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An Evaluation of Analysts' Expectational Data Regarding Firms Listed on the JSE Securities Exchange

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Abstract

This study empirically investigates the usefulness of South African stockbroker analysts' two primary forms of expectational output: earnings forecasts and investment (buy, hold and sell) recommendations. Instead of focusing on individual stockbroker analysts' forecasts and recommendations, the consensus estimates are examined as they are accessible to a large community of investors.

Analysts' earnings forecasts are found to display a pattern of increasing accuracy as the earnings announcement date approaches. This is observed from both the computation of the mean absolute percentage error and Theil's inequality coefficient over varying time horizons. A decomposition of Theil's inequality coefficient reveals that the optimistic systematic bias present in analysts' earnings forecasts initially increases before decreasing uniformly as the earnings announcement date approaches. Also, as the earnings announcement date approaches, the mean percentage forecast error declines and the number of overestimates and underestimates in analysts' earnings forecasts converges. A comparison of analysts' earnings forecasts to those estimated using a first order auto regressive time-series model shows that analysts are more accurate in predicting earnings than the econometric model.

The equally-weighted return performance of analysts' consensus buy, hold and sell recommendations as well as the effect of transacting on changes in those recommendations are investigated. It is found that if an investor strictly follows analysts' consensus recommendations, only the buy recommendations result in significant abnormal returns as estimated under a two-factor arbitrage pricing theory (APT) model. The hold and sell recommendations yield insignificant results under each measure of performance. It is noted that the number of sell recommendations is very small representing only 3% of the sample. Examining the effect of changes in recommendations, over a two-month holding period shares with a downgrade in recommendation achieve significantly negative alphas. In contrast, the abnormal returns of the upgrade portfolios are not significantly different from zero. It appears that investors can benefit to a greater extent by acting on *downward changes* in analysts' consensus recommendations than on the level of recommendations themselves.

Declaration

I, Chandan Prayag, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I empower the university to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

Signed by candidate

February 2004

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Introduction

"...forecasts have become the be all and end all of the financial markets. Without them, many a player would lack the necessary imagination in respect of future developments and commitments in the markets, as well as the necessary confidence in the form of a supposed guarantee to be able to shape at least part of their own future".

- Goldberg and von Nitzsch (2001:1)

1.1 Introduction

A forecast is simply a statement about a yet unknown future event. The main output of stockbroker analysts¹ involves the making of at least some kind of forecast or prediction. Using a wide variety of techniques, financial analysts produce reports that are often used by traders, mutual fund managers, portfolio managers and individual investors in their decision-making processes. Asquith, Mikhail and Au (2002) describe an analyst's report to be the culmination of a process that includes the collection, evaluation and dissemination of information related to a firm's future performance. In general, most analysts' equity reports include three key summary elements: earnings forecasts, a stock recommendation – such as buy, hold or sell – and a price target.

Analysts' expectational data have recently received considerable attention. Prior to that, Elton, Gruber and Gultekin (1981:975) indicate, "*...almost all research which attempts to measure the impact of expectations utilizes not expectational data but historical extrapolations of past data that the authors hope will serve as a proxy for expectational data*". Elton, Gruber and Grossman (1986:669) pinpoint, "*...while expectations play an important role in most economic theories, studies evaluating expectational data are not*

¹ Throughout this thesis, the terms 'stockbroker analysts', 'financial analysts' and 'security analysts' are used interchangeably.

common". The main purpose of delving into analysts' expectational data has been to understand the role of analysts in conveying information to the market participants. In this study, the evaluation of the information content of analysts' expectational data is performed by looking at: (i) an estimate of a number produced by analysts, the interpretation of which is up to the user (earnings forecasts); and (ii) a clear and unequivocal course of action recommended by the forecaster (a buy, hold or sell recommendation). The importance attached to these two analysts' expectational data is stressed in Givoly and Lakonishok (1984:40), who argue that, "...*earnings forecasts are probably next to stock recommendations, the most notable output of financial analysts*".

Chang and Most (1980) refer to earnings per share as the single most important accounting variable that possesses the greatest information content of any array of accounting variables. The importance of investigating earnings forecasts has been highlighted in previous studies. Brown and Rozeff (1978:1) mention, "...*accurate measurement of earnings expectations is essential for studies of firm valuation, cost of capital and the relationship between unanticipated earnings and stock price changes*". Indeed, the extensive research questioning the quality of earnings forecasts may be attributable in part to the central role that earnings growth projections assume in theoretical models of share valuation. Givoly and Lakonishok (1984) recognise the prominence of earnings information in investment decisions and performance evaluation and acknowledge that predictions of earnings have become an essential product of the financial analysts' industry and pivotal for the evaluation of the firm's financial position.

Another analysts' expectational data subject to multiple inquiries is their stock recommendations. Throughout the evolution of the stock market, a central fascination has been the belief in analysts' ability to predict the future price movement of a particular common stock. Brokerage firms spend a lot of money annually analysing stocks and trying to convince investors that certain stocks are more or less attractive than others by making buy or hold or sell recommendations. Dimson and Marsh (1984) emphasise that stockbrokers' analysts are responsible for a significant proportion of the original research carried out in the equity markets, which is communicated to and utilised by virtually all active fund managers.

This thesis empirically investigates analysts' earnings forecasts and their stock recommendations of companies listed on the JSE Securities Exchange (JSE) of South Africa. More specifically, the accuracy of security analysts' earnings forecasts and the extent of the systematic bias inherent in these earnings forecasts are determined. This should partly shed light on the rationality of analysts' earnings forecasts, a parameter that is highly sought after by market participants in making their investment decisions. In addition, the value that an investor can create on the basis of the level of and changes in brokerage firms' analysts' recommendations is examined. Many investors, both individual and institutional, rely predominantly or entirely on such external research and it is therefore important to evaluate the quality of the information conveyed in analysts' buy, hold and sell recommendations. The remainder of the chapter is set out as follows. Section 1.2 outlines the motivation for this research and the research objectives. Section 1.3 provides details on the structure of this thesis, together with a brief overview of each chapter.

1.2 Motivation for this research

Considerable research pertaining to analysts' expectational data has been conducted within the developed markets of Western Europe, Japan and particularly the United States. The accuracy of analysts' earnings forecasts has attracted the attention of academics as early as Cragg and Malkiel (1968). Since then, numerous studies have been undertaken by researchers in the United States and other developed markets whereby the accuracy and the extent of forecast error in analysts' earnings forecasts were investigated. On the other hand, the value of analysts' recommendation has been an issue ever since Cowles (1933) evaluated the forecasting ability of analysts from professional financial services and publications. However, it was only since the 1970s that several studies, investigating the value of analysts' recommendations have been published in the United States. Consequently, the effectiveness of analysts' recommendations has been questioned in other developed markets.

The financial community believes in the forecasting superiority of analysts because all major brokerage houses produce earnings estimates for clients who are disposed to pay for them. The fact that security analysts represent a higher cost factor than time-series models

and therefore are expected to produce more accurate forecasts has been the driving force behind the extensive literature on analysts' earnings forecasts. Besides, underlying this research is abundant theoretical and empirical international literature, which supports the notion that investors are interested in obtaining information about a company's future earnings. Therefore, a study explaining the properties of analysts' earnings forecasts available to investors is always desirable.

Analysts' recommendations come at a cost, whether it is in the form of commission charged by brokers upon the purchase of shares or subscription fees due to investment advisory services. Consequently, the quality of the information content of the recommendations provided by analysts at the brokerage houses and investment advisory services has been subject to constant scrutiny. Moreover, as demonstrated by Treynor and Black (1973), there is a need to know the level of forecasting ability implicit in internal and external research in order first to decide how much weight to place on individual forecasts and second to form rational judgements on the appropriate levels of diversification and turnover for portfolio managers' funds. An investigation of the value achieved by the level of analysts' stock recommendations will partly help to unveil the forecasting ability of analysts, who undertake extensive research that is communicated to and used by mostly all active portfolio managers.

South Africa is an emerging market. Very often, emerging market research lags behind the developed market. Robertson (2002:2) argues, "*...any research on emerging markets that addresses this lag and enhances our understanding of their workings is well motivated*". While there has been no published study examining the accuracy of analysts' earnings forecasts in South Africa, only two studies [Bhana (1990) and Hall and Millard (2002)] investigate the value of analysts' recommendations. In recent times, analysts' earnings forecasts and their stock recommendations have been the subject of interest in other emerging markets, such as, Hong Kong, Singapore and Australia. Following the developed markets and other emerging markets, this study provides an insight in analysts' earnings forecasts and their recommendations regarding firms listed on the JSE.

The investigation of the accuracy of analysts' earnings forecasts has been primarily undertaken as a result of the increased availability of earnings forecasts data for firms listed on the JSE in recent years. In addition, the South African studies [Bhana (1990) and

Hall and Millard (2002)] that attempted to assess the value of brokerage information do not provide a comprehensive analysis of the performance of the average brokers' recommendations. The use of brokers' recommendations from just two and three broking houses respectively, may fail to generalise the value of South African brokers' recommendations as a whole. Investigations regarding the value achieved by acting on changes in or recurrences of analysts' recommendations have not yet been carried out in South Africa despite the promising findings in the international literature. This study identifies the outperformance achieved by following analysts' consensus recommendations, which are the composite recommendations from across the broking community and changes in these recommendations by using a procedure of portfolio rebalancing as recommendations change.

In summary, this study is motivated by the limited literature in the South African context of two of analysts' most coveted expectational data, namely, earnings forecasts and stock recommendations.

1.3 Thesis organisation

Chapter Two contains an overview of the finance theory that is relevant to the research conducted in this thesis. The importance of estimated earnings in security valuation is emphasised. The issue of rational expectations is then introduced and the characteristics of a rational expectation are provided. Moreover, the three forms of the Efficient Market Hypothesis (EMH) are presented and the paradox that exists between how the academics and practitioners view the stock market is explained.

Chapter Three provides an appraisal of the investment literature that is relevant to the empirical work conducted in this thesis. The literature review distinguishes between prior researches undertaken on first, the properties of analysts' earnings forecasts and second, the investment value of the level of and changes in analysts' stocks recommendations. The sections are arranged to allow comparisons to be drawn between the international literature and the literature that is specific to the JSE.

Chapter Four introduces the data sets that are used in this study. The sources from which these data are available are revealed. The data sets are further analysed and any meaningful observation is made. In the end, the use of the consensus of analysts' earnings forecasts and stock recommendations in this thesis is justified.

Chapter Five investigates the accuracy and systematic bias inherent in analysts' earnings forecasts of firms listed on the JSE. The accuracy of analysts' earnings forecasts is assessed primarily, by looking at the forecast error as the earnings announcement date approaches and secondarily, by comparing analysts' earnings forecasts to forecasts estimated using a first order autoregressive time-series model. The three measures of error used, namely, the average absolute percentage error, Theil's inequality coefficients and regression analysis are defined. A decomposition of Theil's inequality coefficient into its characteristic sources allows the measurement of the systematic bias present in analysts' earnings forecasts.

Chapter Six analyses the investment value of analysts' recommendations on firms listed on the JSE. First, the value of analysts' buy, hold and sell recommendations is investigated and second, the investment value achieved by acting on all possible permutations of changes in analyst' stock recommendations is assessed. Besides computing the raw and market-adjusted returns for each portfolio of changes in or recurrences of analysts' recommendations, the risk-adjusted returns, estimated under the Capital Asset Pricing Model (CAPM) and a two-factor Arbitrage Pricing Theory (APT) model, are calculated for a one, two and three-month holding period.

Chapter Seven provides a concise summary of the results of the study. Moreover, the findings are discussed in the context of the theory outlined in Chapter Two. Suggestions are finally provided for further research pertaining to analysts' expectational data.

Theoretical Overview

2.1 Introduction

Two important theories in finance stand as precursors to the examination of analysts' earnings forecasts and stock recommendations. On the one hand, there is the concept of rational expectations that market participants expect from analysts. Analysts' earnings forecasts are widely used by individual and institutional investors, many of whom rely predominantly on these forecasts in making investment decisions. On the other hand, by giving a clear and unequivocal course of action, i.e. making a recommendation, analysts convey certain information regarding the performance of specific shares. Therefore, the informational content of analysts' stock recommendations is evaluated by looking at the return performance of the recommended shares and this brings the EMH in context.

This chapter provides a theoretical overview of the issues of rational expectation and informational efficiency. The remainder of this chapter is set out as follows. Section 2.2 explains the importance of earnings forecasts in share valuation and introduces the characteristics of a rational expectation. Section 2.3 describes the concept of EMH and how the academics' and practitioners' view on the efficiency of the stock market differs. Section 2.4 summarises the overview.

2.2 The importance of earnings estimates and the concept of rational expectations

2.2.1 The importance of earnings estimates in security valuation

Fundamental analysis at the company level involves analysing mainly accounting data such as earnings, sales, dividends and so forth in order to estimate the company's intrinsic value. The two basic approaches to valuing shares using fundamental security analysis are: (i) the present value approach (primarily the dividend discount model); and (ii) the P/E ratio (multiple of earnings) approach (Jones, 1990).

Under the present value approach, the intrinsic or estimated value of a security is equal to the discounted (present) value of the future stream of cash flows that an investor expects to receive from the asset. Because dividends are the only cash payment a shareholder receives directly from a firm, they are the foundation of valuation of shares. The dividend discount model (DDM) is a widely accepted stock valuation tool and is based on the same present value principle. The model which is also known as the 'Gordon model' (after Prof. Myron J. Gordon who popularised the model in 1962), calculates the present value of the future dividends that a company is expected to pay to its shareholders. Assuming that the dividend growth rate for a particular firm will be approximately constant over the future, the dividend discount model reduces to the constant-growth version and is given by the following equation:

$$P_{i0} = \frac{D_{i1}}{k_i - g_i} \quad (1)$$

- where: P_{i0} = the estimated value of the common stock today
 D_{i1} = the expected dividend at time 1 = $D_{i0} (1+g_i)$
 k_i = the required rate of return for firm i
 g_i = the expected (constant) growth rate of dividends of firm i , assuming $g_i < k_i$.

In equation (1), the expected dividend of firm i at time 1 is a function of its expected earnings since $D_{i1} = \text{payout ratio} * \text{estimated EPS of firm } i \text{ at time } 1$.

The alternative fundamental analysis method of valuation used by analysts is the P/E ratio or earnings multiplier approach. Although the conceptual framework for the P/E model is not as solidly based on economic theory as the DDM, it is derived from an identity that is unquestionably correct. These P/E ratios show the underlying identity on which the P/E valuation model is based: This identity is

$$P_{i0} = \text{current market price} = E_{i0} * P_{i0} / E_{i0} \quad (2)$$

As such, the share price is the product of two variables: (i) EPS; and (ii) the P/E multiple. An investor can estimate the intrinsic value of a share by multiplying the justified P/E ratio with the current earnings. In practice, the multiplier model is used more informally in estimating intrinsic value and a typical formulation uses estimated earnings for the next 12 months (Jones, 1990). The basic equation then becomes:

$$\begin{aligned} P_{i0} &= \text{Forecasted EPS} * \text{Forecasted P/E ratio} & (3) \\ &= E_{i1} * P_{i0} / E_{i1} \end{aligned}$$

Therefore, using either equation (1) or (3) to estimate the intrinsic value of a share, an investor necessarily requires an estimate of the future (expected) EPS. Therefore, the estimation of a firm's fair stock price is based on its expected earnings.

There are two ways to obtain an earnings estimate. Primarily, an investor can rely on earnings estimates as provided by security analysts, who make such forecasts as part of their job. Alternatively, investors can use mechanical procedures such as time-series models to estimate earnings. Because of the importance of earnings estimates in security valuation models, it is essential for investors to make use of the most accurate earnings forecasts in order to identify undervalued or overvalued shares accurately and to transact accordingly.

2.2.2 The concept of rational expectation

The concept of rational expectations has recently become the underpinning of many economic models [Givoly and Lakonishok (1984)]. Major research efforts empirically

assessing the degree of rationality in the expectations of economic variables, such as, inflation, GNP and unemployment have been carried out. Motivated by the increased availability of analysts' earnings forecasts, the rationality of these predictions has also been investigated. The question of rationality of earnings expectations is essential since it is directly related to the efficiency of the stock market. Evidence of rational earnings forecasts would be consistent with both findings of stock market efficiency and the important role of earnings in stock valuation. Findings of irrational forecasting by analysts would be inconsistent with stock market efficiency unless either financial analysts' forecasts do not characterise the true market expectations or earnings expectations do not play the role envisioned for them by the various valuation models [Givoly and Lakonishok (1984)].

As discussed in Givoly and Lakonishok (1984), Muth (1961) criterion for rationality states that expectations should be generated by the same stochastic process that produces the variables to be forecasted. However, most tests for the Muthian hypothesis have adopted a weaker condition, namely, that expectations fully reflect all the information in the past history of the forecast variable. This implies that a rational forecast cannot be improved by studying past forecast errors.

The central idea of the rational expectations hypothesis is illustrated by Attfield, Demery and Duck (1985). Imagine an economic variable, Y , whose value in any period t is actually determined by its own lagged values and by lagged values of other variables X and Z in accordance with the following process:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 X_{t-1} + \alpha_3 Z_{t-1} + u_t \quad (3)$$

where X, Y and Z are all variables and $\alpha_0, \alpha_1, \alpha_2$ and α_3 are constant coefficients. The random term u_t is included because it is assumed that Y (rightly) follows a stochastic process, inherently including an unpredictable element. If at the end of period $t-1$, the value of Y_{t-1}, X_{t-1} and Z_{t-1} is known, their expectation of Y for period t will be given by:

$$E_{t-1} Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 X_{t-1} + \alpha_3 Z_{t-1} \quad (4)$$

Because u_t is a random variable which may be positive or negative, it implies that it follows a probability distribution centered at zero and has a constant and finite variance (σ_u^2). Therefore, the expectation of u_t at the end of the period $t-1$ is given by $E_{t-1}u_t$ and is equal to zero (the mean value) as its value cannot be predicted on the basis of any information available in period $t-1$. If the actual value of Y is determined in accordance with equation (3), it follows that the expectational error will be equal to:

$$Y_t - E_{t-1}Y_t = u_t \quad (5)$$

The implication of the above is that if the process of determining Y is understood, the error of a rational expectation of Y is the same as the random component of the process determining Y . In summary, the general characteristics of rational expectations are described as follows: (i) the mean or average error is zero; (ii) there is no discernible pattern to the expectational error; and (iii) the rational expectation is in general the most accurate expectation it is possible to form.

First, once the process determining Y is allowed to be stochastic, rational expectations no longer have the implausible characteristic of being perfectly accurate each period. Rational expectations have the attribute of being correct on average and therefore, the mean error will equal to zero. Second, the theory of rational expectations rules out any pattern in forecasting errors. To be noted that if expectations are rationally formed, the forecasting or expectational error will equal the random element in the process determining the variable being forecast and by assumption this random element itself displays no pattern. Because the random element, u , exhibits no pattern then neither does the forecasting error if expectations are rational. Third, the rational expectation, the expectation formed in accordance with the process actually determining the variable, will be a more accurate expectation than formed on another basis. In other words, the variance of the forecasting errors will be lower under rational expectations than under any other method of forecasting.

These characteristics of a rational expectation have been generally observed by academics evaluating the rationality of earnings forecasts. Crichfield, Dyckman and Lakonishok (1978:652) assert, "...an implied purpose of earnings per share forecasts provided by security analysts is to yield unbiased estimates of future earnings per share which would

be useful for investors in assessing firms' equilibrium values". Moreover, in their review of the properties of analysts' earnings forecasts, Givoly and Lakonishok (1984) brought to light the testable implications of the rationality assumption. In their own words, "...*rational expectations should be unbiased and the most accurate, and the time-series of forecast errors should be serially uncorrelated*" (p. 127). As such, all possible extrapolations of the time-series of the variable, and the utilisation of the cross-sectional relationship between realised earnings across companies, should be rooted in the forecast. This once again stresses the implication that no systematic improvement of forecasts can be made by studying the past series of forecasts and realisations.

In another paper, Givoly and Lakonishok (1984:40) restate, "...*accuracy, however, is only one aspect of a wider attribute that useful forecasts must possess – that is, rationality, or the ability to reflect all available information*". The study acknowledges the difficulty to determine empirically whether analysts' forecasts are rational because it is almost impossible to define the set of all available information. However, it does avow that one piece of information that a rational forecaster should consider is his previous forecast error. In other words, a rational forecast will adjust for any systematic error (or bias) apparent from past performance. As an example, if past predictions proved to be consistently biased upward, then the new forecast should adjust fully for this error.

