beta} = \frac{\hat{\sigma}(R_i R_m)}{\hat{\sigma}^2(R_m)}$$

$$\text{and } R = \frac{\hat{\sigma}(R_i R_m)}{(\hat{\sigma}R_i)(\sigma R_m)}$$

$$\therefore \hat{\beta} = R \frac{\hat{\sigma}(R_i)}{\hat{\sigma}(R_m)}$$

$$\text{Thus } \frac{\hat{\beta}}{R} = \frac{\hat{\sigma}(R_i)}{\hat{\sigma}(R_m)}$$

The Beta quotient can be viewed, therefore, as the standard deviation of the return of a share over the standard deviation of the return on the market.

Before leaving OLS and proceeding to the next section, note that the returns R_{it} and R_{mt} used in this study are defined as

$$R_{it} = \log_e P_{i;t} - \log_e P_{i;t-1}$$

where $R_{i;t}$ is the return on the share i in period t

$P_{i;t}$ is the price of share i at the end of period t

$P_{i;t-1}$ is the price of share i at the beginning of period t

This measure of return is equivalent to a continuously compounded rate of return and is, therefore, considered most appropriate (Fama 1965).

10.3.2.3 Procedures and Data

Weekly share price data between February 1968 and November 1980 are available at the University of Cape Town (UCT) for approximately 130 industrial companies quoted on the JSE. However, the longest continuous period between these dates for the greatest number of companies was the 11 year period from 1 January 1969 through 31 December 1979 for 95 of these companies. The study is restricted to these 95 shares and 11 years of data.

The pre-enactment and post-enactment risk measures were based on the time periods set out schematically in Figure 10.3.