2.3 The EMH and analysts' stock recommendations

2.3.1 The Efficient Market Hypothesis (EMH)

One of the most heated debates in finance around the world has been the extent to which stock markets are efficient. Robertson (2002) affirms that the degree of efficiency depends on the extent to which asset prices fully reflect available information. He cites the study of Fama (1970:288) which notes, "*All the empirical research on the theory of efficient markets has been concerned with whether prices 'fully reflect' particular subsets of available information.*" Moreover, as explained in Fama (1991), the evaluation of market efficiency can only take place within a theoretical framework of an asset pricing model.

Predominantly, the CAPM has been used whenever the need for an asset pricing model arose. Recently though, the APT has gained in popularity, mainly because of its less restrictive assumptions than the CAPM. While the CAPM finds equilibrium through optimal portfolios as implied by portfolio theory, the APT finds equilibrium by ruling out arbitrage possibilities.

Summing up the empirical evidence and upon the review of the theory, Fama (1970) stipulates three forms of market efficiency, namely, the weak form, the semi-strong form and the strong form. The weak form of market efficiency is demonstrated by a random change in asset prices and past asset prices that contain no information about future changes. The semi-strong form of market efficiency is characterised by asset prices that reflect all public information contained in published financial reports. Finally, the strong form of market efficiency states that, in addition to public information, all private information is incorporated in asset prices and only privileged or inside information can lead to trading profit¹.

Fama (1991) suggests revised classifications of the asset market efficiency. The weak form of market efficiency was renamed as return predictability. Under return predictability, there has been a change in the empirical focus from testing short-run relationships based on past returns to tests that use longer horizons. The semi-strong form was termed as event studies. Event studies involve the assessment of the impact of well-defined incident such as a takeover bid, listing or stock split on subsequent stock prices. Lastly, the strong form of market efficiency was reinstated as a test for private information. Tests of the role of private information measure the extent to which insiders, or professional investment managers, are able to earn abnormal returns.

2.3.2 The paradox between academics and practitioners

Bidwell (1977) describes how the academic's view and the practitioner's view as to the nature of the stock market and the value of stock sensitivity are diametrically opposed. These contradictions have constantly been visited and tested over times [Elton, Gruber and Gultekin (1981), Bhana (1990) and Barber, Lehavy, McNichols and Trueman (2001)].

The academic's view depicts an efficient market in which new information is immediately available at minimal cost to the investment community. Coupled with negligible transaction costs, share prices will immediately adjust to reflect new information. As such, each common stock at any point in time is fairly priced with respect to its value. According to Bidwell (1977:26), "*...it is neither underpriced nor overpriced but is equal to the mean expected value of the distribution of the next period return minus a factor allowing for a holding period return commensurate to the risk of the security*". The academic view is expressed by the EMH as put forward by Fama (1970).

Bhana (1990) illustrates the impact of analysts' recommendations in an efficient market. Accordingly, the strong form of the EMH predicts that an analysts' recommendation would result in no share price adjustment at all. A weaker version on the other hand, would allow the recommendation to carry information but predicts that prices will adjust as soon as the analysts' clients have access to the information. Under this version, clients act as arbitrageurs, purchasing undervalued shares in anticipation of abnormal returns. As long as a share price is undervalued, clients continue to purchase, and ultimately the information contained in the recommendation is completely reflected in the price.

The practitioner or traditional view is that security markets are not perfect: actual price will not always equal value. This implies that portfolio managers and analysts can attain consistently superior returns, per units of risk accepted, by share selection resulting in a nondiversified portfolio. Analysts utilise a number of fundamental and technical approaches to isolate shares whose prices and values are divergent. By discovering a change in a company's future earnings streams, or a change in the probability distribution of that stream, the analyst can, in an imperfect market, pre-empt the market process and thereby profit. Implicit in this view of the market is that share prices do not instantaneously adjust to new information and that knowledge and analysis are important and can lead to share selections yielding above-average returns [originally from Bidwell (1977) and replicated in Bhana (1990)].

The paradox between academics and practitioners is actually a result of the existence of pockets of inefficiency. The concept of asymmetric information argues that the financial marketplace contains pockets of inefficiency in the availability and use of information,

¹ See Robertson (2002).

such that insiders can earn excess returns by selectively trading assets based on the special information they have been able to acquire. Although these small pockets of inefficiency would allow practitioners to earn a good living, it would not mean that the market was inefficient from a macro perspective. If analysts did not think that they could earn abnormal returns, they would not do the fundamental and technical analysis that in fact makes the market efficient. Boldt and Arbit (1984) traced and evaluated the empirical evidence supporting, as well as contradicting, the EMH. It was argued that the case for all forms of EMH is neither as strong as most academics assume, nor as weak as most professional investors like to believe.

2.4 Summary

The concepts reviewed in this chapter describe several important theoretical considerations that are appropriate to the empirical work conducted in this thesis. It has been discussed how analysts' earnings forecasts are an important piece of information to markets participants. It is still essential to ensure that these market participants are using rational predictions. Analysts' earnings forecasts are close to being rational if they are accurate and free from any systematic bias. By assessing their accuracy and the extent of systematic bias inherent in them, this study helps the market participants to judge the degree of rationality of analysts' earnings forecasts. The issue of rationality of analysts' earnings forecasts is important for their continued use by market participants, who can keep on using them as issued by analysts or adjust them appropriately depending on the results of this research. In addition, the forecasting ability of analysts is questioned by investigating the post-recommendation performance of recommended stocks. This represents a test of the semi-strong form of market efficiency since it investigates whether investors are able to earn abnormal return on the basis of publicly available information, such as analysts' consensus recommendations.

Literature Review

3.1 Introduction

The investment theory introduced in the previous chapter provides a framework for empirically assessing the quality of analysts' forecasts and their ability to identify outperforming and underperforming shares. The aim of this chapter is to provide a review of the investment literature as a reference for the empirical work conducted in the subsequent chapters of this thesis.

In each section of this chapter the international literature is surveyed independently to the literature that is distinct to the JSE. The South African case, if available, can therefore be contrasted to the international literature. The remainder of the chapter is set out as follows. Section 3.2 presents the literature that empirically evaluates the properties of analysts' earnings forecasts. Section 3.3 reviews the studies that investigate the investment value of analysts' recommendations issued from three sources, namely, brokerage houses, investment advisory services and the financial press. Section 3.4 summarises this chapter.

3.2 Empirical evaluations of the properties of analysts' earnings forecasts

Although no published study of any attribute of analysts' earnings forecasts is available in South Africa, this widely used accounting parameter has attracted the attention of academics internationally. In particular, the properties of security analysts' earnings forecasts have been subject to extensive research in the United States. The focus of the early research concerning security analysts' earnings forecasts has been on the issue of

accuracy. The preoccupation with accuracy as opposed to other properties of the earnings forecasts stems from the fact that security analysts represent a higher cost factor than time-series models and as such, are expected to produce more accurate forecasts. However, contemporary research on the accuracy of analysts' earnings forecasts is conflicting and contradictory.

Cragg and Malkiel (1968) compared the five-year earnings growth rates forecasted by five investment houses for 185 companies for the years 1962-1963 with two sets of naïve models as one predicting no change and the other a change in growth rate equal to past changes in growth rate. They conclude, "*...forecasts based on perceived past growth rates...do not perform much differently from the analysts' predictions*" (p. 77). In their study Elton and Gruber (1972) examined annual earnings forecasts made by analysts in a large pension fund, an investment advisory service and a large brokerage house and reached the same conclusion. They were unable to find any significant difference in accuracy between the best naïve model (an exponential smoothing model) and each of the three groups of analysts' forecasts.

Although these early results cast doubt on the usefulness of analysts in formulating forecasts, later studies resulted in more intuitively appealing findings.

Brown and Rozeff (1978) examined two sets of quarterly earnings forecasts for 50 firms over the period from 1971 to 1975. The first set was obtained through the application of econometric models to each firm's previous earnings history. Box-Jenkins (1970) models, which are highly regarded for their ability to make the most efficient use of the time-series data, were used. The second set was obtained from the earnings forecasts of security analysts as reported in the Value Line Investment Survey. The results suggested that the Value Line Investment Survey consistently makes better earnings forecasts than the Box-Jenkins time-series models.

Crichfield, Dyckman and Lakonishok (1978) investigated the ability of security analysts to provide estimates of earnings per share, which incorporate all available information. This would suggest that analysts' forecasts are rational since they cannot be improved by studying past forecasts and realisations. Different aspects of the quality of analysts' earnings forecasts were examined for each year from 12 months prior to one month

following the end of the fiscal year. Besides concluding that analysts' forecasts become more accurate as the reporting date approaches, the study found that the predictions of changes in earnings per share data contain no significant systematic bias.

Elton, Gruber and Gultekin (1984) found that analysts' errors decline monotonically as the end of the fiscal year approaches. The tendency for analysts to overestimate the growth rates of securities they believed would perform well and to underestimate the growth rate of companies they believed would perform poorly was also apparent. Analysts on average had difficulty in forecasting the earnings growth of a company, which had large forecasting errors in the previous year. Moreover, it was found that analysts tend to have greater divergence of opinion for the first four months of a year, with no evidence of a systematic decrease in divergence of opinion over the rest of the year.

Givoly and Lakonishok (1984) found that analysts' earnings forecasts do incorporate the past history of realisations and predictions in an unbiased manner and, as such, can be classified as being rational. They even went further to acknowledge analysts' earnings forecasts as a reasonable proxy for the unobservable market expectation of earnings. An alternative criterion in choosing an earnings expectation proxy is market association, whereby the forecast whose error is most highly correlated with abnormal returns is the proxy of choice (Foster, 1977).

Brown, Hagerman, Griffin and Zmijewski (1987) compared the performance of three quarterly earnings forecasting models with those generated by Value Line analysts for a sample of 200 companies. The results showed that analysts' earnings forecasts were superior. The authors disclosed the reason for the superiority of analysts' forecasts being, "...due to better utilization of information existing at the forecast initiation date for the time-series models, a contemporaneous advantage, and acquisition and use of information after the time-series models' forecast initiation date, a timing advantage" (p. 61). It was concluded that analysts' expectations are a better surrogate for market expectations than time-series forecasts.

Conroy and Harris (1987) studied how the accuracy of forecasts made by analysts, time-series models or combinations of the two are affected by forecast horizon, number of analysts and the dispersion of analysts' forecasts. It was found that the average of

analysts' forecasts is a more accurate predictor of corporate earnings per share than forecasts from the time-series models employed. However, this superior forecasting ability appears largely for forecast horizons of less than a year and declines steadily as the forecast horizon increases. Furthermore, for predictions in the first half of the fiscal year, the study demonstrated that forecasting benefits could be achieved by combining time-series and analysts' forecasts, especially if there are few analysts' forecasts available.

A major contributor to the literature of earnings forecasts is the study conducted by O'Brien (1988), which examined three composite analysts' earnings per share forecasts as proxies for expected earnings: the mean, the median and the most current forecast. Quarterly time-series models of earnings were used as benchmarks, against which analysts' forecasts were compared. The primary result was that the most current forecast available is more accurate than either the mean or the median of all available forecasts. Consistent with previous research, it was also found that analysts are generally more accurate than time-series models. In addition, the study found that security analysts' forecasts tend to be too optimistic, i.e. are upwardly biased.

As researchers reached some consensus on their findings regarding the accuracy of analysts' earnings forecasts, other aspects of earnings forecasts were investigated:

Dreman and Berry (1995) questioned the use of consensus earnings forecasts in valuation methods, as the average forecast error appeared to be increasing overtime. Analysts were found to be optimistic on average, with errors large across industries and through various stages of the business cycle. Recognising that behavioural factors could account for the large errors, the authors recommended the use of broad-band rather than single point estimates of consensus earnings forecasts.

Following previous research (e.g. O'Brien, 1988), which documented that timely composites of analysts' forecasts are superior to the mean forecast in terms of predictive ability, Brown and Kim (1991) additionally showed that timely composites are superior to the mean on the market association dimension. Using the mean forecast obtained from Zacks Investment Research and Lynch, Jones & Ryan summary tapes, it was shown that timely aggregate analysts' forecasts are more highly associated with excess returns than the mean forecast. Stickel (1992) looked at the relative forecasting ability of all-American and

non all-American industry analysts and found that all-American earnings per share forecasts were more accurate by approximately \$ 0.03 per share. However, the statistical significance of the outperformance was not tested. Consistent with conclusions reached by O'Brien (1988), the study also affirmed that analysts tend to be too optimistic in forecasting earnings per share.

De Bondt and Thaler (1990) investigated security analysts' earnings forecasts for the existence of any bias. They reached the conclusion that predictions of stock market professionals show a pattern of overreaction and that forecast changes are too extreme to be considered rational. De Bondt and Forbes (1999) empirically analysed the herding behaviour in analysts' forecasts of earnings per share. They defined herding as '*excessive agreement*' among predictions, i.e. a surprising degree of consensus relative to the predictability of corporate earnings. In agreement with prior research, evidence of excessive optimism in consensus forecasts and herding behaviour among analysts was found. Furthermore, the study pinpointed that as more analysts produce forecasts, disagreement rises, but only up to a point. Once they had 8 predictions, additional forecasts do not add to the forecast dispersion.

More recently, Capstaff, Paudyal and Rees (2001) analysed the earnings differentials in nine European countries, namely, Belgium, France, Germany, Ireland, Italy, Netherlands, Spain, Switzerland and the United Kingdom. In general, they found that analysts in all countries outperform naïve models. Analysts are typically optimistic and increasingly inaccurate, the longer the forecast horizon. They also noted that analysts in the United Kingdom and the Netherlands are good forecasters, while Italian and Spanish forecasters show poor results. Forecast bias is strongly evident, especially for the Swiss forecasts.

Measuring the earnings surprises of international firms in 40 countries from the Asia-Pacific and Europe regions, Hsu (2001) found that financial analysts were not accurate in forecasting and that they tended to over-estimate earnings more often over the sample period considered. Black and Carnes (2002) investigated the determinants of the accuracy of analysts' earnings forecasts in the larger economies of the Asian-Pacific region. Besides exhibiting an optimistic bias on average, analysts' forecasts were shown to be more accurate in those nations with higher overall competitiveness rankings. Countries using British-based accounting methods were found to have smaller forecast errors and firms

with a larger difference between market and book value of equity were typified with a larger optimistic bias in the analysts' forecasts. da Silva (2002) disclosed that the accuracy of a particular industry's earnings forecasts can be improved by taking into consideration information from other industries. More specifically, by incorporating inter-industry linkages information into both the raw analysts' forecasts and forecasts obtained using the time-series models, the adjusted-analysts' forecasts were found to be unbiased and significantly more accurate.

3.3 Empirical evaluations of analysts' stock recommendations

Research questioning the ability of analysts to provide value-added recommendations originates as early as Cowles (1933). The study evaluated the forecasting efforts of professional agencies in either picking stocks with the potential to outperform the market or predicting the future movements of the stock market. The purchase recommendations of 16 financial services and the predictions of 24 financial publications engaged in forecasting the stock market failed, on average, to yield results exhibiting any forecasting ability. Statistical tests performed on the best individual financial service and the most successful publication lead to the conclusion that results achieved are very little different from what to expect from pure chance. Cowles (1994) furthered his investigation by analysing the performance of 11 of the forecasters over a much longer sample period. Once again, it was found that these leading financial periodicals and services were unsuccessful to display any ability in predicting the future course of the stock market.

Consequently, many academics have assessed the performance of analysts' recommendations over time. More specifically, as mentioned in Aitken, Muthuswamy and Wong (2000), there are three parallel strands of literature on recommendation performance, which as a result of the different degree of accessibility of the various types of recommendations to the individual and institutional investors. Most of the research that has been undertaken concentrates on the value of brokers' recommendations for the mere reason that brokers produce research that is disclosed only to their clients who pay high commissions upon the purchase of shares¹. Some studies have also questioned the value of

¹It is noted that in South Africa, stock-broking firms' consensus recommendations are available to subscribers of I-Net Bridge Real Time. Individual brokers' recommendations are only available to clients of the stock-broking firms.

fee-paying investment advisory services such as the Value Line Investment Survey, while others have analysed the value of recommendations published in the financial press such as the Wall Street Journal (WSJ). A brief review of studies that explored the investment value of each source of recommendations follows.

3.3.1 Value of recommendations issued by brokerage houses

This section focuses on the recommendations provided by stock-broking firms. First, the international literature of analysts' stock recommendations is divided into the United States evidence and other international evidence and discussed. Second, studies on analysts' stock recommendations that are specific to the JSE, are evaluated.

3.3.1.1 United States evidence

Early studies conducted in the United States include Diefenbach (1972), Bidwell (1977), Groth (1978) and Groth *et al* (1979). In general, inconsistent results were found with regard to the relative performance of stocks recommended by analysts.

Diefenbach (1972) made an overall and firm level assessment of the value of recommendations received from the institutional research departments of brokerage firms. For the buy recommendations, it was established that there is not much difference in choosing between this group of recommendations and a random selection process. The author concludes, "*...in aggregate, this group of investment recommendations does not provide a useful universe from which to select investment ideas, although, some sources do provide recommendations that perform better than others*" (p. 56). Buy recommendations outnumbered sell recommendations during the period by about 26 to one. For sell recommendations, it was found that analysts were more selective in the sense that all six sources produced recommendations with negative mean performance differentials relative to the Standard & Poor 425 (S&P 425).

Bidwell (1977) questioned the ability of eleven institutional research firms, chosen due to their reputation of research excellence, to recommend stocks with superior performance

potential. It was found that for a one-year holding period, although the recommendations attained a mean excess return above the Standard & Poor 500 (S&P 500) and a mean excess return above the mean expected excess return (approximated using the market model), statistical tests led to inconclusive results due to the large standard deviations of the estimates. Over other holding periods, the recommended stocks achieved a mean return significantly lower than the mean return of the S&P's 500 stock indices and a mean excess return significantly lower than the mean expected excess return. The findings pointed to a lack of skill on the part of the most qualified analysts to isolate and recommend outperforming stocks.

Groth (1978) found measurable differences in the pattern of risk-adjusted returns for recommended stocks grouped by term (near, intermediate and long) and objective (income and growth). Generally, abnormal returns for some stocks for as long as six months prior to recommendation were observed. However, these returns do not reappear in the extended 12-month post-recommendation period. Groth, Lewellen, Schlardaum and Lease (1979) studied a brokerage house's recommendations to its individual customers during the 1960s and disclosed that abnormal returns could be achieved, even after taking transaction costs and risk into account. Abnormal returns were associated primarily with buy, rather than sell recommendations. The authors conclude, "*...although the recommendations are characterised by valuable stock selection, their market timing is generally poor*" (p. 32).

More recently, Elton, Gruber and Grossman (1986) examined the information content in analysts' recommendations by analysing both the level of the recommendation and the effect of a change in an analyst's recommendation. Disregarding the accuracy of a particular asset pricing model, this study made the more robust assumption that beta is either in general a sufficient metric for risk or the only metric that systematically differs across recommendations and developed comparison portfolios based on differing recommendations but having the same beta. For portfolios of stocks upgraded in ranking, a large return in the month of the change in recommendation was followed by a substantial return in the month after and a smaller return two months after the change. For portfolios of stocks downgraded in ranking, there was a substantial negative return in the month of the change in recommendation and a larger negative return in the month after the change. The results were observed to be statistically significant at both the aggregate and individual brokerage firm levels. It was also shown that the excess returns achievable through

investing in the brokerage firm's recommendations, were not as much as those earned by acting on changes in recommendations.

Stickel (1995) investigated the influence of factors such as the strength of the recommendation, the magnitude of the change in recommendation and the reputation of the analyst issuing the recommendation and others on the short and long-term stock price performance of buy and sell recommendations. Regarding the recommendations considered 55% were buys, 33% were holds and 12% were sells. The calculation of the mean abnormal performance showed that buys generally had positive returns and sells generally had negative returns through Days +60 of the recommendation, and statistically significant abnormal returns were within Days -10 to +10 of the recommendation. As a way of illustrating the immediate impact of the investigated factors on stock price, the author indicates, "...the average return to buy recommendations quadruples, going from 1.16% to 4.61% during Days -5 to +5, if it is a strong buy recommendation that skips a rank (e.g. 3 to 1), is issued by a first-team All-American employed by a large brokerage house recommending a smaller company, and is accompanied by a positive revision in an earnings forecast" (p. 37).

Liang, Ramchander and Sharma (1995) compared the performance of a set of stocks selected on the basis of professional advice to random picks from the "Investment Dartboard" column that appears monthly in the Wall Street Journal (WSJ). Portfolios constructed on the basis of professional advice generated significant positive abnormal return on the day of publication and one day after the publication. Results also suggested that the professional selection statistically outperformed the random selection only within a one-week period and that the random stocks performed better than the professional recommendations over a six-month period. The authors classified professional advice to include a publicity effect since there was no discernible long-term abnormal return.

Womack (1996) considered the investment value to be gained by acting on changes to and from the extreme stock rating categories. Recommendations were predominantly for large-capitalisation companies and the ratio of buy to sell recommendations in the sample was about 7 to 1. The results revealed the existence of significant initial price and volume reactions to different types of recommendation changes. Significant post recommendation stock price drift in the direction forecast by analysts was also observed. Upon the

examination of the post recommendation excess returns, the author infers, “...*not only are event-period returns large and significant for both added-to-buy and added-to-sell recommendations, but post event returns are in the direction predicted by the analysts*” (p. 164).

Barber, Lehavy, McNichols and Trueman (2001) examined the investment performance, tracked in calendar time, of firms grouped into portfolios according to their analysts' consensus recommendations. It was found that purchasing (selling short) stocks with the most (least) favourable consensus recommendations, with daily portfolio rebalancing and a timely response to recommendation changes, resulted in annual abnormal returns greater than 4%. However, less frequent portfolio rebalancing or a delay in reacting to recommendation changes reduced those returns, although they remained significant for the least favourably rated stocks. The investment strategies considered required a great deal of trading that resulted in high transaction costs. Taking into consideration these transactions costs, none of the strategies achieved an abnormal net return that was reliably greater than zero. Nevertheless, the authors concluded that to those investors who consider buying or selling and therefore incurring transactions costs in any case, analysts' recommendations prove to be valuable.

Lately, Brav and Lehavy (2003) examined the information content of analysts' expectational data. Although, the primary focus was on the information content of analysts' target prices alongside that of analysts' stock recommendations and earnings forecasts, the value of analysts' recommendations was examined on its own. Significant positive (negative) price reaction to recommendation upgrades (downgrades) was shown. It was concluded that target price revisions contain information regarding future abnormal returns above and beyond that which is conveyed in stock recommendations.

3.3.1.2 International evidence

The value of brokers' recommendations has also been investigated in other countries. Dimson and Marsh (1984) assessed brokers' forecasting ability in the United Kingdom by comparing forecast returns with realised returns for individual brokers, for brokers as a

group, for internal analysts and for the sample as a whole. In investigating analysts' forecasting ability, the forecasts of specific returns rather than the typical buy, hold and sell recommendations were used. It was found that stock prices react rapidly to the informational content of forecasts. The 3000 trades, directly motivated by the forecasts, outperformed the market by 2.2 percent in the year following the trades. It was also affirmed that differences in forecasting ability between brokers do not appear to prevail, but predictive accuracy can be improved by pooling simultaneous forecasts from different sources.

Bjerring, Lakonishok and Vermaelen (1983) evaluated the investment advice of a leading Canadian brokerage house, which had recommendations of both Canadian and US stocks. The market model was used to estimate abnormal returns. As predicted by the brokerage firm, stocks on the recommended list (buy recommendations which were expected to achieve positive abnormal returns) produced positive abnormal returns. On the other hand, stocks on the representative lists (dropped from the recommended list) achieved abnormal returns that were close to zero. In addition, the raw returns of stocks on the recommended lists were significantly higher during the period of recommendation than in the surrounding period, implying that the information content of the recommendations was not instantly reflected in the market prices.

Aitken, Muthuswamy and Wong (2000) examined the impact of stock recommendations produced by twenty brokerage firms in Australia. The presence of significant daily abnormal returns surrounding the release of buy and sell-related recommendations indicated that brokers had stock-picking ability. However, their market timing ability was poor since prior to the official release of the recommendations, the stocks recommended for purchase and sale already showed evidence of positive and negative abnormal returns respectively. In addition, the study linked brokers' recommendations with significant abnormal trading activity. Both the order and trading activity of the brokers making the recommendations were significantly higher than usual both on the recommendation day and in the post-recommendation period.

3.3.1.3 Prior South African evidence

Bhana (1990) performed an evaluation of the effectiveness of share recommendations by two large firms of stockbrokers in the South African environment. All the buy and sell recommendations made by the firms during the ten-year period from January 1979 through December 1988 were compiled. The average return residuals (estimated by means of the Market Model) of the buy recommendations were uniformly positive for the entire period. However, it was found that the average return residuals were statistically significant 16 weeks prior to recommendation until the week following the recommendation. The sell recommendations depicted negative and statistically significant average residuals during the four weeks preceding, and the week following the recommendation date. It was suggested that the evident ability of stockbrokers to provide better investment recommendations stems from their superior access to new information that is processed more quickly and efficiently than most investors.

Hall and Millard (2002) conducted the other published research assessing the value of brokers' recommendations of shares listed on the JSE. The investment recommendations of the top three broking houses, selected on the basis of the results of the Financial Mail "Analyst of the Year" awards, were used to generate an average recommendation for each of the 16 companies considered. Based on this recommendation, three portfolios (buy, hold and sell) were compiled. The monthly return of each portfolio was compared to the monthly movement of the JSE All-Share Index and the Industrial Index. In addition, the risk-adjusted performance of the portfolio was evaluated using Jensen's alpha measure. The results of the study indicated that if the returns were not adjusted for risk, based on brokers' buy and hold recommendations, investors could earn a return greater than that of the market return. If the returns were adjusted for risk, following brokers' recommendations was found to generate returns greater or equal to the market and limit investors' losses in relation to the movement of the market.

3.3.2 Value of recommendations issued by investment advisory services

As mentioned above, fewer studies have dealt with the performance of stocks recommended by investment advisory services. Investors can subscribe to these

companies or they can access at least some of them free of charge at their library or at the offices of their brokers. Recommendations of investment advisory services have not been subject to much research probably because analysts of brokerage houses often consider them as a source of information before issuing their own recommendations. The fact that they are accessible for a less considerate fixed fee than brokers' recommendations may also explain why there has been relatively fewer studies concentrating on the value of investment advisory services.

This section focuses on the recommendations provided by investment advisory services. First, the international literature of analysts' stock recommendations is reviewed and then, the only study of investment advisory services' analysts' stock recommendations specific to the JSE, is appraised.

3.3.2.1 International evidence

Cheney (1969) evaluated the performance of the stocks on the recommended lists of four experienced and well-equipped subscription investment advisory services, which were identified as to the following common objectives: capital gains, income and combined growth and income. The evidence gathered seemed to warrant a conclusion that the subscription investment advisory services were able to select stocks that offered better than average return on investment. In aggregate, the lists of common stocks recommended by the advisory services increased in value by 353.3% compared with an increase in value of 225.7% by the S&P 500. In addition, the individual lists of growth, income and combination of income and growth stocks of the advisory services provided above-average performances.

Stoffels (1966) considered the effect of a recommendation by an investment advisory service on the short-term changes in the market price of a stock. The focus of the study was upon those small investors who might accept the advice of an investment advisory service and buy a stock without prior or further investigation. The initial hypothesis that a recommendation by an investment advisory service has a noticeable effect on the price of the recommended stock was validated. The effect on the price of the stock remained at least throughout the third or fourth day following the day of recommendation.

Black (1973) analysed the performance of stocks ranked from 1 through 5 by the Value Line Investment Survey. Using a calendar time perspective, equally weighted portfolios were formed of all stocks in each ranking category. As a stock left a particular category, the portfolio was rebalanced. It was assumed that all purchases were made at the close of the market on Friday, which was when most subscribers received their reports. The regression method of testing for consistency of performance was favoured. It was found that revising the portfolios on a monthly basis, yielded extra returns of 10 percent per year for Rank 1 and -10 percent per year for Rank 5. The statistical tests indicated that the excess returns of the rankings were significant and as such consistent over time. Weekly rebalancing of the portfolios made the results even more significant, implying frequent rebalancing as a determinant for higher returns.

3.3.2.2 Prior South African evidence

In his study, Bhana (1990) also determined if the buy and sell recommendations of two South African investment advisory services yielded superior returns during the period 1979 to 1988. Similar to the findings regarding brokers' recommendations, it was established that the buy and sell recommendations of the investment advisory services added economic value for their clients. Besides attributing superior returns to a superior access to new information that is processed more quickly and efficiently, the study suggested that investment analysts have the potential to acquire inside information.

3.3.3 Value of recommendations published in the financial press

Similar to the investment advisory services, little research, questioning the value of the recommendations published in the financial press, has been undertaken. More importantly, no published South African study has yet investigated the value to be derived by following the recommendations in the financial press.

Desai and Jain (1995:1257) found that money managers at Barron's Annual Roundtable (Wall Street's superstars), "...do not on average outperform simple passive benchmarks". Although significant abnormal returns were obtained by the buy recommendations from the recommendation day to the day they were published in Barron's, the abnormal returns were not significantly different from zero for all the holding periods examined after the publication day. Despite the fact that sell recommendations were infrequent, the money managers appeared to predict sell recommendations better. Significant negative abnormal returns were achieved both on the publication day and post-publication holding periods.

Jaffe and Mahoney (1999) studied the performance of common stocks made by the investment newsletters followed by Hulbert Financial Digest. The main finding was that stocks recommended by the newsletters "...do not outperform appropriate benchmarks" (p. 289). Besides, examining the persistence of its performance as measured by raw returns, modest evidence was found regarding the relationship of the newsletters future performance to its past performance. The evidence of persistence was eroded though when performance was measured by abnormal returns. While little evidence of herding among newsletters was found, it appeared that newsletters tended to recommend stocks that had performed well in the past. Finally, it was concluded that newsletters with poor past performance were more likely to go out of business.

Based on the annual All-Star Analysts Survey conducted by the WSJ and Zacks Investment Research, Desai, Liang and Singh (2000) examined the performance of stocks recommended by the set of analysts likely to possess superior stock-picking ability. It was found that the stocks selected by these analysts performed better than the benchmarks after controlling for both size and industry. Besides, analysts who focused on one single industry tended to outperform those recommended by analysts who covered multiple industries.

3.4 Summary

It is not possible to comment on the South African properties of analysts' earnings forecasts since they remain an uninvestigated avenue of enquiry in the South African literature. Besides, it is difficult to contrast the international literature of analysts' stock recommendations with the two studies specific to the JSE. A summary of the prior literature analysing the quality of analysts' earnings forecasts is nevertheless provided, followed by an outline of the findings related to the investment value of analysts' stocks recommendations.

First, earnings forecasts of security analysts appear to be significantly better than those estimated by time-series models. Second, it has been found that the accuracy of security analysts' earnings forecasts declines steadily as the forecast horizon increases. It has further been shown that timely composites of analysts' forecasts are superior to the mean forecast in terms of predictive ability. However, there have been mixed findings as to whether analysts' forecasts can be classified as being rational. While some concluded that earnings forecasts of analysts contain no significant systematic bias, others have rejected analysts' earnings forecasts as being rational especially due to the upward bias they tend to demonstrate. Furthermore, recent studies have observed that analysts also appear to have intrinsic herding behaviour. Finally, analysts' earnings forecasts are more accurate if they are (i) of firms with a modest difference in their market and book value of equity; (ii) adjusted to include inter-industry linkages information; and (iii) from countries that utilise British-based accounting methods and have a good standing in the global competitiveness rankings of the World Economic Forum.

In short, looking at the return performance of analysts' recommendations, it is found that following analysts' recommendation at brokerage houses may not necessarily generate abnormal returns, especially after taking transaction costs into account (Barber *et al*, 2001). In addition, although their stock-picking ability is apparent, analysts' market timing ability is questionable [Groth *et al* (1979), Bjerring, Lakonishok and Vermaelen (1983), Bhana (1990) and Aitken, Muthuswamy and Wong (2000)]. In general, acting on the recommendations issued by investment advisory services seems to yield above average performances. The recommendations from the financial press show inconsistent results.

The problems may lie in determining the appropriate performance benchmarks (Lofthouse, 1996).

University of Cape Town

Data and Descriptive Statistics

4.1 Introduction

This chapter presents the data that are analysed in the empirical chapters of this thesis. The two principal data sets of this thesis consist of (i) earnings per share figures; and (ii) analysts' stock recommendations, which are discussed separately. The methodologies described in the later empirical chapters further outline how these data are used in achieving the objectives of this thesis. Together with providing a detailed breakdown of the two main data sets, the other data used in this thesis are discussed.

The remainder of this chapter is set out as follows. Section 4.2 introduces the two main data sets and provides comprehensive details of their construction and the procedures utilised in adjusting the data prior to analysis. In addition, the sources of the stock returns, the risk-free rate and the returns of the indices on the JSE used in Chapter Six are revealed. Section 4.3 explains the importance of using the consensus of analysts' earnings forecasts and stock recommendations. Section 4.5 summarises this chapter.

4.2 Data

This section provides an overview of the two main data sets that were collected for this thesis. On the one hand, there are the predicted and reported earning figures and on the other hand, there are the recommendations issued by analysts. Both sets of data are the consensus of the analysts' expectational data used. In addition, the sources of the stock returns data, the risk-free rate and the returns of the indices on the JSE employed in this thesis are disclosed.

4.2.1 Earnings per share data

In assessing the accuracy of analysts' earnings forecasts, the earnings figures predicted by analysts are compared to the reported (actual) earnings figures. In addition, a semi-annual auto regressive model is used to generate earnings estimates and the forecast errors from the two sets of earnings estimates, that is, analysts' earnings forecasts and those estimated using the time-series model are contrasted to determine which source of earnings predictions is more accurate. As a result, besides the reported earnings, two proxies of expected earnings are used and a brief description of each one is provided underneath.

4.2.1.1 Reported earnings

Reported interim and final earnings figures and their respective earnings announcement dates were obtained from I-Net Bridge¹. I-Net Bridge makes available the interim and final earnings figures for all firms listed on the JSE on a regular basis. Reported earnings data as from January 1990 are considered because analysts' earnings forecasts were available as from that period.

4.2.1.2 Analysts' earnings forecasts

Prior studies in the United States have made use of at least one of these three publicly available (although not free) sources of earnings forecasts: the *Earnings Forecaster* of Standard and Poor (S&P), the *Value Line's Investment survey* and Lynch, Jones and Ryan's *I/B/E/S Service* (Givoly and Lakonishok, 1984). Besides, depending on the country, other mostly private sources (forecasts made by country-specific service providers, individual brokerage houses and pension funds), have been frequently employed by researchers.

¹ I-Net Bridge is available in the Finance Research Laboratory, School of Management Studies at the University of Cape Town.

In this thesis, the monthly consensus analysts' earnings forecasts for the current financial year were sourced from the I/B/E/S summary database². I/B/E/S, a product of the New York based brokerage firm of Lynch, Jones and Ryan, has available in both manual and computer-readable form, consensus earnings estimates for the current and next fiscal year. The I/B/E/S data is updated once a month with new forecasts. The original data contained monthly earnings forecasts of 167 firms listed on the JSE for the period January 1990 until April 2002. Unfortunately, not all the firms listed on the JSE are covered by analysts and of those with analysts' earnings forecasts, only 30 firms have them at the start of 1990 (refer to Table 4.1).

Out of the 167 firms for which analysts' earnings forecasts were available, 114 were considered in analysing the accuracy of these forecasts. Only those firms for which reported earnings data are available on the I-Net Bridge were retained. Companies that make quarterly earnings announcements were also disregarded³. In addition, the sample period was restricted from the years 1990 to 2002 since analysts' earnings forecasts are only available from the year 1990. Moreover, to be included in the study, a firm must have monthly forecasts during the twelve months prior to the actual announcement. This is required for testing whether the accuracy of forecasts improves as forecast ages⁴ decline and in determining whether forecast timeliness is a characteristic of better forecasts. The descriptive statistics of the sample of analysts' earnings forecasts for each forecast horizon as announcement date approaches are provided in Appendix A.1.

4.2.1.3 Earnings forecasts estimated using a time-series model

Testing for the relative accuracy of analysts' earnings forecasts requires a benchmark for comparative purposes. This study opts to make use of a semi-annual time-series model, which is further explained under the methodology section of Chapter Five. Firms for which earnings forecasts are estimated under the semi-annual time-series model are restricted to those which have at least ten semi-annual earnings per share figures available

² I appreciate the help from the Equity team at Futuregrowth Asset Management for enabling me to access the consensus analysts' earnings forecast as compiled by I/B/E/S.

³ Many mining companies in South Africa have the norm of reporting quarterly earnings.

⁴ A forecast's age is the number of trading days between the analyst's earnings forecast date and the next final announcement date.

on the I-Net Bridge reported earnings database. Again, only shares of firms which announce semi-annual earnings are considered. Companies with quarterly or in some cases yearly announcement of earnings per share are discarded as this hampers the estimation of semi-annual earnings forecasts. For comparative purposes, earnings forecasts are estimated using the auto regressive model only as from the year 1990. Satisfying these criteria results in only 237 firms being retained, for which semi-annual earnings forecasts are estimated. Note that the sample of forecasts used under the time-series model is larger than that made by analysts. The descriptive statistics of the forecasts estimated using the time-series model are given in Appendix A.2.

4.2.1.4 Number of firms with earnings forecasts over the sample period

A breakdown of the number of firms for which analysts' earnings forecasts are observed at the end of each year is provided in Table 4.1. Similarly, the number of firms in each year for which earnings forecasts are estimated using the auto regressive time-series model is shown.

Table 4.1 shows that in the early 1990s only a few firms were subject to analysts' earnings forecasts. In the late 1990s the number of firms with analysts' earnings forecasts more than doubled, and in the year 2001, 119 firms had analysts' earnings forecasts. Likewise, the number of firms for which earnings are econometrically estimated increased considerably from 88 in 1990 to 208 in 2001. The availability of at least ten semi-annual earnings per share figures from the I-Net Bridge reported earnings database for more firms in the 1990s justifies the increase.

Table 4.1: Number of Firms with Earnings Forecasts for each Year from January 1990 until April 2002

The number of firms with analysts' earnings forecasts as well as the number of firms for which earnings forecasts have been estimated using a first-order auto regressive time-series model are shown. The year 2002 reflects analysts' earnings forecasts until the 30th of April.

Year ending	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 (end of April)
Analysts' earnings forecasts	30	31	39	39	46	53	60	64	84	97	113	119	38
Earnings forecasts from time-series model	88	99	121	140	150	154	163	167	166	171	189	208	144

4.2.2 Analysts' stock recommendations

In this thesis, the investment value that investors gain by acting on the level of and changes in analysts' consensus recommendations is also investigated. Consequently, two sets of analysts' stock recommendations result: (i) the analysts' buy, hold and sell recommendations; and (ii) all possible permutations of changes in these recommendations.

4.2.2.1 Analysts' buy, hold and sell recommendations

The analysts' consensus recommendations of brokerage houses used in this study were obtained from I-Net Bridge. The recommendations encompass the period from March 2000 through April 2003. Every month, I-Net Bridge compiles analysts' recommendations of shares listed on the JSE and computes an analysts' consensus recommendation for each share. Typically, the recommendations are graded in terms of B (Buy), Y (Buy+), D (Hold-), H (Hold), G (Hold+), T (Sell-) and S (Sell). For the purposes of this study, in each month of the sample period, the recommendations are simply grouped into buy, hold and sell portfolios.

The database consisted of 5282 recommendations from March 2000 to April 2003. Table 4.2 displays the number of observations in each category. The descriptive statistics are further grouped into shorter sub-periods in order to assess the trend in each category of recommendations over the sample period. Of all the recommendations, 37.92% (2003) are buys, 59.13% (3123) are holds and 2.95% (156) are sells. This distribution is broadly consistent with prior research [Bidwell (1977), Elton et al. (1986), Womack (1996), Barber *et al* (2001) and Hall and Millard (2002)]. Analysts overwhelmingly provide buy and hold recommendations. Such behaviour on the part of analysts is speculated to be a direct result of their interest to stimulate share trades and cultivate relations with management. In addition, it is observed that although the number of recommendations in each month is on average declining over the sample period, there are relatively fewer buy than hold recommendations. It appears that analysts of South African brokerage houses are cautious in releasing buy recommendations, customarily opting for the more conservative hold recommendations.

Table 4.2: Descriptive Statistics of Analysts' Consensus Recommendations of Brokerage Houses from the I-Net Bridge Database, March 2000 to April 2003

The total number of buy, hold and sell recommendations in each period from March 2000 to April 2003 is exhibited. Each category of recommendations is displayed in terms of percentage. The monthly average (Ave) number of recommendations in each category is also shown for each period.