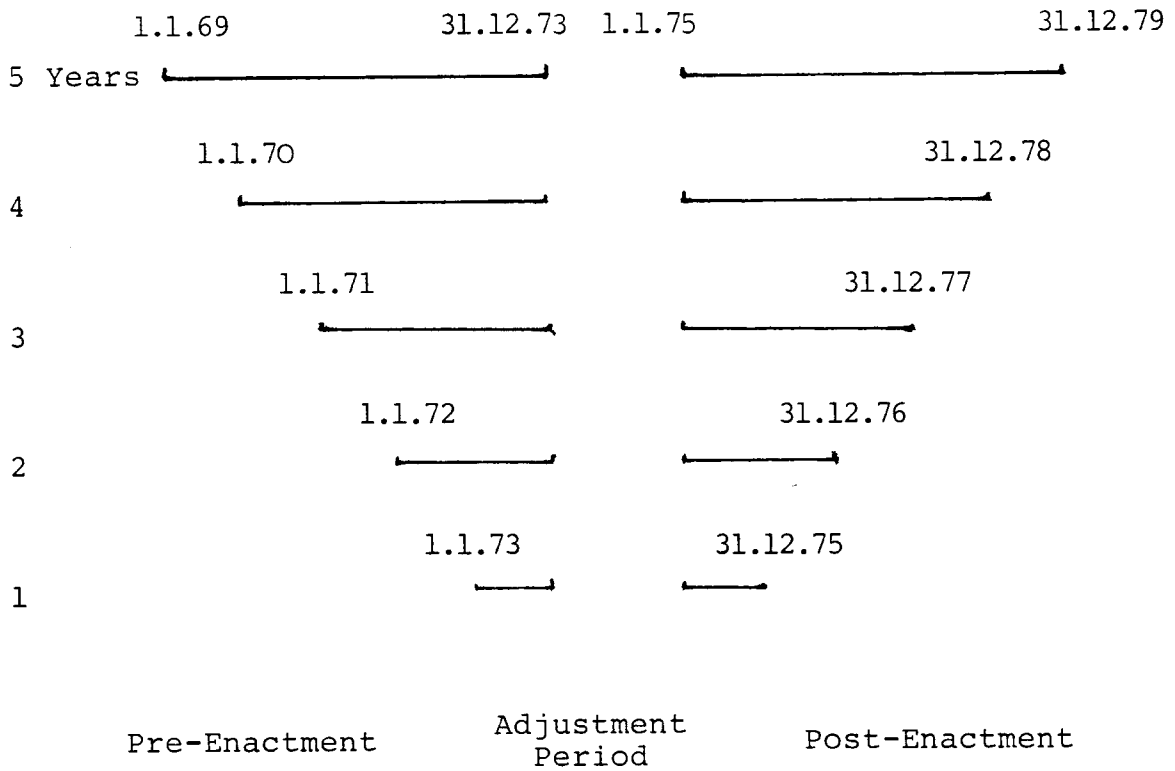


Figure 10.3

Notice that the 1974 calendar year has been omitted for all estimates. This is to allow for an adjustment period after the promulgation of the 1973 Act. This Act became effective on 1 January 1974, but as the firms in the study have a variety of financial year end dates, they do not have a contemporaneous change in environment. It is certain that all price changes prior to 31 December 1973 reflect the old disclosure regime and all price changes after 1 January 1975 reflect the new disclosure regime. Omitting 1974 data for all estimates ensures that comparisons are made on the correct basis.

Five different period lengths were used to ensure that the results are not merely a function of an arbitrary estimate period. However, all paired t-statistics (see below) were based on matched pairs of 'before' and 'after' risk measures estimated over equal periods.

For each of the 95 shares the four different risk measures were estimated for the 10 different time periods illustrated in Figure 10.3 and thus 3 800 separate estimates were obtained, comprising 1 900 matched pairs of pre- and post-risk estimates (475 pairs for each risk measure). These 475 pairs were subjected to the ensuing statistical tests as five separate groups representing each of the five period lengths illustrated above.

The 95 pairs of pre- and post-estimates for each risk measure

and time interval were then grouped according to their disclosure policies in the pre-and post-enactment period relative to the items of interest, that is, according to the groups identified in Table 10.1 (page 303) above. For convenience, Table 10.1 is rearranged and represented as Table 10.2 overleaf.

These seven groups (note Groups 7 and 5 are identical) of paired estimates were subjected to the paired t-test to establish if the relevant risk rating for the group as a whole had changed significantly after the promulgation of the 1973 Act. Thus, 120 t-statistics were computed and the results are presented in four tables (four risk measures) in an eight (groups) x five (period lengths) format (see Tables 10.4 through 10.7, pages 330 to 333). The eight groups were divided into four pairs according to Table 10.2 for intergroup comparisons.

Formally the test statistic is described :

$$t_j = \frac{\bar{d}_j - 0}{S.E.d_j}$$

where $\bar{d}_j = \frac{1}{n} \sum d_{ij}$

$$d_{ij} = \hat{b}_{ij} - \hat{a}_{ij}$$

\hat{b}_{ij} and \hat{a}_{ij} are, respectively, the risk estimate before and after the 1973 Act for share i estimated over j years

Table 10.2

Policy	No.	Pair No.
1. Turnover disclosed prior to 1973	31	
2. Turnover not disclosed prior to 1973	64	1
3. Funds Statement disclosed prior to 1973	63	
4. Funds Statement not disclosed prior to 1973	32	2
5. Funds Statement disclosed/Turnover disclosed	28	
6. Funds Statement disclosed/Turnover not disclosed	35	3
7. Funds Statement disclosed/Turnover disclosed	28	
8. The rest	62	4

and $S.E.d_j = \sqrt{\frac{\hat{\sigma}^2_{d_j}}{n}}$ = standard error of the d_j

$$\hat{\sigma}^2_{d_j} = \frac{\sum d_{ij}^2}{n-1} - \frac{(\sum d_{ij})^2}{n(n-1)} = \text{Variance } d_j$$

Under the null hypothesis that there is no difference in pre- and post-risk estimates, t_j has a student t-distribution with a $n-1$ degrees of freedom. A significance level of 5% was used for all subsequent tests.

n = number of shares in each group

The hypotheses to be tested are given in Table 10.3 overleaf.

This test statistic is parameter based and relies on the assumption that the underlying test data conform to a normal distribution. This assumption is acceptable as the risk estimates did exhibit normal or near normal distributions (test statistics not reported).

The paired t-test is not a test of absolute differences in matched pairs and, therefore, increases and decreases within a group are allowed to set off one another. The result reflects the net trend for the group as a whole, while the averaging across firms reduces the possible bias of large magnitude estimates within a particular sample group.