Period	March 00 - December 00 (10 months)			January 01 - December 01 (12 months)			January 02 - December 02 (12 months)			January 03 - April 03 (4 months)			March 00 - April 03 (38 months)		
	No.	%	Ave	No.	%	Ave	No.	%	Ave	No.	%	Ave	No.	%	Ave
Buy	755	44.1	75	562	33.25	47	562	38.36	47	124	29.18	31	2003	37.92	53
Hold	908	53.04	91	1081	63.96	90	852	58.56	71	282	66.35	70	3123	59.13	82
Sell	49	2.86	5	47	2.78	4	41	2.82	3	19	4.47	5	156	2.95	4
Total	1712	100	171	1690	100	141	1455	100	121	425	100	106	5282	100	139

Table 4.3: Transition Matrix: Number of Changes in Analysts' Consensus Recommendations

This table shows the number of changes in or recurrences of the analysts' consensus recommendations over the 38 months from March 2000 to April 2003. The first row displays the recurrence of the buy recommendations and all the changes from a recommendation of buy to hold and sell. The last column shows all the buy, hold and sell recommendations that are dropped from the database of analysts' consensus recommendations over the sample period. The last two rows report the recommendations for firms that: (1) were previously dropped and reappear later and (2) are first covered by brokers.

From Recommendation of:	To Recommendation of:				
	Buy	Hold	Sell	Total	Dropped
Buy	1645	260	1	1906	69
Hold	226	2721	32	2979	115
Sell	1	16	111	128	20
Total	1872	2997	144	5013	
Reappearance (previously dropped from database)	19	55	4		
First appearance	15	14	0		

4.2.2.2 Changes in analysts' stock recommendations

A 3×3 matrix of the number of changes in or recurrences of analysts' consensus recommendations is provided in Table 4.3. In each cell $\{i, j\}$ of the matrix, the number of observations in the database in which analysts' consensus moved from a recommendation of i to one of j is exhibited. Those recommendations that have reoccurred from one month to another are displayed in the diagonal cells of the matrix. The last column shows the number of buy, hold and sell recommendations that are dropped from the database of analysts' consensus recommendations over the sample period. The 'Reappearance' row in Table 4.3 reports the number of firms with previously discontinued recommendation on the I-Net Bridge database and subsequently reappear as a buy, hold or sell recommendation. The last row shows the number of firms, which were first covered by analysts with a buy, hold or sell recommendation. In all, comparing analysts' consensus recommendations

from month t to month $t+1$ over the sample period (37 comparisons) results in 18 portfolios of different permutation of changes⁵ or recurrences.

In Table 4.3, it is also noticed that most of the entries in the transitional matrix are concentrated in the upper 2x2 cells (recurrences of buy and hold recommendations and changes from a buy to a hold and from a hold to a buy recommendation). In addition, recommendations that are previously dropped reappear most frequently as a hold and least frequently as a sell. Shares of firms that are recommended for the first time in the database have either a buy or a hold recommendation and never a sell recommendation. All these observations once again support the claim that analysts are usually reluctant to make sell recommendations.

Womack (1996) explains that analysts are aware that disseminating sell recommendations to the investment community can represent substantial costs or risks. Because sell recommendations are more visible and less frequent, an incorrect judgement on a sell recommendation is likely to be more costly for an analyst's reputation than an incorrect buy recommendation made when other analysts are more likely to be making the same recommendation concurrently. Pratt (1993) describes various other costs of issuing sell recommendations. Sell recommendations can harm a brokerage firm's present and potential investment banking relationships, and are therefore discouraged by the firm's investment bankers. In addition, top management and investment contacts may limit or cut off the flow of information if an analyst issues unfavourable ratings.

4.2.3 Stock returns data

The data set of monthly stock returns includes all the companies with an analysts' consensus recommendation. The raw stock returns of a share are calculated in a particular month by taking the change in its Total Return Index on the Datastream database⁶. However, those firms that were delisted during the sample period do not have any information on Datastream.

⁵ The first appearance of a company or the reappearance of a previously dropped company on the database is considered as a change in analysts' recommendation.

⁶ The Finance Research Laboratory, School of Management Studies at the University of Cape Town, subscribe to the real-time Datastream database.

The raw stock returns of these delisted shares are computed by equation 1 in Chapter Six. As a result, the monthly closing price of these shares and any dividend declared are needed and these are obtained from the I-Net Bridge database.

4.2.4 Risk-free rate

In Chapter Six, two asset pricing models are used to estimate the abnormal returns that are achieved based on the level of and changes in analysts' consensus recommendations. The prevailing risk-free rate for the relevant period is needed in using the asset pricing models. As a result, this thesis approximates the annualised rate on a 3-month Negotiable Certificate of Deposit (NCD) as the risk-free rate. The annualised rate on a 3-month NCD is obtained from I-Net Bridge.

4.2.5 Returns data of share indices on the JSE

The two asset pricing models used require the returns on the All-share Index (ALSI), the Resources Index and the All-share ex Resources Index. These are obtained by computing the change in their Total Return records on I-Net Bridge.

4.3 Use of analysts' consensus expectational data

The empirical investigation in the later chapters uses the consensus (mean) of analysts' earnings forecasts and stock recommendations. Although, the use of the mean forecast is necessary when individual forecasts are unavailable (as in the I/B/E/S case), studies relying on data that involve more than one forecaster usually utilise the mean forecast instead of individual forecasts. The motivation of using consensus data, discussed by some of the previous studies is provided.

Givoly and Lakonishok (1984) acknowledge that averaging individual forecasts has the effect of reducing the measurement error that is inherent in each individual forecast. This point is further discussed in Conroy and Harris (1987:726), “...*averaging to form a consensus has a ‘portfolio effect’ by reducing measurement errors in individual forecasts, as long as the measurement errors are less than perfectly correlated*”. The benefit of the cancellations of individual errors of opposite sign may even result in the consensus forecast being more accurate than any of the constituent forecasts. Therefore, the error intrinsic in individual forecasts can be reduced by using the consensus of these individual forecasts especially when the measurement errors across forecasters are less than perfectly correlated.

In addition, Givoly and Lakonishok (1984) mention that a consensus can reflect ‘*greater than average*’ knowledge. Accordingly, when the forecast errors are not highly correlated cross-sectionally, even a simple average may outperform each of the individual forecasts. They declare that much of the concept of efficient markets composed of unsophisticated and less than perfectly knowledgeable investors who relies on the notion of the ‘*aggregate wisdom*’ of the market – that is, the superiority of the consensus over individual assessments. Both studies [Givoly and Lakonishok (1984) and Conroy and Harris (1987)] cite Beaver (1981), who, in a seemingly unrelated context, illustrates that the consensus of game-score predictions made by staff members of a daily newspaper (the Chicago Daily News) consistently outperformed predictions made by each of the individual staff members.

O’Brien (1988) agrees that the idiosyncratic error embodied in individual forecasts diminishes by aggregation and therefore, more accurate forecasts can be obtained by combining forecasts. It is stated that gains from combining forecasts arise either from the employment of more information in the aggregate than is used by any individual or from diversification across individuals’ idiosyncratic errors. Otherwise, Conroy and Harris (1987) remind us that in many financial models a security’s equilibrium price depends on some consensus expectation of future returns from owning that security and as such consensus forecasts are appropriate proxies to be used in empirical work that tests such models.

Some pitfalls in using the mean forecasts are also recognised in Givoly and Lakonishok (1984). In the first place when combining forecasts cross-sectionally, the assumption is made that each represents an updated expectation. However, as a result of data collection and preparation, some of the predictions are less updated than others, thus making the average forecast less meaningful. A second shortfall may arise from the change over time in the composition of the group of forecasters who cooperate in forecasting the earnings of a given firm. Finally, reliance on the mean forecast may overlook patterns inherent among individual forecasts.

The fact that consensus analysts' earnings forecasts and analysts' consensus recommendations are readily available and more accessible to a larger community of investors provides the incentive for this thesis to investigate the consensus of analysts' earnings forecasts and stock recommendations.

4.4 Summary

This chapter introduces the data sets employed in this thesis. Reported earnings figures, as well as two proxies of earnings expectations, namely, analysts' earnings forecasts and those estimated using a time-series model are presented. The adjustments made to the original data sets in order to filter the relevant earnings forecasts are outlined. Besides, the number of firms with analysts' earnings forecasts and those for which an earnings forecast is estimated in each year of the sample period is exhibited in Table 4.1. In both cases, it is noted that more firms have an earnings expectation in the late 1990s as compared to the beginning of the sample period.

The sources of the analysts' stock recommendations investigated in this thesis are further revealed. A summary of analysts' buy, hold and sell recommendations over the sample period is provided in Table 4.2. As expected, analysts made relatively fewer sell recommendations than buy or hold recommendations. In addition, all possible permutations of changes in analysts' recommendations are explained and the number of changes over the sample period is displayed in Table 4.3. Once again, the rarity of analysts' sell recommendations is apparent.

The sources of the other data used, namely, stock returns data, the risk-free rate and the share indices returns data, are disclosed. Lastly, the reasons justifying the use of consensus expectations in empirical investigation are outlined.

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Accuracy of Analysts' Earnings Forecasts

5.1 Introduction

In an extensive survey of individual investors, institutional investors and financial analysts, Chang and Most (1979) find that earnings forecasts are considered by respondents in the United States to be the most important expectational data in selecting stocks. Indeed, earnings forecasts are perceived to be even more important than dividends and sales forecasts. Similar results are found for the UK and New Zealand. As, Givoly and Lakonishok (1984:117) conclude, "*No better proof exists for the important role that earnings play in financial markets than the handsome livelihood derived by many professionals from the production, analysis and forecasting of earnings numbers*".

This chapter¹ investigates the accuracy of security analysts' earnings forecasts of companies listed on the JSE. The extent of the systematic error or bias inherent in these earnings forecasts is also determined. The accuracy of analysts' earnings forecasts is compared as the earnings announcement date approaches. Thereafter, the accuracy of analysts' earnings forecasts is compared to forecasts derived from a first order autoregressive time-series model. Should the earnings forecasts made by analysts be more accurate than those estimated using the naïve time-series model this could justify their popularity among investors. In addition, analysts' earnings forecasts are decomposed to ascertain whether their expectations fully reflect the history of the systematic error of their previous earnings forecasts. Based on the discussion of rational expectations outlined in Chapter Two, for a forecast to be rational: (i) it must be the most accurate; and (ii) it cannot

¹ This chapter is the originating work for the article: "*Accuracy of Security Analysts' Earnings Forecasts: The South African case*", Investment Analysts Journal, (forthcoming). This article was also presented at the 13th Annual Southern African Finance Association (SAFA) Conference, Graduate School of Business, University of Cape Town (January 2004).

be improved by studying past forecasts and realisations, implying that at least it should not contain a systematic error.

The remainder of this chapter is organised as follows. In section 5.2, an overview of the data and methodology is provided. In section 5.3, the results of the empirical analysis are presented and discussed. Section 5.4 summarises and concludes.

5.2 Methodology

After introducing the reported and the two proxies of earnings expectations in Chapter Four, the number of firms in each year over the sample periods for which earnings predictions are available under each proxy of earnings expectations was provided. The sources of each earnings figure were revealed and the requirements for a firm's analysts' earnings forecast and earnings prediction estimated using an auto regressive time-series model to be considered in the empirical investigation were discussed. In this section, more details regarding the time-series model used are presented, followed by an introduction of the measures adopted to gauge the forecast error. Then, the methodology undertaken to analyse the accuracy of consensus analysts' earnings forecasts is described. Finally, the different samples of analysts' earnings forecasts and those estimated using the time-series model constructed to test the accuracy of earnings expectations under several scenarios are explained.

5.2.1 A first order auto regressive time-series model

A benchmark is required to compare the relative accuracy of analysts' earnings forecasts. Consequently, this study chooses to make use of a semi-annual time-series model, which has been adapted by Liu, Strong and Xu (2003) to the United Kingdom setting of interim and final earnings announcements after Foster, Olsen and Shevlin (1984) utilised it to estimate quarterly expected earnings previously in their research. Time-series models have often been used in prior research to provide earnings expectations. O'Brien (1988)

describes univariate models as a common means of generating earnings expectations with relative ease and simplicity.

Applied to a semi-annual structure of earnings announcement, the model becomes:

$$E[X_{jt}] = \delta_j + X_{jt-2} + \phi_j(X_{jt-1} - X_{jt-3}), \quad (1)$$

where X_{jt} = half-year earnings of the j th firm in period t and δ_j is a drift term. Equation (1) is calculated for each share successively over the sample period, using a minimum of nine semi-annual observations and adding to the number of observations as data become available. For example, the first half-year expected earnings for the firm for 2004 would equal (i) the firm's first half-year earnings in 2003, plus (ii) the change in the second half-year earnings for 2002 to the second half-year earnings of 2003 times the parameter ϕ_j , plus (iii) the parameter δ_j . The values of ϕ_j and δ_j are determined by regression analysis of the behaviour of earnings prior to the first half-year of 2004. As such, this study uses the above semi-annual time-series model, which is a first-order autoregressive process in second differences with a drift to generate earnings estimates.

5.2.2 Error measures

The accuracy of earnings forecasts is determined by the level of error that is reflected in a forecast measure when the actual earnings figure is announced by the firm with the magnitude of the error representing the extent of the error and the direction depicting an under or over-estimation. Two measures of error, namely, the average absolute percentage error and Theil's inequality coefficient, are used in this study to investigate the accuracy of analysts' earnings forecasts. Coupled with these two error measures, regression analysis is used to assess the forecasting accuracy of analysts' earnings forecasts and forecasts estimated using the first order autoregressive time-series model.

5.2.2.1 Average error measures

Past studies have widely used two average error measures in assessing the accuracy of earnings forecast: the average absolute percentage error of the form $\frac{|Y_{jt}^s - Y_{jt}^a|}{Y_{jt}^a}$, and the average square percentage error $\frac{(Y_{jt}^s - Y_{jt}^a)^2}{Y_{jt}^a}$, where Y_{jt}^s and Y_{jt}^a are the predicted and realised earnings variables for firm j respectively. However, which of the error measures is selected may not be important because of the very similar information content contained within the measures. This study opts to make use of the average absolute percentage error measure in assessing the accuracy of earnings forecasts as it is easier to interpret.

5.2.2.2 Theil's inequality coefficient

Theil's inequality coefficient, by means of a decomposition procedure, allows the assessment of the accuracy of forecasts and the bias inherent in those forecasts. In evaluating how closely the forecasted variable tracks the actual data, a number of different statistics can be used. Theil (1966) proposed the U statistic for the evaluation of economic forecasts. Some studies have relied exclusively on Theil's U statistic for evaluating analysts' forecasts. Theil's U statistic has been improved over time and this study prefers to use the more sophisticated Theil's inequality coefficient, which is defined as:

$$U = \frac{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s - Y_t^a)^2}}{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s)^2 + \frac{1}{T} \sum_{t=1}^T (Y_t^a)^2}} \quad (2)$$

where, Y_t^s = forecasted value of earnings;

Y_t^a = actual value of earnings; and

T = number of periods.

The numerator of U is just the RMS (root-mean-square) forecast error and the scaling of the denominator will always result in U falling between 0 and 1. As such, Theil's inequality coefficient measures the RMS error in relative terms. Comparing each value of U between forecasting models provides a way of determining the relative accuracy of each model, where a U=0 will imply a perfect fit while a U=1 will depict that the predictive performance of the model is as bad as it could possibly be.

Moreover, Theil's inequality coefficient breaks down the simulation error from the model into its characteristic sources. Theil's inequality coefficient can be decomposed into the bias (U^M), the variance (U^S) and the covariance (U^C) proportions of U respectively. The decomposition of Theil's inequality coefficient provides a powerful means of analysing each component of the error in assessing the relative accuracy of the analysts' earnings forecasts and the forecasts estimated using the first-order auto regressive model. The proportions of the inequality can be defined as follows:

$$U^M = \frac{(\bar{Y}^s - \bar{Y}^a)^2}{\left(\frac{1}{T}\right)\sum (Y_t^s - Y_t^a)^2} \quad (3)$$

$$U^S = \frac{(\sigma_s - \sigma_a)^2}{\left(\frac{1}{T}\right)\sum (Y_t^s - Y_t^a)^2} \quad (4)$$

$$U^C = \frac{2(1 - \rho)\sigma_s\sigma_a}{\left(\frac{1}{T}\right)\sum (Y_t^s - Y_t^a)^2} \quad (5)$$

where \bar{Y}^s , \bar{Y}^a , σ_s and σ_a are the means and standard deviations of the earnings forecasts and the actual earnings respectively, and ρ is their correlation coefficient.

The bias proportion (U^M) is an indication of the systematic error, as it measures the extent to which the average values of the simulated and actual series deviate from each other. Whatever the value of the inequality coefficient U, it is hoped that U^M will be close to zero. The variance proportion (U^S) indicates the ability of the model to replicate the degree of variability in the variable of interest. If U^S is large, it means that the actual series has

fluctuated considerably while the simulated series shows little fluctuation, or vice versa. Finally, the covariance proportion (U^C) measures the unsystematic error. It represents the remaining error after deviations from average values have been accounted for. It is unreasonable to expect predictions to be perfectly correlated with actual outcomes and therefore, this component of error is less worrisome than the other two. Because the bias, the variance and the covariance are just proportions of the U value, this implies that $U^M+U^S+U^C=1$.

5.2.2.3 Use of regression analysis in evaluating accuracy

Another popular method of evaluating a forecast is to regress the actual changes to forecast changes. If the intercept estimate is tested insignificantly different from zero and the slope coefficient is tested insignificantly different from one, the forecast is said to be a good one. In addition, this approach breaks down the MSE (mean square error) of the forecast into three parts, namely, the bias proportion (reflected by the extent to which the intercept term is non-zero), the regression proportion (reflected by the extent to which the slope coefficient differs from one) and the disturbance proportion (measures by the variance of the residuals from the regression analysis). It is important to note the similarity of these three parts of the MSE to the decomposed proportions of Theil's inequality coefficient.

5.2.3 Description of constructed samples

The empirical analysis begins with an investigation of the accuracy of analysts' earnings forecasts as the announcement date approaches. It is presupposed that as the earnings announcement date approaches, analysts should be able to provide forecasts that are more accurate as the information on which they base their forecasts becomes more timely. The absolute percentage error is computed for each consensus analysts' earnings forecast (annual) for different horizons prior to the earnings being announced. Then, the average absolute percentage error for each horizon is calculated and the pattern in forecast accuracy of analysts is investigated. A n-month time or forecast horizon represents a period of n months prior to the earnings announcement date, with the exception of the 12-month time horizon that uses earnings forecasts that have been revised since the last announcement

was made. It is observed that analysts' consensus earnings forecasts for certain firms are only updated to reflect the next announcement within a period of 1-3 months. The existence of this lag from the time the annual earnings announcement is made and analysts' consensus earnings forecasts are updated prompted the use of revised earnings forecasts for the 12-month time horizon. In addition, Theil's inequality coefficient is computed for each of the forecast horizons and its decomposition allows the analysis of each component of the forecast error as the earnings announcement date approaches.

For the purpose of testing for their relative accuracy, the relevant set of analysts' consensus earnings forecasts is compared to earnings forecasts estimated by the time-series model. In order to maintain consistency in our comparison, the semi-annual earnings estimated by the time-series model are utilised to obtain annual forecasts. These annual forecasts are constructed from the semi-annual earnings forecasts by summing the appropriate realisations and forecasts. To get the forecast of the annual earnings per share using the semi-annual earnings estimated by the time-series model, the first actual semi-annual earnings per share of the year is added to the estimated second semi-annual forecast². After taking into account the sample requirements, a total of 669 earnings forecasts of analysts were considered, whereas 1693 annual earnings forecasts were estimated under the first-order auto regressive model. This set of earnings forecasts is referred as "Sample 1".

Since there are considerably more firms with earnings forecasts in the late 1990s under both models, the test has been extended to another period (referred as "Sample 2"), which is restricted from the year 1997 to the year 2001. The idea is to isolate any misrepresentation in the findings that may occur as a result of few firms having analysts' earnings forecasts and earnings estimates from the time-series model in the early 1990s (an observation made in Chapter 4). This resulted in a total of 419 earnings forecasts of analysts that are considered and 779 earnings forecasts of firms estimated using the first-order auto regressive time-series model.

Finally, 460 earnings forecasts of analysts were matched up with 460 econometric earnings forecasts of the same firms and for the same earnings announcement dates. This set of

² Since semi-annual realised earnings have been used to compute the semi-annual forecasts from the time-series model and these forecasts do not change until the next realised semi-annual earning is known, it is assumed that the computed semi-annual forecasts have a 6-month forecast horizon.

matched earnings forecasts is referred as "Sample 3". The 460 similar earnings forecasts represent the union of the sets of 669 earnings forecasts of analysts (Sample 1) to the 1693 annual earnings forecasts (Sample 1) estimated by the time-series model.

In summary, three samples (Sample 1, Sample 2 and Sample 3) are considered in comparing the accuracy of analysts' earnings forecasts and those estimated using the first order auto regressive time-series model. Each error measure (average absolute percentage error and Theil's inequality coefficient) is calculated for the three samples described above and for each of the two earnings forecast approaches (analysts' earnings forecasts and forecasts estimated using the time-series model).

5.3 Empirical results

5.3.1 Analysts' earnings forecasts as announcement date approaches

Table 5.1 displays the pattern of increasing forecast accuracy observed in analysts' earnings forecasts as the reporting date approaches. The results are graphically depicted in Appendix A.5. Both measures of error decline uniformly as the announcement date approaches. The average absolute percentage error, which amounts to 23.62% 12-month prior to the reporting date, decreases to 16.66% in the 6-month horizon and further to 7.95% 1-month prior to the reporting date. Theil's inequality coefficient³, for the 12, 6 and 1-month earnings forecast horizon gradually declines from 0.17 to 0.1 and 0.07 respectively. This pattern of convergence towards the announced earnings per share number is consistent with either the information on which their forecasts are based becoming more accurate or the incorporation of some new information by analysts relevant to the predicted earnings per share over the course of the year.

³ The calculation of Theil's inequality coefficient for each time horizon as earnings announcement date approaches is shown in more details in Appendix A.3.

Table 5.1: The Trend of the Error in Analysts' Earnings Forecasts as the Earnings Announcement Date Approaches

A 1-month time horizon represents a period of 1 month prior to the earnings announcement date. The average absolute percentage error and Theil's inequality coefficient are calculated for each time horizon prior to the announcement date, from the year 1990 until the year 2002. Theil's inequality coefficient measures the rms (root-mean-square) in relative terms, where a $U=0$ will imply a perfect fit while a $U=1$ will imply that the model is as bad as it could possibly be. Sample 1, which has 669 analysts' earnings forecasts is used.

Time horizon	12-month	6-month	5-month	4-month	3-month	2-month	1-month
Mean forecast error (%)	9.40	6.46	4.65	2.27	0.85	-0.25	-1.85
Average absolute percentage error (%)	23.62	16.66	14.29	11.75	9.81	9.16	7.95
Theil's inequality coefficient (U)	0.17	0.1	0.09	0.08	0.08	0.07	0.07

This finding corresponds to the pattern that Crichfield, Dyckman and Lakonishok (1978) and O'Brien (1988) find in their respective research, i.e. analysts' earnings forecasts become more accurate as the earnings announcement date approaches.

5.3.2 The characteristic sources of the error in analysts' earnings forecasts as announcement date approaches

In Table 5.2, the bias (U^M), the variance (U^S) and the covariance (U^C) components of the forecast error for each of the forecast horizons are obtained by the decomposition of Theil's inequality coefficient. It is noticed that the bias (U^M) proportion in the analysts' earnings forecasts initially increases from 0.16% in the 12-month forecast horizon to 0.58% in the 6-month forecast horizon, before decreasing considerably to a state of no systematic error at all in the 1-month forecast horizon. In other words, as the announcement date approaches, the extent to which the average value of analysts' earnings forecasts deviates from the average value of the actual earnings diminishes. Although there are grounds to suggest that over-optimism is inherent in analysts' earnings forecasts, it appears to fade away as the announcement date approaches. This observation is further

supported in considering the declining mean percentage forecast error as the earnings announcement date approaches. The mean percentage forecast error at the 12, 6 and 1-month horizon is 9.40%, 6.46% and -1.85% respectively. Although the 1-month mean percentage forecast error is negative, it is not significant enough to affect the above implication.

As the announcement date is approached, the variance (U^S) proportion of Theil's inequality coefficient is found to gradually decline. Table 5.2 shows that the variance (U^S) proportion decreases from 25.54% and 6.27% in the 12 and 6-month forecast horizon respectively to 1.20% in the 1-month forecast horizon. This implies that analysts demonstrate greater ability to replicate the degree of earnings variability in their forecasts as the announcement date approaches. Therefore, as analysts' earnings forecasts become more accurate, i.e. Theil's U becomes smaller, the proportions of the error representing the systematic bias (U^M) and the level of variability (U^S) eventually decrease. Figure 5.1 provides a graphical display of the trend in Theil's inequality coefficient and its characteristic sources as the announcement date approaches. In addition, the characteristic sources of Theil's inequality coefficient in the 1-month forecast horizon approach largely the ideal distribution of inequality of the three sources, i.e. $U^M = U^S = 0\%$ and $U^C = 100\%$.

Time horizon	12-month	6-month	5-month	4-month	3-month	2-month	1-month
U	0.17	0.10	0.09	0.08	0.08	0.07	0.07
U^M	0.16%	0.58%	0.50%	0.42%	0.24%	0.04%	0.00%
U^S	25.54%	6.27%	3.90%	2.03%	1.29%	1.62%	1.20%
U^C	74.46%	93.31%	95.76%	97.70%	98.62%	98.49%	98.95%

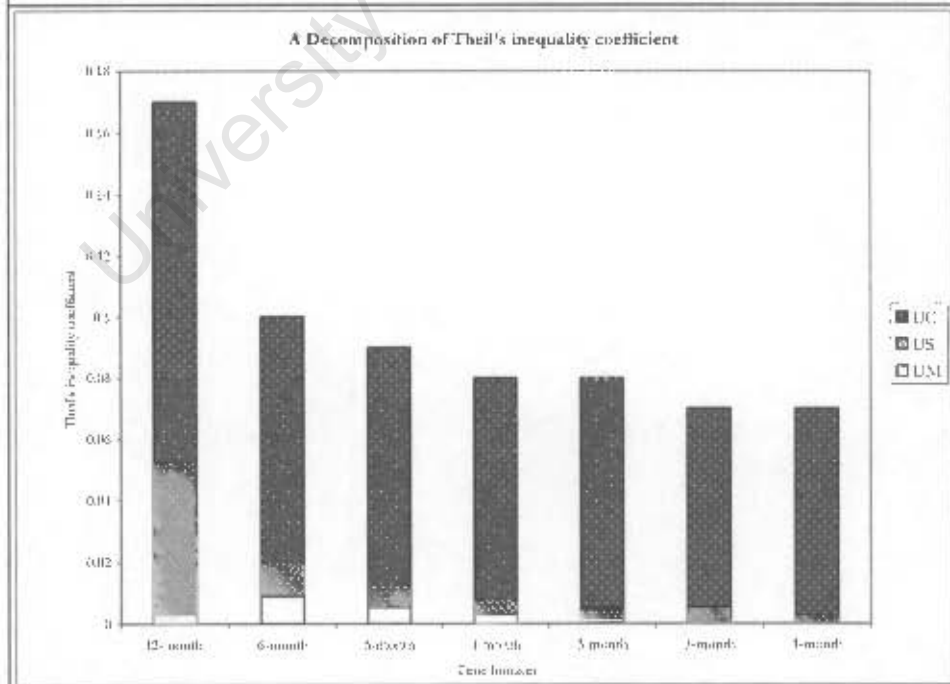
Therefore, as analysts' earnings forecasts become more accurate, i.e. Theil's U becomes smaller, the proportions of the error representing the systematic bias (U^M) and the level of variability (U^S) eventually decrease.

5.3.3 Analysts' earnings forecasts vs. earnings estimated using a time-series model

As mentioned earlier, three samples were considered whereby in each one the relevant set of analysts' earnings forecasts, with a 6-month horizon, was compared to the estimated earnings forecasts from the auto regressive time-series model, with the aim of assessing their relative accuracy. The accuracy of these two proxies of earnings estimates is evaluated using (i) the average absolute percentage error; (ii) Theil's inequality coefficient; and (iii) regression analysis.

Figure 1: The Trend of the Decomposed Theil's Inequality Coefficient as the Announcement Date Approaches

A 1-month time horizon represents a period of 1 month prior to the earnings announcement date. Sample 1, which has 689 analysts' earnings forecasts is used. Theil's inequality coefficient U is decomposed into its characteristic sources for each horizon prior to the announcement date, from the year 1990 until the year 2002. U^M , U^S and U^C are the bias, the variance and the covariance proportions of U respectively. The proportion of U^M , U^S and U^C is graphically adjusted in each horizon so that the trend can be viewed successfully.



5.3.3.1 Average absolute percentage error

Table 5.3 summarises the average absolute percentage error under each of the three samples for both the analysts' earnings forecasts and the forecasts estimated using the time-series model. The mean forecast value and the mean actual value are also disclosed for each earnings forecasts model under the three samples.

The results tabulated reveal that analysts' earnings forecasts are on average more accurate than earnings forecasts estimated by the time-series model. In the first sample considered, over the years 1990-2002, the average absolute percentage error reflected by analysts' earnings forecasts is 16.66%, compared to a considerably higher 98.96% achieved by the earnings forecasts which were estimated by the first-order auto regressive model over the same years. The notably higher level of error computed for the time-series model, which reflects very poor performance, can be partially explained by the fact that 1693 earnings forecasts were used for the time-series model compared to a mere 669 analysts' earnings forecasts.

Table 5.3: Comparison of the Average Absolute Percentage Error between Analysts' Earnings Forecasts and Forecasts Estimated using a Time-Series Model (6-month time horizon)

In calculating the average absolute percentage error in the earnings forecasts provided by analysts and estimated using the first order auto regressive time-series model, three samples are considered. Sample 1, with 669 analysts' earnings forecasts and 1693 earnings forecasts estimated using a time-series model, is for the years 1990-2002 and is the original sample resulting from the sample requirements. Sample 2, with 419 analysts' earnings forecasts and 779 earnings forecasts estimated by the time-series model, concentrates on the years 1997-2001 and is considered since more firms had an analysts' earnings forecast over this period. And finally, sample 3 has 460 analysts' earnings forecasts and 460 estimates using the time-series model. Period 3 is constructed with the aim of comparing similar number of earnings forecasts, pertaining to the same firms and earnings announcement dates. The mean forecast value and the mean actual value are the arithmetic means of all the forecast earnings and reported earnings considered under each model and for each sample. The comparison is performed using earnings forecasts estimated 6 months prior to the announcement date.

Sample Model	1 (1990-2002)		2 (1997-2001)		3 (1990-2002)	
	Analysts	Time-series	Analysts	Time-series	Analysts	Time-series
Average absolute percentage error (%)	16.66	98.96	9.53	65.51	11.79	14.59
Mean forecast value (cents)	225.90	124.85	241.74	148.91	247.47	248.48
Mean actual value (cents)	218.95	125.74	240.72	148.28	245.40	246.66

Restricting the time horizon over the period where more firms had earnings forecasts (i.e. Sample 2 with forecasts from years 1997 to 2001) shows little change from the previous results. In this case, the analysts' earnings forecasts reflect an average absolute percentage error of 9.53% compared to the figure of 65.81% that is observed in the earnings forecasts estimated by the time-series model. This again implies that analysts provide more accurate forecasts than the time-series model.

When the accuracy is evaluated using matched observations (Sample 3), the forecasts made by analysts again show a lower average absolute percentage error than that returned by the first-order auto regressive model (11.79% vs. 14.59%). This confirms that analysts' earnings forecasts are more accurate than those estimated by the time-series model. Interestingly, matching the number of observations in each model has resulted in bringing the level of error more in line, although analysts still outperform the time-series model. The lower level of error calculated for the time-series model is partly due to the removal of highly dispersed earnings forecasts with regard to the actual mean values of earnings.

5.3.3.2 Theil's inequality coefficient

As a means of corroborating the result discussed above, the relative accuracy of the two sources of earnings forecasts is further evaluated using Theil's inequality coefficient⁴ (U). Table 5.4 displays over each period, Theil's inequality coefficient for analysts' earnings forecasts and forecasts estimated by the time-series model. The bias (U^M), the variance (U^S) and the covariance (U^C) proportions of U for each model are compared over each sample.

Theil's inequality coefficient also reveals that the earnings forecasts estimated by the time-series model lead to more error than analysts' earnings forecasts. In each of the samples considered, the analysts' earnings forecasts achieved a less significant value of U relative to the value of U attained by the time-series model. Theil's inequality coefficient was thereafter decomposed into its respective bias, variance and covariance proportions and compared across the two forecasting approaches.

⁴ The calculation of Theil's inequality coefficient for analysts' earnings forecasts and forecasts estimated using a time-series model (6-month time horizon) is displayed in more details in Appendix A.4

Table 5.4: Comparison of Theil's Inequality Coefficient between Analysts' Earnings Forecasts and Forecasts Estimated under a Time-Series Model (6-month time horizon)

U is Theil's inequality coefficient and U^M , U^S and U^C are the bias, the variance and the covariance proportions of U respectively. Theil's inequality coefficient is computed for the analysts' earnings forecasts and forecasts estimated using a first order time-series model. Sample 1, with 669 analysts' earnings forecasts and 1693 earnings forecasts estimated using a time-series model, is for the years 1990-2002 and is the original sample resulting from the sample requirements. Sample 2, with 439 analysts' earnings forecasts and 779 earnings forecasts estimated by the time-series model, concentrates on the years 1997-2001 and is considered since more firms had an analysts' earnings forecast over this period. And finally, Sample 3 has 460 analysts' earnings forecasts and 460 estimates using the time-series model. Sample 3 is constructed with the aim of comparing similar number of earnings forecasts, pertaining to the same firms and earnings announcement dates.

Sample Model	1 (1990-2002)		2 (1997-2001)		3 (1990-2002)	
	Analysts	Time-series	Analysts	Time-series	Analysts	Time-series
U	0.1000	0.2141	0.0970	0.1379	0.1014	0.1104
U^M	0.58%	0.00%	0.01%	0.00%	0.01%	0.02%
U^S	6.27%	28.09%	9.25%	23.60%	7.93%	39.24%
U^C	93.31%	71.99%	90.98%	76.53%	92.27%	60.95%

Theil's inequality coefficient also reveals that the earnings forecasts estimated by the time-series model lead to more error than analysts' earnings forecasts. In each of the samples considered, the analysts' earnings forecasts achieved a less significant value of U relative to the value of U attained by the time-series model. Theil's inequality coefficient was thereafter decomposed into its respective bias, variance and covariance proportions and compared across the two forecasting approaches.

The bias proportion (U^M) is larger for the analysts' earnings forecasts than for the time-series model. This is the case within each sample. Although, for the analysts' earnings forecasts, the 0.01% of bias proportions is acceptable in sample 2 and 3, a 0.58% of bias proportion in sample 1 is somewhat high⁵. However, it was observed earlier from Table 5.2 that as the reporting date approaches, the bias component in the analysts' earnings forecasts decreases considerably from 0.58% in the 6-month horizon to no systematic bias at all in the 1-month horizon. The time-series model achieves the ideal proportion of bias (close to 0%) and this may be explained by the fact that it is a mechanical model.

⁵ A U^M value greater than 0.1% or 0.2% is considered to be high and the model is expected to be revised.

The analysts' earnings forecasts resulted in lower values of the variance (U^S) proportion in each of the three samples, i.e. 6.27% vs. 28.09%, 9.25% vs. 23.60% and 7.93% vs. 39.24% respectively. The large variances observed for earnings estimates from the time-series model are explained by the fact that in predicting these estimates, the model makes use of movement in past earnings realisations, which seldom reoccurs. As such, analysts come closer in reproducing the degree of variability observed in the actual earnings.

Finally, the value of the covariance proportion (U^C) for the analysts' earnings forecasts is closer to 100% than for the time-series model and this observation is true in each of the three samples. Indeed, for any value of $U > 0$, the ideal distribution of inequality over the three sources is $U^M = U^S = 0\%$ and $U^C = 100\%$.

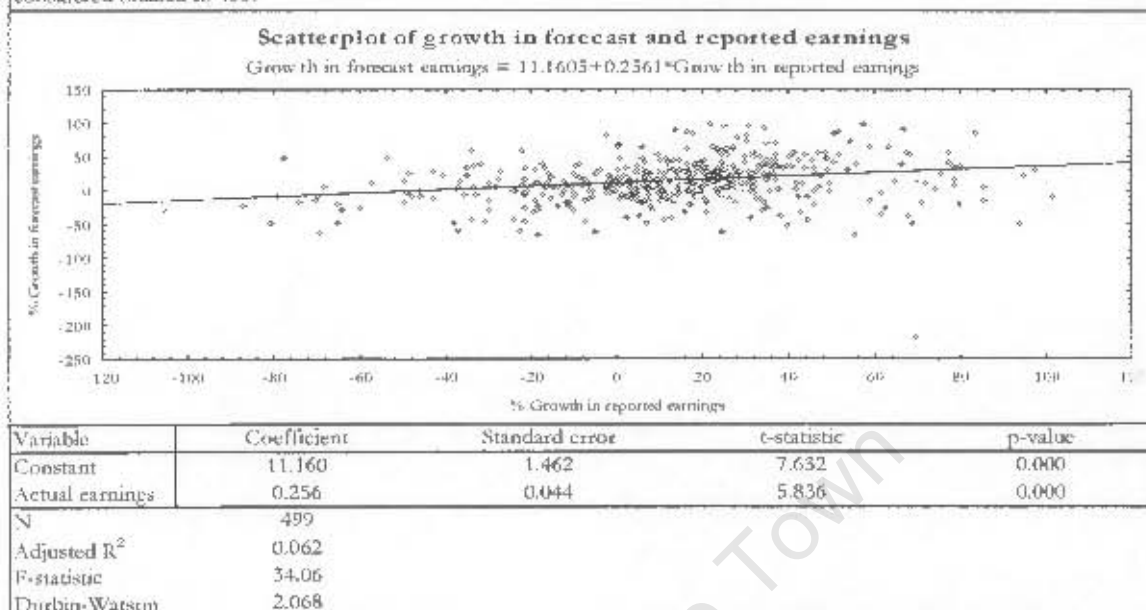
As such, except for the first sample in which a considerably high systematic bias level was detected, analysts' earnings forecasts appear to be derived from a better model than earnings forecasts estimated using the first order autoregressive time-series model.

5.3.3.3 Forecast accuracy using regression analysis

In Tables 5.5, 5.6 and 5.7, regression analysis is performed for the change in forecast earnings and change in reported earnings. Different forecast horizons of analysts' earnings are examined. Regressing the percentage growth in analysts' 12, 6 and 1-month earnings forecasts against the percentage growth in reported earnings results in declining values of the intercept (approaching zero) and values of the slope closer to one as the earnings announcement date gets closer. This is evidence of increasing accuracy as the earnings announcement date approaches.

Table 5.5: Growth in analysts' 12-month earnings forecasts vs. Growth in reported earnings

Sample 1 has been used in conducting the regression analysis. The growth in analysts' earnings forecasts, estimated 12 months prior to the announcement date, is evaluated against the growth in reported earnings. The number of observations considered totalled to 499.

**Table 5.6: Growth in analysts' 6-month earnings forecasts vs. Growth in reported earnings**

Sample 1 has been used in conducting the regression analysis. The growth in analysts' earnings forecasts, estimated six months prior to the announcement date, is evaluated against the growth in reported earnings. The number of observations considered totalled to 515.