The null hypothesis is rejected in cases where the t-statistic exceeds the critical values of the student t-distribution with $(n-1)$ degrees of freedom.

Table 10.3

Hypothesis	Condition	Notation in Tables 4-7
H_0	$(b_{ij} - a_{ij}) = 0$	NC (no change)
H_{1a}	$(b_{ij} - a_{ij}) < 0$	C^+ (+ve change)
H_{1b}	$(b_{ij} - a_{ij}) > 0$	C^- (-ve change)

In all 120 t-statistics were derived and the results are presented in Tables 4 through 7 in Section 10.3.3. Critical values are not reported, but for each t-test one of the symbols (NC , C^+ , C^-) indicating the appropriate hypothesis, is reported.

Summary of Procedural Steps

- (1) Compute $\hat{\beta}$, R^2 , $\hat{\sigma}^2$, $\hat{\beta}/R$ for each share over the 10 time periods shown in Figure 10.3; 3 800 measures in total.
- (2) Thus for each share and each type of risk a pre- and post-enactment measure was obtained for each of the five time intervals illustrated in Figure 10.3; 1 900 pairs in total.
- (3) The shares were then classified according to the matrix of Tables 10.1 and 10.2.
- (4) The paired risk measures were grouped according to (3) and a paired-t statistic was computed for each group, each risk type and each time period. Thus, for each risk type 40 t-statistics were obtained, that is, eight classifications across five time periods.
- (5) The interpretation was then based on a comparison between the four pairs of classifications (Table 10.2) and the five time periods for each risk type.
- (6) The t-statistics represent the longitudinal or 'through time' control and the paired classification represents the cross-sectional control.

10.3.3 Results and Interpretations

10.3.3.1 Changes in Systematic Risk ($\hat{\beta}$)

The analysis in this section is based on the results summarised in Table 10.4 (page 330).

The disclosure/non-disclosure of turnover does not appear to have any real effect on $\hat{\beta}$. $\hat{\beta}$ appeared to be fairly stationary in the period before and after the 1973 Act for both disclosure and non-disclosure firms, based on estimates from 1 to 4 years. Based on five year estimates, it seems that while disclosure firms' $\hat{\beta}$ estimates remained unchanged the non-disclosure firms on average were rated less risky in the post-enactment period, thus indicating the possibility of accepting the C series of interpretations (accept H_{1b}) (refer Section 10.3.1).

The results for the disclosure/non-disclosure of the funds statement are the same as for turnover for the one to three year estimates, that is, no change for both groups. Based on four year estimates, non-disclosure firms exhibited no change in $\hat{\beta}$; but the disclosure firms were rated more risky in the post-enactment period. Thus non-disclosure firms were relatively less risky in the post-enactment period. Based on the five year estimates, both groups were rated significantly less risky after the

passing of the Act. The results are, therefore, not that clear and it seems reasonable to accept the null hypothesis with respect to the funds statement.

In fact, for both the above comparisons a rejection of the null hypothesis of change in $\hat{\beta}$ does not seem justified. Thus, neither the non-disclosure of turnover nor the funds statement when taken separately appear to affect market estimates of β .

The third column for comparison on Table 10.4 is far more interesting. It seems that for firms with a disclosure policy *vis à vis* the funds statement, the disclosure or non-disclosure of turnover seems critical. The turnover non-disclosures were rated less risky in three of the five period lengths and for the other period lengths (viz. three and four years) $\hat{\beta}$ remained unchanged. Interestingly, based on the three and four year estimates, disclosure firms were rated more risky ($\hat{\beta}$ increases) whereas β remained unchanged for the other three period lengths. Thus it seems clear that in all cases the disclosure of turnover, given the disclosure of the funds statement, resulted in a relative downward risk rating. Moreover, the non-disclosure of turnover, given the voluntary disclosure of the funds statement, seemed to increase systematic risk. The C series of interpretations seem appropriate and the null hypothesis is rejected in favour of H_{1b} .

The fourth comparison on Table 10.4 has a similar pattern to the second comparison and it supports the conclusion that the disclosure or non-disclosure of turnover is only critical where the funds statement is disclosed. A testing of the converse, viz. establishing the effect of not disclosing a funds statement (given the disclosure of turnover), would be intriguing. However, the "disclose turnover/non-disclose funds statement" category only applied to three shares (see Table 10.1), making such a test infeasible.

A general pattern that emerges is that $\hat{\beta}$ is more stationary over shorter periods which is consistent with the results of Blume (1975) and Baesel (1974) on the NYSE.

10.3.3.2 Changes in Total Risk (σ^2) (Variance)

The analysis in this section is based on the results summarised in Table 10.5 (page 331).

It is interesting to note that there was no significant change in total variance for any category for the one year measures.

For three of the five period lengths, the non-disclosure of turnover group was rated less risky, in terms of total variance in the post enactment period whereas disclosure firms were rated less risky in only the five

year category. Thus, the C series would seem feasible. The non-disclosure of turnover seems to result in a higher total variance.

Although the non-disclosure of funds statement category exhibited a significantly lower variance for two of the periods, the disclosure firms behaved likewise. The B series of interpretations would consequently be evoked, despite the null hypothesis being accepted in both cases.

The third comparison is encouraging as the emergent pattern is identical to that between disclosure/non-disclosure of turnover (the first comparison). The inference to be drawn is that with respect to total variance there is little interaction between the disclosure of funds statement and turnover.

The fourth comparison is identical to the third which must indicate that the disclosure of turnover dominates. This pattern is to be expected given the previous three cases.

Therefore, one may conclude that the C series interpretations would apply to the turnover system and the B series to the funds statement system with respect to total variance.

10.3.3.3 Changes in the Coefficient of Determination (R^2)

The analysis in this section is based on Table 10.6 (page 332). As previously indicated, R^2 is not in itself a risk measure. However, it provides a measure of the proportion systematic : total risk and, therefore, the proportion unsystematic : total risk.

Table 10.6 is not dealt with on a pairwise basis initially, but rather in total for at this level an interesting result emerges.

Initially one would expect these relationships to change more over longer than shorter periods. This trend is evident in the previous two sections. The interesting aspect of Table 10.6 is that the changes seem to be systematic, i.e. no change for years 1 through 3 (with two exceptions) and all reducing in year 5 with the anomaly being year 4 when only the non-disclosures are down rated.

It seems that the longer the estimation period, the more chance of a downward revision in R^2 in the subsequent period of equal length. The non-disclosures, however, seem to be systematically more sensitive to these changes and 'turn' before the disclosure firms. This implies that the disclosure of turnover tends to reduce the proportion of systematic risk to total risk. This view is more likely to hold

than the alternative interpretation that unsystematic risk increases as information is disclosed.

This raises interesting questions on the relation between the various elements of risk and information which may provide a fruitful direction for future research.

10.3.3.4 Changes in Beta Quotient ($\hat{\beta}/R$)

The analysis is based on Table 10.7 (page 333). Again, observing the results *in toto*, no change is apparent for any category based on the one-year and five-year estimates, but the quotient increased for all categories on the four year estimates. The only discernible differences between disclosure and non-disclosure firms were in the two and three year estimates.

The disclosure of turnover, again, seems to dominate. The disclosure firms' Beta quotient increases for the three year estimate and remains the same for the two year data. The converse is true of the non-disclosure firms, i.e. the quotient remains constant based on the three year data and decreases for the two year estimates.

There is a fundamental weakness in using this risk measure since, as indicated above, the disclosure of turnover in

terms of the 1973 Act tends to reduce β and R^2 and thus, any change in the quotient may reflect merely the relative change in β and R , adding little to the interpretation.

However, in view of the certain degree of heteroskedacity reported by Affleck-Graves (see Section 10.3.2.2), the Beta quotient may be a more useful measure of systematic risk. If the quotient is a better measure of systematic risk, it seems as though the information effects are actually less apparent than $\hat{\beta}$, although a similar inference as that for $\hat{\beta}$ would seem appropriate. That is, the non-disclosure of turnover resulted in shares being rated more risky based on the quotient although less significantly so than with the $\hat{\beta}$ measure.