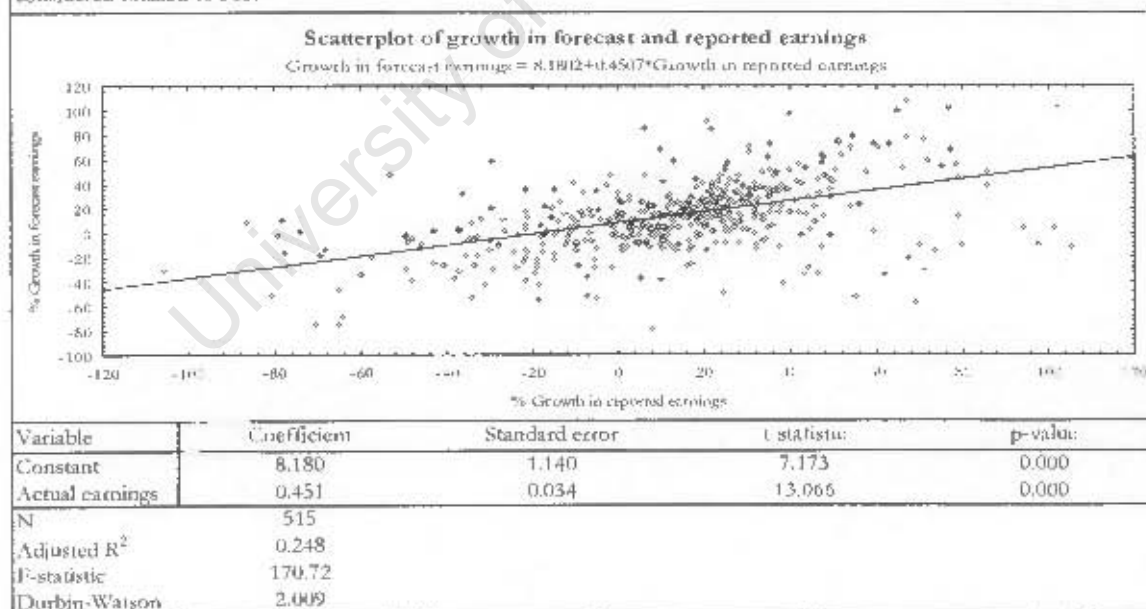
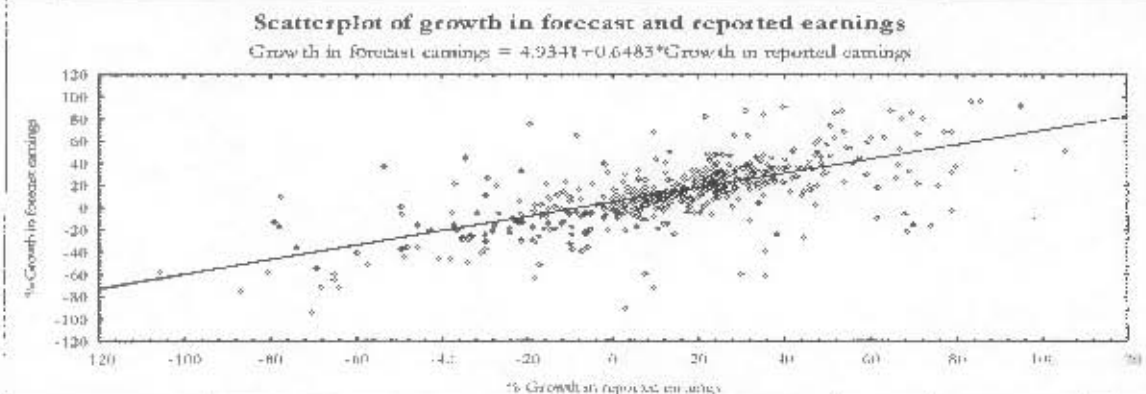


Table 5.7: Growth in analysts' 1-month earnings forecasts vs. Growth in reported earnings

Sample 1 has been used in conducting the regression analysis. The growth in analysts' earnings forecasts, estimated one month prior to the announcement date, is evaluated against the growth in reported earnings. The number of observations considered totalled to 518.

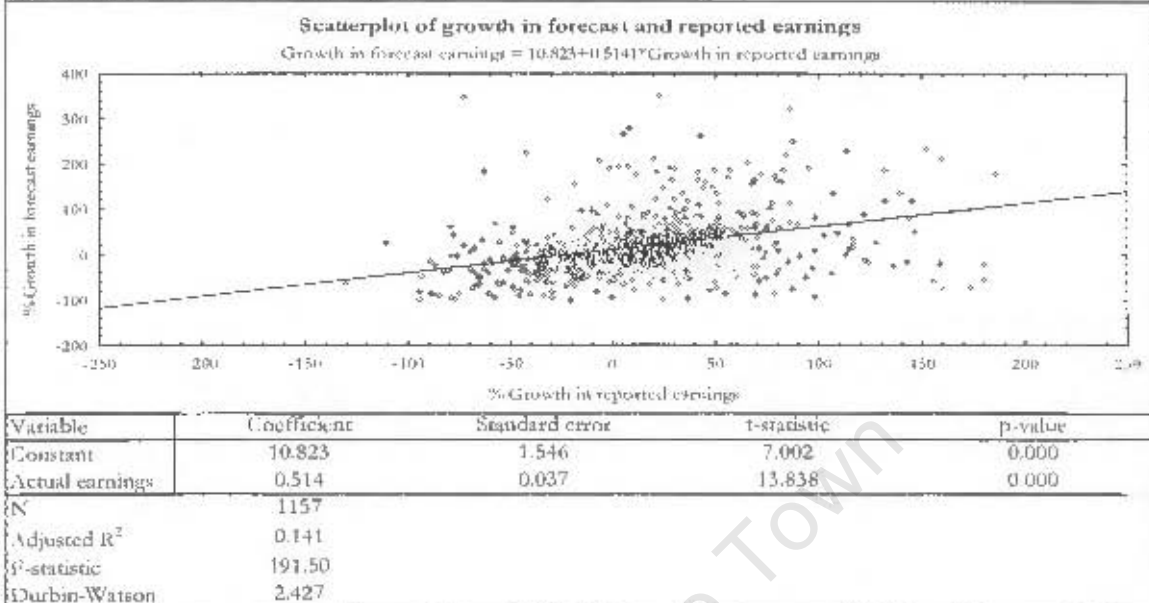


Variable	Coefficient	Standard error	t-statistic	p value
Constant	4.934	1.022	4.827	0.000
Actual earnings	0.648	0.031	20.975	0.000
N	518			
Adjusted R ²	0.459			
F-statistic	439.95			
Durbin-Watson	2.331			

The percentage growth in the forecasts estimated by the auto regressive time-series model is also regressed against the percentage growth in reported earnings. The scatter plot and regression analysis are displayed in Table 5.8. The intercepts and slope coefficients of the percentage growth in analysts' 6-month earnings forecasts and the percentage growth in the forecasts estimated by the auto regressive time-series model are tested to see how different they are from zero and one respectively. Testing the values of the intercept in each case reveals that they are significantly different from zero. Similarly, testing for the slope coefficients shows that they are significantly different from one in each scenario. The implication is that both analysts and the auto regressive time-series model used fail to significantly forecast the exact change in the reported earnings. It is difficult to differentiate which is a better predictor using regression analysis.

Table 5.8: Growth in 6-month earnings forecasts using time-series model vs. Growth in reported earnings

Sample 1 has been used in conducting the regression analysis. The growth in earnings forecasts, with a 6-month horizon and estimated using a first-order autoregressive time-series model is evaluated against the growth in reported earnings. The number of observations considered amounted to 1157.



5.3.4 Over-optimism in analysts' earnings forecasts?

Over-optimism on the part of analysts in making forecasts is apparent from the results that have been reported. It can be observed from Table 5.3 that the mean forecast value of the analysts' earnings forecasts in each of the three samples considered is greater than the mean actual value. In addition, the analysts' earnings forecasts have resulted in positive errors. This means that on average analysts tend to make earnings forecasts, which are more often greater than the actual earnings and this is apparent when considering the relative frequency of cases of underestimation or overestimation in the number of analysts' earnings forecasts. The results reported in Table 5.9 focus on this issue.

Within each forecast horizon investigated there are more overestimates than underestimates of analysts' earnings forecasts. In addition, as the forecast horizon decreases, the number of overestimated and underestimated forecasts converges, implying that on average, as overestimates cancel underestimates, analysts' forecasts tend to become more accurate. This observation confirms that the over-optimism in analysts' earnings forecasts weakens as the reporting date is approached. It also confirms the pattern of increasing accuracy in analysts' earnings forecasts as the earnings announcement date approaches.

5.4 Summary and conclusion

The investigation of the accuracy of security analysts' earnings forecasts of firms listed on the JSE demonstrates that analysts display a pattern of increasing accuracy as the announcement date approaches. A declining trend in the level of error, using both the average absolute percentage error and Theil's inequality coefficient methods, is observed. A 1-month forecast horizon displays a 7.95% of average absolute percentage error and 0.07 Theil's inequality coefficient, while a 6-month horizon results in 16.66% average absolute percentage error and 0.1 Theil's inequality coefficient. The 12-month horizon depicts a 23.62% of average absolute percentage error and 0.17 Theil's inequality coefficient. This result is consistent with findings of prior international research.

In addition, Theil's inequality coefficient is decomposed into its bias, variance and covariance components. Analysing each element of error in Theil's inequality coefficient shows that the systematic bias in analysts' earnings forecasts initially increases before declining considerably as the earnings announcement date approaches. More precisely, the 1-month forecasts prior to the announcement date have no systematic bias at all, although the 12 and 6-month forecasts reflect unreasonable level of bias, i.e. 0.16% and 0.58% respectively. This implies that although over-optimism is inherent in analysts' earnings forecasts, it fades away as the reporting date approaches. In addition, it is noticed that the variability present in the analysts' earnings forecasts decreases as the earnings announcement date approaches. Indeed, the variance component in analysts' earnings forecasts which amounts to 25.54% and 6.27%, twelve and six months prior to the announcement date respectively, falls to 1.20% one month prior to the announcement date.

Moreover, it has been observed that earnings forecasts produced by analysts are more accurate than earnings forecasts estimated using a naïve first order auto regressive time-series model. Comparing the decomposed Theil's inequality coefficient for each of the competing sources of earnings forecasts also provides grounds to suggest that analysts derive better earnings forecasts than the model. However, the use of regression analysis suggests that both analysts and the auto regressive model fail to significantly forecast the exact change in reported earnings.

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Value of Analysts' Consensus Recommendations

6.1 Introduction

This chapter empirically investigates whether an investor can pursue an investment strategy that consistently earns abnormal returns based on South African stock-broking analysts' consensus recommendations. First, the returns that an investor achieves by holding portfolios formed on the basis of analysts' buy, hold or sell recommendations on the JSE Securities Exchange (JSE) of South Africa for the period March 2000 to April 2003 are calculated. Second, the performance of portfolios constructed based on changes in analysts' consensus recommendations is explored. The performance of each portfolio of permutations of upgrade, downgrade, recurrence, first coverage and discontinuation of coverage is investigated.

This chapter is organised as follows. Section 6.2 discusses the data and methodology. The results of the empirical analysis are reported in Section 6.3. Section 6.4 summarises and concludes.

6.2 Data and methodology

In Chapter Four, the sources and the descriptive statistics of the set of analysts' consensus buy, hold and sell recommendations used in this thesis are provided. Besides, different portfolios of all the possible permutations of the changes in analysts' consensus recommendations are formed and the number of observations in each portfolio is disclosed. A major finding resulting from the analysis of the number of observations in the level of and in the changes of analysts' consensus recommendations is that analysts seldom make

sell recommendations, more often opting for either a buy or hold recommendation. In this section, the different measures of returns utilised in evaluating the performance of each portfolio of analysts' consensus buy, hold and sell recommendations and the different permutations of changes in these recommendations are provided. Further, the methodology adopted in the investigation of analysts' consensus recommendations is explained.

6.2.1 Measures of return performance

The performance of different investment strategies with respect to analysts' consensus recommendations is evaluated using three different measures:

First, the raw return¹ is calculated for each portfolio constructed. The raw return of a share in a particular month is derived by computing the change in its Total Return Index on the Datastream database. Datastream does not have information of firms which were delisted during the sample period. The returns on these shares are calculated as:

$$R_{it} = \frac{(P_{it} - P_{i(t-1)}) + D_{it}}{P_{i(t-1)}}, \quad (1)$$

where

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

D_{it} = the dividend on share i for which the last date to register fell within period t ; and

P_{it} = the price of share i at the end of period t .

The monthly closing price of these shares and any dividend declared are obtained from the I-Net Bridge database. The LDR or ex-dividend date, as opposed to the payment date, is used for timing the inclusion of the dividend. This compensates the shareholders for the drop in price occurring on the ex-dividend date by the amount of the dividend owing to

¹ The raw return includes the share price appreciation or depreciation plus any dividend declared.

them. This method is consistent with that suggested by van Rensburg, Slaney and Hardy (1997).

Second, the market-adjusted return for each of the constructed portfolios is calculated. It is given by $R_{pt} - R_{mt}$ for portfolio p in month t , where R_{mt} is the month t return on the All-share Index (ALSI). The returns for the indices used in this study are obtained by computing the change in their Total Return data on I-Net Bridge.

Third, two measures of risk-adjusted evaluation of each portfolio are performed. Initially, Jensen's (1968) alpha is employed. It is based on the theoretical framework of the Capital Asset Pricing Model (CAPM) and is calculated as the difference between what a portfolio actually earns and what it is expected to earn, given its level of systematic risk. Jensen's alpha measures the return that an investor acting on the level of or changes in analysts' consensus recommendations would have earned above, or below, the return of an unmanaged portfolio with the same risk. The alpha (α_p) is estimated as the intercept term in the following monthly time-series:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \varepsilon_{pt}, \quad (2)$$

where

- R_{ft} = the risk-free rate in period t ;
- α_p = the estimated alpha or intercept term;
- β_p = the estimated beta of the portfolio;
- R_{mt} = the return on the ALSI during period t ; and
- ε_{pt} = the random error term for portfolio p in period t .

Following van Rensburg and Slaney (1997) and van Rensburg (2002), a two-factor APT model is subsequently used and the factors identified are the Resources Index (J000) and the All-share ex Resources Index (J250). The performance of each portfolio is further evaluated, using the following time-series regression:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{1p} (R_{RESIt} - R_{ft}) + \beta_{2p} (R_{ALSI \text{ ex } RESIt} - R_{ft}) + \varepsilon_{pt}, \quad (3)$$

where

- β_{1p} = the sensitivity of return of the portfolio to the Resources Index;
 β_{2p} = the sensitivity of return of the portfolio to the All-share ex Resources Index;
 R_{RESIt} = the return on the Resources Index during period t ;
 $R_{ALSI \text{ ex } RESIt}$ = the return on the All-share ex Resources Index during period t ;
and
 ε_{pt} = the random error term for portfolio p in period t .

In using the above-mentioned asset pricing models, the prevailing risk-free rate for the relevant period is needed. In estimating the abnormal return (1-month) achieved by a portfolio, the effective 1-month rate on a 3-month NCD is used. The annualised rate on a 3-month NCD is obtained from I-Net Bridge.

6.2.2 Methodology

The methodology used by this study follows a calendar-time perspective, very similar to the one used by Barber *et al* (2001). Calendar-time portfolios based on the analysts' consensus recommendation of each covered firm are constructed. Consequently, the investment performance of the firms grouped into portfolios is tracked. Since the data are of a monthly nature, any portfolio rebalancing occurs at the end of the month. This carries the assumption that investors react to a change in consensus recommendation at the end of the month in which the change took place. This ensures that any return that the investor might have earned from the advance knowledge of the recommendations is excluded from return calculations. After determining the composition of each portfolio as at the end of month t , the equally weighted return for the month $t+1$ is computed.

In determining the value of analysts' consensus recommendations, the monthly arithmetic mean of the raw returns of portfolios constructed on the basis of each class of recommendations is calculated. The mean market-adjusted return of each portfolio is then

computed for each month. The arithmetic means of the raw and market-adjusted returns for the buy, hold and sell portfolios are calculated over the sample period and statistical tests are performed to determine whether they are significantly different from zero. Finally, the risk-adjusted performance of each portfolio over the sample period is determined by estimating the resulting alpha from the CAPM and the two-factor APT model respectively.

Likewise, for each of the 18 portfolios formed as a result of considering the changes in analysts' recommendations, the equally weighted raw return is computed each month. The market-adjusted return of each portfolio is then calculated. The average raw and market-adjusted returns of each portfolio are then determined by working out the arithmetic mean of all the months for which a return has been calculated. Statistical tests are performed to determine whether the mean raw and market-adjusted returns are significantly different from zero. Also, the risk-adjusted performance of each portfolio based on the number of months for which each portfolio has observations is determined by estimating the resulting alpha from the CAPM and the two-factor APT model respectively.

6.3 Empirical results

The performance of analysts' consensus buy, hold and sell recommendations is initially calculated using the arithmetic mean raw return. However, by merely considering the mean raw return, little can be said about the performance of each type of recommendations. Any meaningful evaluation of performance can only be done if a relative comparison is made and both realised return and risk are taken into account. As a result, besides calculating the mean raw return, the market and risk-adjusted returns are computed for each portfolio of the level of and changes in analysts' consensus recommendations. For comparison purposes, the return performance of the level of and changes in analysts' consensus recommendations is presented separately.

6.3.1 Performance of portfolios formed on the basis of the level of analysts' consensus recommendations

6.3.1.1 Percentage raw returns

The arithmetic mean percentage return for the 38 months period is calculated for each category of recommendations. The percentage monthly returns earned on the basis of analysts' consensus recommendations over the sample period are provided in Table 6.1. Student's t-statistic, testing whether the monthly returns of each class of recommendations are significantly different from zero (at a 90% confidence level), is displayed in brackets below each return. The mean raw return² achieved by analysts' consensus buy, hold and sell recommendations over the sample period is 0.83%, 0.19% and 0.46% respectively. As expected, the portfolio of buy recommendations yields the highest mean raw return. Contrary to expectation, the portfolio of sell recommendations outperforms the portfolio of hold recommendations. The buy, hold and sell consensus recommendations do not achieve a mean raw return, which is significantly different from zero.

6.3.1.2 Percentage market and risk-adjusted returns

The performance of the analysts' consensus buy, hold and sell recommendations is assessed relative to the market by calculating the market-adjusted return for each category of recommendations (Table 6.1). The mean market-adjusted return³ is 0.09%, -0.54% and -0.28% for the buy, hold and sell recommendations respectively. Consistent with the information inherent in analysts' recommendations, the buy recommendations outperform the market, while the sell recommendations achieve a return inferior to the market. However, the hold recommendations, which are expected not to perform significantly different from the market, not only yield a negative market-adjusted return but also result in a higher negative market-adjusted return than the sell recommendations. Nevertheless, in testing for statistical significance, none of the buy, hold and sell recommendations earn statistically significant mean market-adjusted returns.

² The mean raw return is the arithmetic mean of the monthly raw returns.

Table 6.1: Percentage Monthly Returns Earned on the Basis of Analysts' Consensus Recommendations

This table displays the percentage monthly returns achieved by acting on portfolios formed on the basis of analysts' consensus recommendations. The mean raw return is the arithmetic mean of the monthly returns achieved by each category of recommendations. The market-adjusted return is the arithmetic mean of the raw returns less the return on the All-share Index. The CAPM intercept is the estimated intercept from a time-series regression of the portfolio return ($R_p - R_f$) on the market (ALSI) excess return ($R_m - R_f$). The intercept for the APT two-factor model is the estimated intercept from a time-series regression of the portfolio return on the excess return of (1) the All-share ex-Resources Index (2) the Resources Index as independent variables. Each t -statistic (displayed in brackets below each return) relates to the null hypothesis that the associated return is zero. The returns and respective t -statistics that are significant at a level of 10 percent or better are shown in bold.

Portfolio	Mean Raw Return	Mean Market-adjusted Return	Intercept from	
			CAPM	Two-factor APT
Buy	0.83 (0.87)	0.09 (0.13)	0.06 (0.10)	0.99 (2.05)
Hold	0.19 (0.22)	-0.54 (-0.90)	-0.58 (-1.09)	0.17 (0.37)
Sell	0.46 (0.24)	-0.28 (-0.15)	-0.32 (-0.18)	-0.73 (-0.36)

Table 6.1 also displays the risk-adjusted return (or alpha⁴) for each type of analysts' consensus recommendations, computed under the CAPM and the two-factor APT model respectively. The alphas estimated under the CAPM are 0.06%, -0.58% and -0.32% for the buy, hold and sell recommendations respectively. As such, only the buy recommendations result in a positive abnormal return and both the hold and sell recommendations yield a negative abnormal return, which is relatively higher for the hold recommendations. Alphas estimated under the CAPM are not found to be significantly different from zero. The alphas, estimated under the two-factor APT model, show a rather different abnormal return performance. The buy recommendations earn a statistically significant abnormal return of 0.99%. The hold recommendations gain a positive abnormal return of 0.17% and the sell recommendations yield a negative abnormal return of -0.73%.

³ The mean market-adjusted return is the arithmetic mean of the monthly market-adjusted returns.

⁴ The alpha, or abnormal return, under each asset pricing model is obtained by estimating the intercept terms from the time-series regressions illustrated as equation (2) and (3).