Table 10.4
Changes in Systematic Risk ($\hat{\beta}$)

Time Period of Estimate (Years)	Turnover Policy	Funds Statement Policy	Funds Statement Disclosed : Turnover Policy	Turnover and Funds Statement Policy
	D	ND	D	ND
No. in Sample	31	63	28	28
	31	32	35	57
5	NC	C ⁻	NC	C ⁻
4	NC	C ⁺	NC	C ⁺
3	NC	NC	C ⁺	NC
2	NC	NC	NC	NC
1	NC	NC	C ⁻	NC

Table 10.6
Changes in Coefficient Determination (R²)

Time Period of Estimate (Years)	Turnover Policy		Funds Statement Policy		Funds Statement Disclosed : Turnover Policy		Turnover and Funds Statement Policy	
	D	ND	D	ND	D	ND	D	ND
No. in Sample	31	64	63	32	28	35	28	57
5	C ⁻	C ⁻	C ⁻	C ⁻	C ⁻	C ⁻	C ⁻	C ⁻
4	NC	C ⁻	C ⁻	C ⁻	NC	C ⁻	NC	C ⁻
3	NC	NC	NC	NC	NC	NC	NC	NC
2	NC	NC	NC	NC	NC	NC	NC	NC
1	NC	NC	C ⁻	NC	NC	C ⁻	NC	NC

Table 10.7

Changes in Beta Quotient ($\hat{\beta}/R$)

Time Period of Estimate (Years)	Turnover Policy		Funds Statement Policy		Funds Statement Disclosed : Turnover Policy		Turnover and Funds Statement Policy	
	D	ND	D	ND	D	ND	D	ND
No. in Sample	31	64	63	32	28	35	28	57
5	NC	NC	NC	NC	NC	NC	NC	NC
4	C ⁺	C ⁺	C ⁺	C ⁺	C ⁺	C ⁺	C ⁺	C ⁺
3	C ⁺	NC	NC	NC	C ⁺	NC	C ⁺	NC
2	NC	C ⁻	C ⁻	NC	NC	C ⁻	NC	C ⁻
1	NC	NC	NC	NC	NC	NC	NC	NC

10.3.4 Tentative Conclusions

Table 10.8 (overleaf) summarises the tentative conclusions drawn for each of the risk measures for each comparison pair (per Table 10.2).

It is emphasised that a tabulation of these conclusions should not be interpreted as providing a categorical conclusion. The table is presented merely for the convenience of reflecting on the tentative positions taken in the discussion.

The C series of interpretations seem feasible for the information system reflected in successive turnover disclosures. Thus, the non-disclosure of turnover is associated with a higher risk rating by the market. This is particularly acute when this non-disclosure policy was pursued for turnover, but a disclosure policy was implemented for the funds statement. An attempt is made below to distinguish the competing interpretations of this condition, namely the C series presented in Section 10.3.1.

C(1) is an unlikely candidate since the market estimate errors in all probability would be averaged out across so many firms.

C(2) is more feasible than C(1). However, as indicated, in view of the importance of the co-variability of

Table 10.8

Risk Measure	Pairs of Differential Disclosure Firms			
	1*	2	3	4
$\hat{\beta}$	S	S	R	S
$\hat{\sigma}^2$	R	S	R	R
R^2	R	S	R	R
$\hat{\beta}/R$	R	S	R	R

Key :

- S = the required disclosure of the item had no impact on risk post 1973
- R = the required disclosure of the item reduced risk in the post 1973 period

* See Table 10.2, page 319, for groupings

earnings and given the disclosure of earnings by all firms at all times, the additional disclosure of turnover is not likely to improve estimates, considering the potentially high correlation between turnover and earnings.

C(3) is the most likely candidate and it is submitted cautiously that the non-disclosure of turnover *per se* is a determinant of market risk. It is unlikely that non-disclosure revealed undesirable management attitudes towards information dissemination as these attitudes would presumably be unaffected by the disclosure requirement. That is, if the market was suspicious of management's propensity to suppress information, the mandatory disclosure would not allay the market's fears that other information was being suppressed. It is submitted that the non-disclosure of the information is a noise factor in the market estimates of risk and biases the measures upward. This result supports the intuitive notion that the market extracts a premium for needless uncertainty.

As regards the funds statement non-disclosure, the B series of interpretations are the most appropriate. To an extent, this is a rather uninteresting result and it is impossible to distinguish the reasons. Thus, no inference at all is drawn.

In concluding it must be emphasised that an overriding

factor which cannot be controlled with the proposed methodology, is the fact that the 1973 Act introduced certain regulations which may change the structure of the market environment. For example, a requirement to produce interim reports and provisional results may have changed the structure of the information market, with attendant disturbances. Another factor which may have affected the overall market for information was the section which deemed insider dealing to be a criminal offence. This may substantially change the flow of information into the market. In mitigation, it is maintained that, while conceding that the environment may have changed from the pre-enactment period to the post-enactment period, all other provisions will have affected firms equally and at the same time. The effects on the different firms would in all probability occur randomly across firms, thus dissipating any disturbance on the results obtained in this study.

Finally, therefore, it is unlikely that these general factors would alter substantially the inference here drawn.

10.4

CONCLUSION

This chapter set out to explore the potential relationship between information and risk and in so doing provided more questions than answers.

Its major thrust was to investigate the relationship between voluntary disclosures/non-disclosures and market determined risk. The two information systems reflected by turnover and the funds statement provided the accounting variables while variance of returns and $\hat{\beta}$ were the market risk measures employed. These risk measures were further investigated using two indirect measures of market risk, namely R^2 and Beta quotient.

The disclosure requirements of the 1973 Companies Act provided the methodological framework introducing a longitudinal dimension to the problem.

The results are encouraging although the interpretation and conclusions must remain tentative. It would seem that the non-disclosure of certain 'known' information may in itself be a determinant of risk. Thus, it is possible that the mapping between real events and market risk measures may be distorted by various informational factors.

Further research is obviously required, both theoretically and empirically, on the information market and its structure.

These results are also indicative of the usefulness of disclosure legislation. The paper has not concerned itself with issues of regulation, yet where the publicising of information results in observable reduced risk estimates, some 'benefits' seem to exist. Whether these improve efficiency or whether Pareto optimality obtains, and whether these benefits outweigh any costs that may exist, remain open issues.

Benston (1973) in a paper primarily concerned with the effects of the Securities Act ('33 and '34) indicated that the required reporting of a sales figure had little impact on β . It is not apparent that this study controlled any other disclosure requirements necessitated in terms of these acts. The purpose of the Benston paper was quite different and a comparison with the results and conclusions presented is hence not warranted.

While these results may be viewed by some to be of historical interest only, an admonition may be sounded to financial disclosure policy makers : non-disclosure of information may be a lot more costly than believed! Thus, to achieve the objectives of financial reporting, it is important to consider not only the usefulness of the disclosed data, but the negative utility of not disclosing data.

The results are obviously data specific and provide evidence of relationships on the JSE. However, it is hoped that the results provide more generalised insights into and provoke research and debate on an altogether intriguing topic.

FOOTNOTES : CHAPTER 10

- (1) In this paper a time series of firm specific data is considered to reflect an 'information system'. If disclosed each datum of the series, e.g. the annual turnover figure, can be regarded as a signal to the market.
- (2) The Act required the disclosure of the firm's annual turnover or the percentage change over the previous year's turnover. These policies are not distinguished in this study. Very few firms disclose only percentage changes.
- (3) To be considered a disclosure firm with respect to the funds statement, it was sufficient for the firm to present any form of funds statement voluntarily. It was not necessary for this voluntary statement to comply exactly with the subsequent legislation.

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A P P E N D I C E S

APPENDIX IDISTRIBUTION OF FINANCIAL STATEMENT AND ANNOUNCEMENT DATES

Month	Percentage firms with Financial year ending:	Percentage of Preliminary Announcements in:	Percentage of Interim Announce- ments in:
	AR	PA	IA
January	0.0	4.1	3.2
February	5.7	13.5	20.4
March	17.3	9.2	4.2
April	0	4.8	4.8
May	2.7	4.8	8.0
June	25.6	12.2	9.0
July	1.4	7.5	5.2
August	0.0	13.4	13.5
September	13.9	10.8	9.3
October	0.0	3.1	8.6
November	2.9	9.8	11.8
December	30.5	6.8	2.0
Total*	100	100	100

* Total number of firms 41, total PA = 261 total IA = 261.