The alphas of analysts' consensus hold and sell recommendations are not significantly different from zero.

6.3.1.3 Summary

Therefore, analysts' consensus buy recommendations yield a positive return, whether or not the return is adjusted for risk. In addition, if the two-factor APT model is the most appropriate asset pricing model to use, the buy recommendations earn a significant positive monthly abnormal return of 0.99% over the sample period considered. This implies that by following analysts' buy recommendations, an investor would have added economic value to his investment. Little can be inferred by looking at the risk-adjusted and unadjusted returns of the hold and sell recommendations. Besides yielding inconsistent results under each asset pricing model, the hold and sell recommendations achieve returns that are not significant enough to induce any conclusion. The sell portfolio also comprises of a relatively small sample. Appendix B.2 displays the results from the hypothesis testing of the returns and the regression analysis performed to estimate abnormal returns for the level of analysts' consensus recommendations.

6.3.2 Performance of portfolios based on the changes in or recurrences of analysts' consensus recommendations

Each category of analysts' consensus recommendations in a given month is made up of the (1) recurrences of recommendations; (2) changes from other categories of recommendations; (3) reappearances after being previously dropped from; and (4) first appearances of the recommendation on the database. A breakdown of each level of analysts' consensus recommendations into its constituents is provided in Appendix B.1. Analysts also frequently discontinue their recommendations of certain shares. Apart from assessing the value of each category as a whole, this study investigates whether any valuable investment strategy emanates from acting exclusively on changes in or recurrences of analysts' consensus recommendations.

The percentage raw and market-adjusted returns achieved by acting on changes in or recurrences of analysts' consensus recommendations are provided in Table 6.2 and Table 6.3 respectively. In addition, the risk-adjusted returns estimated under the CAPM and a two-factor APT model and realised by acting on changes in or recurrences of analysts' consensus recommendations, are displayed in Table 6.4 and Table 6.5. For each of the 18 categories, a one, two and three-month holding period return is computed with the intention of analysing the 'post-event' effect. The t-statistic, based on the null hypothesis that the raw or market-adjusted or abnormal return is zero, is displayed in brackets below each return. The returns and respective t-statistics, of those categories of changes in or recurrences of analysts' consensus recommendations that are significant at a level of 10% or better, are shown in bold. For categories with insufficient data points to test for the consistency of the returns over time, 'n/a' is displayed.

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Table 6.2: Raw Percentage Returns Achieved by Acting on Changes in or Recurrences of Analysts' Consensus Recommendations

This table shows the one, two and three-month percentage raw returns achieved by acting on changes in or recurrences of analysts' consensus recommendations. Raw returns are the arithmetic mean of the monthly returns (share price appreciation or depreciation plus any dividend declared) over the period March 2000 to April 2003. The first row displays the one, two and three-month raw percentage returns associated with the recurrence of the buy recommendations and all the changes from a recommendation of buy to hold, sell or discontinuation of coverage. The last two rows report one, two and three-month raw percentage returns associated with recommendations for firms that (1) were previously dropped and reappear later and (2) are first covered by brokers. Portfolios are rebalanced at the end of each month. t-statistics of the returns (displayed in brackets below each return) are calculated for each category of changes in or recurrences of analysts' consensus recommendations with sufficient observations over the sample period. Each t-statistic is based on the hypothesis that the mean return is zero and return that is significant at a level of 10 percent or better is shown in bold. For those categories of changes in or recurrences of analysts' consensus recommendations that have no or insufficient data points, 'n/a' has been displayed.

Holding Period	One-month				Two-month				Three-month			
From Recommendation of:	To Recommendation of:				To Recommendation of:				To Recommendation of:			
	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped
Buy	1.02 (1.11)	-1.26 (-1.15)	3.85 (n/a)	-0.25 (-0.08)	2.06 (1.59)	-1.39 (-0.79)	3.85 (n/a)	8.44 (1.23)	3.28 (2.22)	0.01 (0.01)	111.54 (n/a)	8.21 (1.24)
Hold	1.25 (0.81)	0.46 (0.50)	-6.05 (-1.83)	0.83 (0.42)	1.10 (0.59)	1.44 (1.11)	-9.53 (-1.94)	1.95 (0.80)	0.55 (0.25)	2.59 (1.73)	-3.34 (-0.59)	0.31 (0.08)
Sell	0.00 (n/a)	1.93 (0.38)	3.52 (1.54)	8.78 (1.27)	3.85 (n/a)	3.94 (0.70)	8.20 (2.40)	-0.91 (-0.14)	3.85 (n/a)	11.95 (0.83)	10.50 (2.47)	3.08 (0.27)
Reappearance (Previously dropped from database)	2.27 (0.50)	0.22 (0.09)	-10.03 (-0.99)		2.66 (0.38)	-0.01 (0.00)	-19.82 (-1.04)		2.06 (0.24)	4.17 (0.70)	-16.80 (-0.71)	
First appearance	-3.93 (-0.89)	-0.54 (-0.14)	n/a (n/a)		-4.75 (-1.04)	6.48 (0.90)	n/a (n/a)		-3.71 (-0.70)	5.04 (0.71)	n/a (n/a)	

Table 6.3: Market-Adjusted Percentage Returns Achieved by Acting on Changes in or Recurrences of Analysts' Consensus Recommendations

This table shows the one, two and three-month percentage market-adjusted returns achieved by acting on changes in or recurrences of analysts' consensus recommendations. Market-adjusted returns are the arithmetic mean of the raw returns less the return on the All-share Index over the period March 2000 to April 2003. The first row displays the one, two and three-month market-adjusted percentage returns associated with recurrence of the buy recommendations and all the changes from a recommendation of buy to hold, sell or discontinuation of coverage. The last two rows report one, two and three-month market-adjusted percentage returns associated with recommendations for firms that: (1) were previously dropped and reappear later and (2) are first covered by brokers. Portfolios are rebalanced at the end of each month. t-statistics of the returns (displayed in brackets below each return) are calculated for each category of changes in or recurrences of analysts' consensus recommendations with sufficient observations over the sample period. Each t-statistic is based on the hypothesis that the mean return is zero and return that is significant at a level of 10 percent or better is shown in bold. For those categories of changes in or recurrences of analysts' consensus recommendations that have no or insufficient data points, 'n/a' has been displayed.

Holding Period	One-month				Two-month				Three-month			
	To Recommendation of:				To Recommendation of:				To Recommendation of:			
From Recommendation of:	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped
Buy	0.10 (0.14)	-2.19 (-2.39)	5.70 (n/a)	-1.84 (-0.6)	0.23 (0.21)	-3.22 (-2.31)	7.07 (n/a)	5.32 (0.81)	0.58 (0.40)	-2.69 (-1.27)	118.80 (n/a)	3.87 (0.57)
Hold	0.33 (0.27)	-0.47 (-0.74)	-5.25 (-1.72)	0.48 (0.30)	-0.73 (-0.53)	-0.39 (-0.39)	-10.49 (-2.21)	2.04 (1.01)	-2.16 (-1.09)	-0.12 (-0.10)	-5.75 (-1.02)	-0.46 (-0.12)
Sell	-9.84 (n/a)	1.16 (0.23)	2.59 (1.12)	9.21 (0.40)	-3.95 (n/a)	2.56 (0.55)	6.38 (1.87)	-1.85 (-0.27)	-2.44 (n/a)	9.66 (0.68)	7.80 (1.94)	0.31 (0.03)
Reappearance (previously dropped from database)	2.45 (0.55)	-1.39 (-0.72)	-14.58 (-22.10)		1.83 (0.33)	-2.37 (-0.65)	-21.05 (-2.42)		-0.07 (-0.01)	-0.37 (-0.06)	-17.60 (-2.67)	
First appearance	-5.43 (-1.23)	-2.22 (-0.51)	n/a (n/a)		-8.05 (-1.81)	1.79 (0.24)	n/a (n/a)		-10.46 (-1.69)	-2.52 (-0.31)	n/a (n/a)	

Table 6.4: Risk-Adjusted Percentage Returns, Estimated under CAPM, Achieved by Acting on Changes in or Recurrences of Analysts' Consensus Recommendations

This table shows the one, two and three-month percentage risk-adjusted returns achieved by acting on changes in or recurrences of analysts' consensus recommendations. Based on the CAPM, Jensen's alpha is used. It is represented by the estimated intercept from a time-series regression of the portfolio return ($R_p - R_f$) on the market (ALSI) excess return ($R_m - R_f$). The first row displays the one, two and three-month risk-adjusted percentage returns associated with recurrence of the buy recommendations and all the changes from a recommendation of buy to hold, sell or discontinuation of coverage. The last two rows report the one, two and three-month risk-adjusted percentage returns associated with recommendations for firms that: (1) were previously dropped and reappear later and (2) are first covered by brokers. Portfolios are rebalanced at the end of each month. t-statistics (displayed in brackets below each alpha) are calculated for each category of changes in or recurrences of analysts' consensus recommendations with sufficient observations over the sample period. Each t-statistic is based on the hypothesis that the estimated alpha is zero and alpha that is significant at a level of 10 percent or better is shown in bold. For those categories of changes in or recurrences of analysts' consensus recommendations that have no or insufficient data points, 'n/a' has been displayed.

Holding Period	One-month				Two-month				Three-month			
	To Recommendation of:				To Recommendation of:				To Recommendation of:			
From Recommendation of:	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped
Buy	0.11 (0.18)	-2.18 (-2.55)	n/a (n/a)	-1.63 (-0.52)	0.24 (0.26)	-3.21 (-2.37)	n/a (n/a)	5.08 (0.75)	0.58 (0.50)	-2.69 (-1.46)	n/a (n/a)	4.96 (0.73)
Hold	0.33 (0.27)	-0.46 (-0.84)	-5.38 (-1.66)	0.47 (0.28)	-0.73 (-0.53)	-0.37 (-0.44)	-10.72 (-2.21)	1.79 (0.85)	-2.16 (-1.15)	-0.12 (-0.12)	-5.88 (-1.04)	-1.29 (-0.35)
Sell	n/a (n/a)	1.08 (0.21)	2.61 (1.15)	9.14 (1.29)	n/a (n/a)	2.66 (0.56)	6.39 (1.89)	-2.65 (-0.39)	n/a (n/a)	9.52 (0.65)	7.80 (1.92)	0.58 (0.05)
Reappearance (Previously dropped from database)	1.95 (0.42)	-1.27 (-0.67)	-14.82 (n/a)		2.57 (0.47)	-2.34 (-0.62)	-20.30 (n/a)		-0.12 (-0.02)	0.47 (0.08)	-16.66 (n/a)	
First appearance	-5.12 (-1.13)	-1.37 (-0.34)	n/a (n/a)		-7.43 (-1.61)	4.33 (0.53)	n/a (n/a)		-6.32 (-1.10)	5.36 (0.64)	n/a (n/a)	

Table 6.5: Risk-Adjusted Percentage Returns, Estimated under APT, Achieved by Acting on Changes in or Recurrences of Analysts' Consensus Recommendations

This table shows the percentage risk-adjusted returns (alpha), estimated under a two-factor APT model. The alpha is the estimated intercept from a time-series regression of the portfolio return on the excess return of (1) the All-share ex-Resources Index (2) the Resources Index as independent variables. The first row displays the one, two and three-month percentage risk-adjusted returns associated with recurrence of the buy recommendations and all the changes from a recommendation of buy to hold, sell or discontinuation of coverage. The last two rows report the one, two and three-month percentage risk-adjusted returns associated with recommendations for firms that: (1) were previously dropped and reappear later and (2) are first covered by brokers. Portfolios are rebalanced at the end of each month. t-statistics (displayed in brackets below each alpha) are calculated for each category of changes in or recurrences of analysts' consensus recommendations with sufficient observations over the sample period. Each t-statistic is based on the hypothesis that the estimated alpha is zero and alpha that is significant at a level of 10% or better is shown in bold. For those categories of changes in or recurrences of analysts' consensus recommendations that have no or insufficient data points, 'n/a' has been displayed.

Holding Period	One-month				Two-month				Three-month			
	To Recommendation of:				To Recommendation of:				To Recommendation of:			
From Recommendation of:	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped	Buy	Hold	Sell	Dropped
Buy	-0.60 (-0.77)	-2.39 (-2.51)	n/a (n/a)	-0.50 (-0.15)	2.22 (3.55)	-1.29 (-0.98)	n/a (n/a)	9.93 (1.46)	3.74 (4.65)	1.34 (0.77)	n/a (n/a)	8.37 (1.10)
Hold	-0.44 (-0.30)	-1.99 (-2.68)	-3.83 (-1.11)	0.79 (0.42)	1.20 (0.90)	1.28 (1.96)	-8.32 (-1.54)	2.19 (0.86)	0.63 (0.31)	2.47 (3.07)	-4.78 (-0.65)	2.42 (0.52)
Sell	n/a (n/a)	-4.24 (-0.63)	4.71 (2.68)	13.57 (2.57)	n/a (n/a)	2.30 (0.40)	4.50 (1.18)	7.66 (1.18)	n/a (n/a)	17.86 (0.99)	4.95 (1.04)	6.04 (0.31)
Reappearance (Previously dropped from the database)	8.36 (2.20)	0.70 (0.34)	n/a (n/a)		10.82 (1.52)	-0.52 (-0.12)	n/a (n/a)		26.10 (2.05)	1.39 (0.16)	n/a (n/a)	
First appearance	-4.47 (-1.00)	-2.04 (-0.39)	n/a (n/a)		-5.23 (-1.10)	1.32 (0.14)	n/a (n/a)		0.05 (0.01)	6.73 (0.71)	n/a (n/a)	

6.3.2.1 Portfolio performance: Recurrences of recommendations

The 'Buy-Buy' portfolio (recurrence of a buy recommendation) achieves a positive market-adjusted return, which increases uniformly from 0.10% for a one-month holding period to 0.58% for a three-month holding period. The alpha estimated under CAPM displays a similar pattern of increasing abnormal return of 0.11%, 0.24% and 0.58% over the one, two and three-month holding periods respectively. Neither the market-adjusted returns nor the CAPM alphas is significantly different from zero. If the risk-adjusted return is estimated under the two-factor APT model, the 'Buy-Buy' portfolio earns an alpha of -0.60% for a one-month holding period but for the two and three-month holding periods, positive alphas of 2.22% and 3.74% are estimated and found to be significantly different from zero.

The market-adjusted return and the alpha estimated under CAPM for the 'Hold-Hold' portfolio (recurrence of a hold recommendation) decreases uniformly from -0.47% and -0.46% respectively for a one-month holding period to -0.12% for a three-month holding period. Neither the market-adjusted return nor the CAPM alphas is tested significantly different from zero. In estimating the risk-adjusted return for the one, two and three-month holding periods under the two-factor APT model, alphas of -1.99%, 1.28% and 2.47% are obtained and each alpha is found to be significantly different from zero.

The 'Sell-Sell' portfolio (recurrence of a sell recommendation) earns positive market-adjusted and risk-adjusted (under CAPM) returns that increase uniformly over the three holding periods. Moreover, for the two and three-month holding periods, the positive returns are significantly different from zero. Similarly, the risk-adjusted return of 4.71% estimated under the two-factor APT for the 'Sell-Sell' portfolio is significantly positive for a one-month holding period. The two and three-month holding periods result in positive alphas that are not significantly different from zero.

Generally, it is noted that the market-adjusted returns and the risk-adjusted returns estimated under CAPM are consistent with each other over the three holding periods. The risk-adjusted return, estimated under the two-factor APT model shows rather different results for each category of recurrences discussed above. The same discrepancy is detected when investigating the changes in analysts' consensus recommendations.

6.3.2.2 Portfolio performance: Upgrades and downgrades

The market-adjusted returns and the CAPM alphas earned by the 'Buy-Hold' portfolio (change from a buy to a hold recommendation) are -2.19% and -2.18% respectively for a one-month holding period and -3.22% and -3.21% respectively for a two-month holding period. For a three-month holding period, both measures of return yield -2.69%. The market-adjusted returns and CAPM alphas are significantly different from zero only for the one and two-month holding periods. On the other hand, the alpha estimated under the two-factor APT model is -2.39% and -1.29% respectively for the one and two-month holding periods. For a three-month holding period, the abnormal return is 1.34%. Only the negative alpha of -2.39% for a one-month holding period is statistically significant.

The 'Hold-Buy' portfolio (change from a hold to a buy recommendation) achieves identical market-adjusted returns and CAPM alphas of 0.33%, -0.73% and -2.16% for the one, two and three-month holding periods respectively. However, the alphas estimated under the two-factor APT model are -0.44%, 1.20% and 0.63% for each of the three holding periods. Each measure of performance yields returns for the 'Hold-Buy' portfolio that are not significantly different from zero.

The trend in the performance of the 'Hold-Sell' portfolio (change from a hold to a sell recommendation) over the three holding periods is consistent for the three measures of returns. The portfolio generally achieves negative return which first increases from a one-month to a two-month holding period before decreasing over a three-month holding period. Only the market-adjusted return of -10.49% for a two-month holding period is significantly different from zero.

Over the one, two and three-month holding periods, the 'Sell-Hold' portfolio (change from a sell to a hold recommendation) gains market-adjusted returns of 1.16%, 2.56% and 9.66% respectively. A similar increasing positive pattern is observed when the risk-adjusted return is estimated under CAPM. The risk-adjusted return estimated under the two-factor APT model is -4.24%, 2.30% and 17.86% for the one, two and three-month holding periods respectively. Neither the market-adjusted nor the risk-adjusted returns are significantly different from zero for any of the three holding periods.

As depicted in Table 4.3, both the 'Buy-Sell' portfolio (change from a buy to a sell recommendation) and the 'Sell-Buy' portfolio (change from a sell to a buy recommendation) have only one observation over the sample period, implying that analysts seldom change a buy to a sell recommendation or vice versa. Consequently, the computation of the market-adjusted returns for these portfolios is rendered meaningless and it is also impossible to compute risk-adjusted returns. The percentage returns earned by the upgrade and downgrade portfolios formed on the basis of changes in analysts' consensus recommendations are additionally summarised in Appendix B.4.

6.3.2.3 Portfolios performance: Discontinued coverage

In addition, three portfolios of shares for which a buy, hold and sell recommendation has been discontinued are formed on a monthly basis and are referred to as 'Buy-Dropped', 'Hold-Dropped' and 'Sell-Dropped' respectively. The 'Buy-Dropped' and 'Hold-Dropped' portfolios do not provide a significant return in any of the three holding periods irrespective of whether the market-adjusted or the risk-adjusted returns are computed. Under each measure of performance, a negative return is observed for a one-month holding period, followed by a positive return for a two-month and a smaller positive return for a three-month holding period. For the 'Sell-Dropped' portfolio, the market-adjusted return is 9.21%, -1.85% and 0.31% respectively over the one, two and three-month holding periods. Similarly, the one, two and three-month holding periods produce alphas estimated under the CAPM and the two-factor APT model of 9.14%, -2.65% and 0.58%, and 13.57%, 7.66% and 6.04% respectively. Only the two-factor APT one-month's alpha of 13.57% is statistically significant.

6.3.2.4 Portfolio performance: Reappearances of recommendations

Moreover, all recommendations that are dropped from the database and reappear in a later month are placed in separate buy, hold and sell portfolios. Those recommendations that are dropped and reappear as a buy recommendation achieve positive market-adjusted and risk-adjusted (CAPM) return for a one and two-month holding period. Both measures of returns result in a negative value over a three-month holding period. Significant risk-

adjusted returns of 8.36% and 26.10% for the one and three-month holding periods respectively are estimated under the two-factor APT model. Those recommendations that reappear as a hold earn negative market-adjusted returns over the three holding periods. CAPM alphas of -1.27%, -2.37% and 0.47% are estimated for the one, two and three-month holding periods respectively. Using the two-factor APT model, alphas of 0.70%, -0.52% and -1.39% are approximated for the one, two and three-month holding periods respectively. None of the returns computed for those recommendations that reappear as a hold are significant at a 90% confidence level. Those recommendations that are dropped from the database and reappear as a sell recommendation achieve a significant market-adjusted return of -14.58% for a one-month holding period. Due to only four recommendations reappearing as a sell (with three occurring in the same month), it is not possible to perform statistical test on the risk-adjusted return estimated under CAPM and no approximation of the risk-adjusted return can be made using the two-factor APT model.