APPENDIX IINUMBER OF WEEKS BETWEEN FINANCIAL YEAR END AND PRELIMINARY REPORT

No. of Weeks	<u>AUDITED/UNAUDITED</u>					
	Percentage of Announcements	Cumulative Percentage	Percentage Audited**	Cumulative Percentage	Percentage Unaudited	Cumulative percentage
Less than 2	4.7	4.7	0.0	0.0	8.5	8.5
3	2.2	6.9	0.0	0.0	4.0	12.5
4	9.1	16.0	3.3	3.3	13.8	26.3
5	8.4	24.4	4.1	7.4	11.8	38.1
6	15.7	40.1	14.0	21.4	17.1	55.2
7	12.8	52.9	18.0	39.4	8.5	63.7
8	16.4	69.3	19.7	59.1	13.8	77.5
9	14.9	84.2	20.4	79.5	10.5	88.0
10	6.2	90.4	6.5	86.0	5.9	93.9
11	4.0	94.4	4.0	90.0	6.1	100.0
12	4.0	98.4	9.0	99.0	0.0	100.0
More than 13	1.6	100.0	1.0	100.0	0.0	100.0
Total*	100		100		100	

* Total number of announcements 261.

** 44,5% of all announcements were audited.

APPENDIX III

NUMBER OF WEEKS BETWEEN FINANCIAL YEAR END AND PRELIMINARY REPORT

POSITIVE FORECAST ERROR/NEGATIVE FORECAST ERROR.

No. of Weeks	Percentage of Announce-	Cumulative percentage	Percentage positive error **	Cumulative percentage	Percentage Negative error.	Cumulative percentage
Less than 2	4.7	4.7	3.4	3.4	5.5	5.5
3	2.2	6.9	3.4	6.8	4.1	9.6
4	9.1	16.0	3.4	10.2	4.1	13.7
5	8.4	24.4	8.5	18.7	10.4	24.1
6	15.7	40.1	15.4	34.1	9.0	33.1
7	12.8	52.9	13.7	47.8	12.5	45.6
8	16.4	69.3	12.0	59.8	14.5	60.1
9	14.9	84.2	14.5	74.3	16.0	76.1
10	6.2	90.4	9.4	83.7	14.6	90.7
11	4.0	94.4	9.4	93.1	4.2	94.9
12	4.0	98.4	4.3	97.4	3.7	98.6
More than 13	1.6	100.0	2.5	100	1.4	100
Total *	100		100		100	

* Total number of announcements - 261

** 44,8% of all announcements were 'good news' (positive error).

APPENDIX IVCOMPANIES INCLUDED IN STUDIES**

1. Abercom Investments Limited
2. Aberdare Cables Africa Limited
3. Adcock Ingram Limited
- * 4. AECI Limited
5. African Cables Limited
- * 6. African Oxygen Limited
- * 7. Anglo Alpha Limited
- * 8. Anglo American Industrial Corporation Limited
9. Anglo Transvaal Industries Limited
10. Asea Electric South Africa Limited
11. Associated Engineering S.A. Limited
12. Associated Furniture Companies Limited
- * 13. Barlow Rand Limited
- * 14. Beares Limited
- * 15. Blue Circle Limited
- * 16. Bonmore Investments Limited
17. Bonuskor Beperk
- * 18. Boumat Limited
19. Calan Limited
- * 20. Carlton Paper Corporation Limited
- * 21. Chemical Holdings Limited
22. Claude Neon Lights (S.A.) Limited
23. C.N.A. Investments Limited
24. Cullinan Holdings Limited
25. Currie Finance Corporation Limited
26. Currie Motors (1946) Limited
27. Die Afrikaanse Pers (1962) Beperk
- * 28. Dorbyl Limited
- * 29. Dunlop South Africa Limited
30. Dunswart Iron & Steel Works Limited
- * 31. Edgars Stores Limited
32. Ellerine Holdings Limited
- * 33. Everite Limited
- * 34. Federale Voedsel Beperk
- * 35. Federale Volksbeleggings Beperk

- * 36. Foschini Limited
- * 37. Frasers Limited
- * 38. Gallo (Africa) Limited
- * 39. General Tire & Rubber Co. (South Africa) Limited
- 40. Greetermans Stores Limited
- 41. Gresham Industries Limited
- 42. Grinaker Holdings Limited
- 43. Gibb & Inggs Limited
- * 44. Huletts Corporation Limited
- 45. Industrial & Commercial Holdings Group Limited
- 46. Irvin & Johnson Limited
- * 47. Kaap Kunene Beleggings Beperk
- * 48. Kohler Brothers Limited
- 49. Lamberts Bay Holdings Limited
- 50. Leac Limited
- 51. LTA Limited
- * 52. Malbak Limited
- 53. McCarthy Group Limited
- * 54. Metal Box South Africa Limited
- * 55. Metcash Limited
- 56. Mitchell Cotts Limited
- * 57. Murray & Roberts Holdings Limited
- 58. National Trading Co. Limited
- * 59. O.K. Bazaars (1929) Limited
- * 60. Otis Elevator Co. Limited
- * 61. Pick 'n Pay Stores Limited
- 62. Placor Holdings Limited
- * 63. Plate Glass & Shatterprufe Industries Limited
- 64. Premier Milling Limited
- * 65. Protea Holdings Limited
- 66. Rembrandt Beherende Beleggings Beperk
- 67. Rembrandt Group Limited
- * 68. Rennies Consolidated Holdings Limited
- * 69. Reunert & Lenz Limited
- 70. Rex Trueform Clothing Co. Limited

71. Romatex Limited
 72. Russel Holdings Limited
 73. Sappi Limited
 74. Scottish Cables (South Africa) Limited
 - * 75. Seardel Investment Corporation Limited
 - * 76. Sentrachem Limited
 77. South African Breweries Limited
 78. South African Marine Corporation Limited
 79. South West Africa Fishing Industries Limited
 80. Steelmetals Limited
 - * 81. Stewarts & Lloyds of South Africa Limited
 82. Television & Electrical Holdings Limited
 83. The Argus Printing & Publishing Co. Limited
 84. The Sterns Diamond Organisation Limited
 85. The Tongaat-Hulett Group Limited
 86. The Union Steel Corporation of South Africa Limited
 87. Tiger Oats & National Milling Co. Limited
 - * 88. Toyota (South Africa) Limited
 - * 89. Trek Beleggings Beperk
 90. Truworths Limited
 91. W & A Investment Corporation Limited
 92. Wesco Investments Limited
 93. Willem Barendz Limited
 94. Williams Hunt South Africa Limited
 - * 95. Woolworths Limited
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** This excludes the LIFO study of Chapter 8 - see Appendix V.

* Indicates companies included in Part 2 and Part 3 studies.

All companies in this appendix were included in the Part 3 study.

APPENDIX VLIFO FIRMS INCLUDED IN CHAPTER 8 STUDY

<u>Firm</u>	<u>Date of Announcement</u>	<u>% Reduction of F.I.F.O. earnings</u>	<u>β</u>
1 Anglo Alpha Cement Ltd	1 March 1979	6	0,90
2 AECI Limited	11 March 1976	14	0,80
3 The Natal Chemical Syndicate Limited	23 August 1979	50	0,85
4 Seardel Investment Corp. Limited	31 August 1979	20	1,00
5 African Cables Limited	1 October 1976	13	0,35
6 Huletts Aluminium Ltd	1 June 1977	24	0,55
7 National Bolts Limited	26 September 1975	50	0,35
8 Stewarts & Lloyds of S.A. Limited	22 November 1979	31	1,25
9 Vereeniging Refractories Limited	20 February 1980	9	0,55
10 Coates Brothers (S.A.) Limited	24 January 1980	23	0,60
11 Kohler Brothers Limited	15 February 1980	14	0,35
12 Metal Box S.A. Limited	1 June 1977	41	0,60
13 Sappi Limited	9 March 1976	7	0,65
14 Huletts Corporation Ltd	1 June 1977	5	0,80
15 Romatex Limited	30 April 1979	8	1,20
16 Sterns Diamond Organisation Limited	13 June 1979	42	0,90
17 Trek Beleggings Ltd	23 April 1975	8	0,85
18 Steelmetals Limited	27 September 1976	4	0,75
19 Metal Closures Group S.A. Limited	7 February 1980	13	0,70
20 Suncrush Limited	21 March 1975	7	0,50
21 B & S Steel Furniture Co. Limited	31 May 1979	11	1,00

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