6.3.2.5 Portfolio performance: First coverage

Furthermore, three different portfolios comprising of shares of companies that are first listed on the database are formed on a monthly basis. The aim is to establish the relative performance of shares for which coverage has just been initiated. Shares that have been introduced in the database as buy recommendations earn negative market-adjusted return for each of the three holding periods. However, only the market-adjusted return of -8.05% over a two-month holding period is statistically significant. While the alpha estimated under CAPM is -5.12%, -7.43% and -6.32% for the one, two and three-month holding periods respectively, that estimated under the two-factor APT model is -4.47%, -5.23% and 0.05%. The risk-adjusted returns are not statistically significant. Those shares that appear for the first time as a hold recommendation attain negative return over a one-month holding period under each measure of performance. Over a two-month holding period though, each measure of returns yields a positive value. Over a three-month holding period, the market-adjusted return is -2.52% and each asset pricing model gains a positive alpha. None of the returns in each holding period is significantly different from zero. There has not been a single share that appears for the first time on the database of analysts' consensus recommendations over the sample period, with a sell recommendation.

6.3.2.6 Summary

Each category of recurrences (reiterations of a firm's recommendation over two successive months) results in significant returns under at least one measure of performance. Although the 'Hold-Hold' portfolio achieves a negative risk-adjusted return under the two-factor APT model for a one-month holding period, an investor would have earned positive abnormal returns of 1.28% and 2.47% respectively over the two and three-month holding periods. However, by acquiring shares for which there is a recurrence of buy recommendations, the investor would have achieved higher positive abnormal returns of 2.22% and 3.74% respectively over the two and three-month holding periods. Intriguingly, the 'Sell-Sell' portfolio achieves positive market-adjusted and abnormal returns, as estimated under CAPM, for the two and three-month holding periods and positive abnormal return estimated under the two-factor APT model for a one-month holding period⁵.

Although none of the upgrade portfolios produces significant returns, it can be observed that in general, an investor will earn higher returns by acting on changes in recommendations (both upgrades and downgrades) instead of strictly following analysts' consensus recommendations of brokerage houses. This is consistent with the findings of Elton, Gruber and Grossman (1986), Womack (1996) and Brav and Lehavy (2003). The downgrade portfolios, on the other hand, provide significant results, which can be replicated in viable investment strategies. More specifically, shares with a change from a hold to a sell recommendation achieve a market-adjusted return of -10.49% and an abnormal return estimated under CAPM of -10.72% for a two-month holding period. In addition, shares with a change from a buy to a hold recommendation, constantly earn negative market-adjusted and risk-adjusted returns for a one-month holding period [-2.19% and -2.18% & -2.39% respectively]. A two-month holding period generates significantly greater negative market-adjusted and risk-adjusted (under CAPM only) returns for shares with a change from a buy to a hold recommendation.

Shares that reappear as a sell recommendation, after previously being dropped from the database earn a significant market-adjusted return of -14.58% over a one-month holding

⁵ Appendix B.3 displays the results from the hypothesis testing of the returns and the regression analysis performed to estimate abnormal returns for the portfolios of changes in or recurrences of analysts' consensus recommendations.

period. Although, this may indicate that analysts have the ability to identify shares that underperform, one must realise that there are only four instances where a share has reappeared as a sell recommendation in the database over the sample period (Table 4.3). On the other hand, by holding shares that reappear as a buy recommendation, an investor earns a significant alpha, estimated under the two-factor APT model of 8.36% for a one-month holding period. Holding the same portfolio of shares for a three-month holding period, an alpha of 26.10% is achieved, implying that shares which reappear as a buy recommendation, have worth that lasts up to three months.

Shares for which a sell recommendation has been discontinued, surprisingly earn a positive abnormal return, approximated using the two-factor APT model, of 13.57% over a one-month holding period. Another unexpected finding relates to shares that are covered for the first time by analysts and appear as a buy recommendation. These shares yield a significant market-adjusted return over a two-month holding period of -8.05%. However these findings are based on a very small sample size.

6.4 Summary and conclusion

This chapter investigates whether the analysts' consensus recommendations from South African brokerage houses provide valuable investment information to investors over the period from March 2000 to April 2003. If an investor strictly follows analysts' consensus recommendations of shares listed on the JSE, only the buy recommendations result in a significant alpha, estimated under a two-factor APT model, of 0.99% over a one-month holding period. The hold and sell recommendations produce insignificant results under each asset pricing model. The implication for the potential investors in the stock exchange is not to base their investment decisions solely on the analysts' consensus recommendation of brokerage houses.

In addition, several investment strategies designed to take advantage of changes in or recurrences of analysts' consensus recommendations are investigated. If an investor acts on the recurrences (reiterations of a firm's recommendation over two successive months) of hold and buy recommendations, positive alphas of 2.47% and 3.74% respectively are

earned over a three-month holding period. A higher positive alpha of 26.10% is earned by holding shares that reappear as a buy recommendation after previously being dropped from coverage. Shares that have reappeared as a sell recommendation earn a significant market-adjusted return of -14.58% for a one-month holding period.

Surprisingly, the recurrences of sell recommendations yield significantly positive abnormal returns over a three-month holding period. Shares for which a sell recommendation is discontinued, earn a significant positive alpha of 13.57% for a one-month holding period. Also, shares that are covered for the first time by analysts and appear as a buy recommendation yield a significant market-adjusted return over a two-month holding period of -8.05%. However, it should be noted that the above findings are based on a very small sample.

It is found that an investor generally earns significantly higher returns by acting on *downgrades* instead of strictly following the level of analysts' consensus buy, hold and sell recommendations. Over a two-month holding period, shares with a change from a hold to a sell recommendation achieve an abnormal return of -10.72%. In addition, shares with a change from a buy to a hold recommendation earn significant negative market-adjusted and abnormal returns over one and two-month holding periods.

Conclusion

As outlined in Chapter One, this thesis has two main objectives. The first objective is to investigate the accuracy of security analysts' earnings forecasts of firms listed on the JSE, coupled with an examination of the systematic bias or error inherent in analysts' earnings forecasts. The second objective is to analyse the investment value of portfolios constructed on the basis of the level of and changes in or recurrences of analysts' consensus recommendations.

The remainder of the chapter is set out as follows. Section 7.1 provides a summary of the main findings regarding each of the objectives above. The findings are discussed in the context of the theory outlined in Chapter Two. Section 7.2 suggests several areas for further research on analysts' expectational data in a South African context.

7.1 Summary of findings

Recently, there have been numerous studies in the international arena evaluating the properties of analysts' expectational data. However, there is no published study regarding analysts' earnings forecasts in the South African literature¹. In addition, none of the two studies investigating the value of analysts' recommendations has used consensus data and looked at the effect of changes in these recommendations. This thesis provides insights, based on the analysis of JSE data, on the two most coveted analysts' expectational data.

¹ As pinpointed in Chapter Five, the findings pertaining to the accuracy of analysts' earnings forecasts will constitute the first published article in this area in South Africa.

7.1.1 Accuracy of analysts' earnings forecasts

Because analysts' earnings forecasts are widely used by market participants, it is important to know whether these forecasts are rational. Summarising the prior international research [Muth (1961), Crichfield, Dyckman and Lakonishok (1978) and Givoly and Lakonishok (1984)], it is found that in general, for a forecast to be rational, it must be the most accurate and more importantly, it should at least fully reflect the history of the systematic error in previous forecasts.

The set of 669 analysts' consensus earnings forecasts of 114 firms listed on the JSE is obtained from the I/B/E/S summary database. A first order auto regressive time-series model is used to generate semi-annual earnings forecasts, against which analysts' earnings forecasts are compared. It is found that for both proxies of earnings forecasts, namely, forecasts issued by analysts and those estimated using the time-series model, there are more firms with earnings predictions in the late 1990s. In evaluating the accuracy of earnings forecasts, three measures of error are used: (i) the average absolute percentage error; (ii) Theil's inequality coefficient; and (iii) regression analysis. The reported earnings figures and the respective earnings announcement dates utilised are sourced from I-Net Bridge. Theil's inequality coefficient is further decomposed into the characteristic sources (the bias, variance and covariance proportions) of the forecast error. The comparison of analysts' earnings forecasts to those estimated using the time-series model is performed over three different samples.

Analysts' earnings forecasts are found to display a pattern of increasing accuracy as the earnings announcement date approaches. Both the average absolute percentage error and Theil's inequality coefficient decline uniformly. The average absolute percentage error of analysts' earnings forecasts with a 12, 6 and 1-month horizon is 23.62%, 16.66% and 7.95% respectively. Similarly, Theil's inequality coefficient for a 12, 6 and 1-month horizon is calculated to be 0.17, 0.1 and 0.07 respectively. The systematic bias inherent in analysts' earnings forecasts initially increases before decreasing steadily to disappear completely (0%) one month prior to earnings announcement. The variance proportion of the forecast error gradually declines as the reporting date approaches. Also, the investigation of the relative frequency of cases of underestimation and overestimation in analysts' earnings forecasts reveals that over each of the forecast horizons, there are more

overestimates than underestimates, but as the announcement date approaches, the number of overestimates and underestimates converges. This implies that although analysts are too optimistic in making earnings forecasts, the over-optimism weakens as the earnings announcement date approaches. In each of the three samples considered, the comparison of analysts' earnings forecasts to those estimated using a first order autoregressive time-series model depicts that analysts are more accurate in predicting earnings than the econometric model. In addition, in each of the sample, the covariance proportion of the forecast error is closer to 100% for analysts' earnings forecasts than for the forecasts estimated using the time-series model and this reflects analysts' superiority in making earnings projections.

Therefore, the findings of this thesis revealed that analysts' earnings forecasts become increasingly rational as the earnings announcement date approaches. More precisely, analysts' earnings forecasts display the highest degree of rationality one month prior to earnings announcement.

7.1.2 Value of Analysts' Consensus Recommendations

Analysts explicitly express their expectation about the relative near-term return performance of a given firm when they make a stock recommendation. For the purpose of this study, analysts' consensus recommendations of brokerage houses are obtained from I-Net Bridge. The analysis of the number of observations in each category of the level of and changes in or recurrences of analysts' consensus recommendations shows that analysts seldom make sell recommendations, more often opting to issue buy or hold recommendations. The equally weighted return performance of each calendar-time portfolio constructed on the basis of the level of and changes in or recurrences of analysts' consensus recommendations is evaluated using three different measures. Raw returns, market-adjusted returns and risk-adjusted returns are computed. Since the data are of a monthly nature, any portfolio rebalancing occurs at the end of the month.

The major finding is that superior returns are attained if an investor focuses on changes in or recurrences of analysts' consensus recommendations instead of strictly following the level of these recommendations. Only analysts' buy recommendations achieve a

significantly positive abnormal return for a 1-month holding period. It is not possible to induce any conclusion from the risk-adjusted and unadjusted return performances of analysts' hold and sell recommendations. Inconsistent results are found under each asset pricing model and the number of sell recommendations is very small representing only 3% of the sample. On the other hand, the recurrences of buy and hold recommendations earn significantly positive abnormal returns over a three-month holding period. A significantly higher abnormal return is obtained for a three-month holding period by holding shares that reappear as a buy recommendation after previously being dropped from coverage. Similarly, shares that reappear as a sell recommendation earn a significantly negative market-adjusted return for a one-month holding period. Significantly positive abnormal returns are achieved by the portfolios of recurrences of sell recommendations and shares for which a sell recommendation is discontinued. However, these findings are not considered to be material since they are based on a small sample. Finally, the downgrade portfolios of a change from a hold to a sell recommendation and from a buy to a hold recommendation yield significantly negative abnormal returns. However, the abnormal returns of the upgrade portfolios are not significantly different from zero.

Therefore, rather than the level of analysts' consensus recommendations, investment strategies based on the changes in these recommendations yield higher returns. As mentioned in Elton, Gruber and Grossman (1986), one interpretation of this finding is that recommendation changes capture qualitative aspects of a firm's operation (e.g., managerial abilities, strategic alliances, intangible assets, or other growth opportunities) that are not reflected by the level of analysts' consensus recommendations on its own. This study interprets rather differently. It is believed that lower returns are achieved by acting on the level of analysts' consensus recommendations because analysts' view of the performance of a particular share is already reflected in its price as postulated by the EMH. In contrast, the information content of the changes in analysts' consensus recommendations is usually lagged on the stock market and takes longer to be fully reflected in the share price. It should be noted that transaction costs have been ignored in the construction of the portfolios of this study. It is very possible that after taking transaction costs into account, very few of the investment strategies, if any, will still yield returns that are significantly different from zero. However, as highlighted in Barber *et al* (2001), to those investors who consider buying or selling and therefore incurring transaction costs in any case, changes in analysts' consensus recommendations may prove to be valuable.

7.2 Suggestions for future research

Over time, various properties of analysts' earnings forecasts have been investigated internationally. Because no studies on analysts' earnings forecasts have been published in the South Africa, a number of avenues for further research exist. The accuracy of analysts' earnings forecasts has been evaluated to those estimated using a first order auto regressive time-series model. It is suggested that the evaluation is performed using more robust econometric models. Another feature of analysts' earnings forecasts to be studied is their cross-sectional dispersion. Givoly and Lakonishok (1984) suggest that the cross-sectional dispersion of analysts' forecasts may represent a surrogate for the risk associated with the firm. Such a surrogate is of unique value to researchers because, unlike most other risk surrogate estimated from past-series (e.g., the standard deviation of the return or the security beta), this one represents an ex-ante measure of risk. A further topic of research is to explore the relationship between analysts' earnings forecast mistakes and the stock price behaviour subsequent to earnings announcement. This will reveal the existence of any post-earnings announcement drift.

Although using a calendar time perspective rather than the conventional event time perspective, this study indirectly provides a test for the semi-strong form of market efficiency by investigating the 'post-event' performance of analysts' consensus recommendations. Despite the significant abnormal returns achieved by the various stock market investment strategies, this analysis fails to contribute adequately to the market efficiency debate since trading costs have not been taken into account. It is strongly urged that further research in this area is undertaken on this topic whereby the portfolio turnover is estimated and the associated transactions costs incurred in implementing the investment strategies are considered. Should the returns still be significantly different from zero, this will be consistent with the practitioner or traditional view that share prices do not instantaneously adjust to new information and that appropriate investment strategies can yield above-average returns. However, if the market is efficient, investors will act on these investment strategies formulated on the basis of analysts' consensus recommendations as long as the share price is undervalued, so that ultimately the information contained in the recommendation will be completely reflected in the price.

It is suggested that the investment value to be derived from analysts' consensus recommendations is investigated over a longer time horizon using a more comprehensive data set. Besides, the cross-sectional characteristics of the recommended stocks on the JSE need to be analysed. Jegadeesh *et al* (2002) show that stocks with high positive price momentum, high volume, greater past sales growth, and higher expected long-term earnings growth rates are given more positive recommendations by analysts. Another possible area of interest is to examine the relation of analysts' recommendations to other concurrently available public information, probably focusing on variables that prior studies showed to have some predictive power for future returns.

Along with their earnings forecasts and stock recommendations, analysts have been increasingly disclosing target prices recently. Brav and Lehavy (2003) believe that these target prices provide market participants with analysts' most concise and explicit statement on the magnitude of the firm's expected value. It is suggested that further research is undertaken to evaluate the informativeness of analysts' target prices both unconditionally and conditional on contemporaneously issued recommendations and earnings forecasts revisions.

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Appendices

Appendix A

- A.1 Descriptive Statistics of the Sample of Analysts' Earnings Forecasts for each Forecast Horizon as Announcement Date Approaches A:1
- A.2 Descriptive Statistics of Analysts' Earnings Forecasts and Forecasts Estimated using a Time-Series Model (6-month Time Horizon) A:2
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Appendix B

- B.1 A Breakdown of each Level of Analysts' Consensus Recommendations into its Constituents B:1
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Appendix A.2: Descriptive Statistics of Analysts' Earnings Forecasts and Forecasts Estimated using a Time-Series Model (6-month Time Horizon)						
<p>The descriptive statistics, under each sample, of analysts' earnings forecasts and forecasts estimated using a first order auto regressive time-series model are provided. Sample 1, with 669 analysts' earnings forecasts and 1693 earnings forecasts estimated using a time-series model, is for the years 1990-2002 and is the original sample resulting from the sample requirements. Sample 2, with 419 analysts' earnings forecasts and 779 earnings forecasts estimated by the time-series model, concentrates on the years 1997-2001 and is considered since more firms had an analysts' earnings forecast over this period. And finally, sample 3 has 460 analysts' earnings forecasts and 460 estimates using the time-series model. Period 3 is constructed with the aim of comparing similar number of earnings forecasts, pertaining to the same firms and earnings announcement dates. The comparison is performed using earnings forecasts estimated 6 months prior to the announcement date.</p>						
Sample	1 (1990-2002)		2 (1997-2001)		3 (1990-2002)	
Model	Analysts	Time-series	Analysts	Time-series	Analysts	Time-series
Mean	225.90	124.85	241.74	148.91	247.47	248.48
Standard Error	15.11	9.54	22.85	14.63	18.55	23.20
Median	121.00	52.04	112.00	64.51	140.50	137.69
Mode	30.00	187.99	105.00	187.99	30.00	n/a
Standard Deviation	390.77	392.42	467.67	408.25	397.76	497.61
Sample Variance	152704.82	153995.41	218719.49	166666.95	158214.63	247611.37
Kurtosis	121.38	279.41	93.04	300.14	146.11	220.20
Skewness	8.90	5.05	8.11	14.41	9.89	12.90
Range	6802.00	16769.18	6802.00	10004.84	6802.00	9361.46
No. of Observations	669	1693	419	779	460	460

Appendix A.3: Calculation of Theil's Inequality Coefficient for each Time Horizon as Earnings Announcement Date Approaches								
The steps to calculate Theil's inequality coefficient for each time horizon prior to the announcement date are hereby provided. The numerator of Theil's inequality coefficient is the RMS (root-mean-square error). The denominator on the other hand, is scaled in such a way that Theil's inequality coefficient will always falls between 0 and 1.								
Time horizon		12-month	6-month	5-month	4-month	3-month	2-month	1-month
	Formula							
Numerator	$\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s - Y_t^a)^2}$	147.95	91.49	82.54	75.63	69.94	66.63	64.71
Denominator	$\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s)^2} + \sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^a)^2}$	874.27	918.89	924.06	928.44	930.17	928.66	929.20
Theil's inequality coefficient	$\frac{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s - Y_t^a)^2}}{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s)^2} + \sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^a)^2}}$	0.17	0.10	0.09	0.08	0.08	0.07	0.07

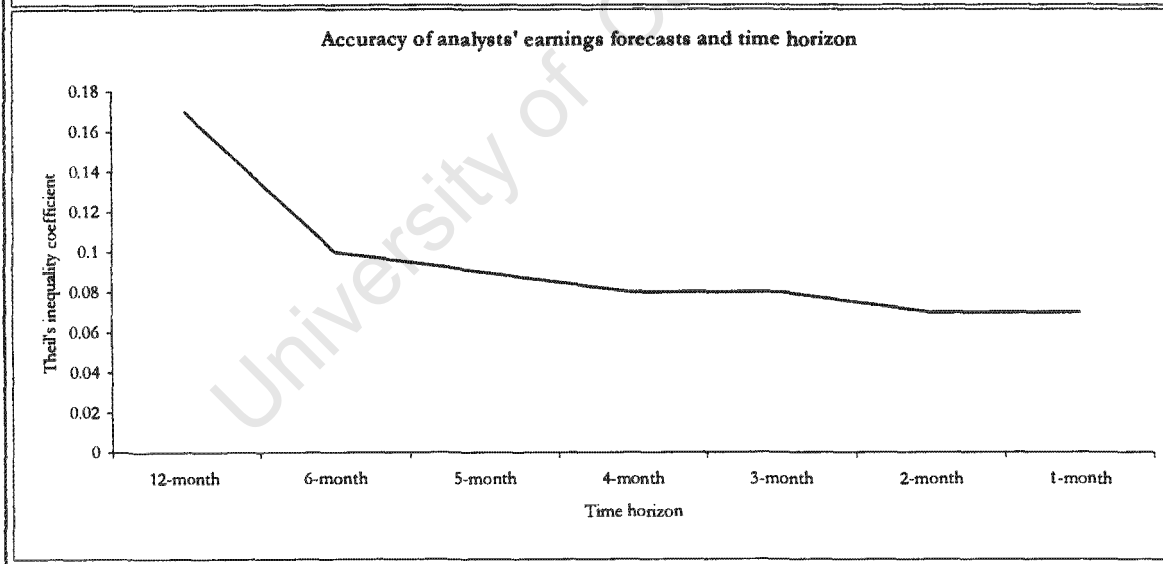
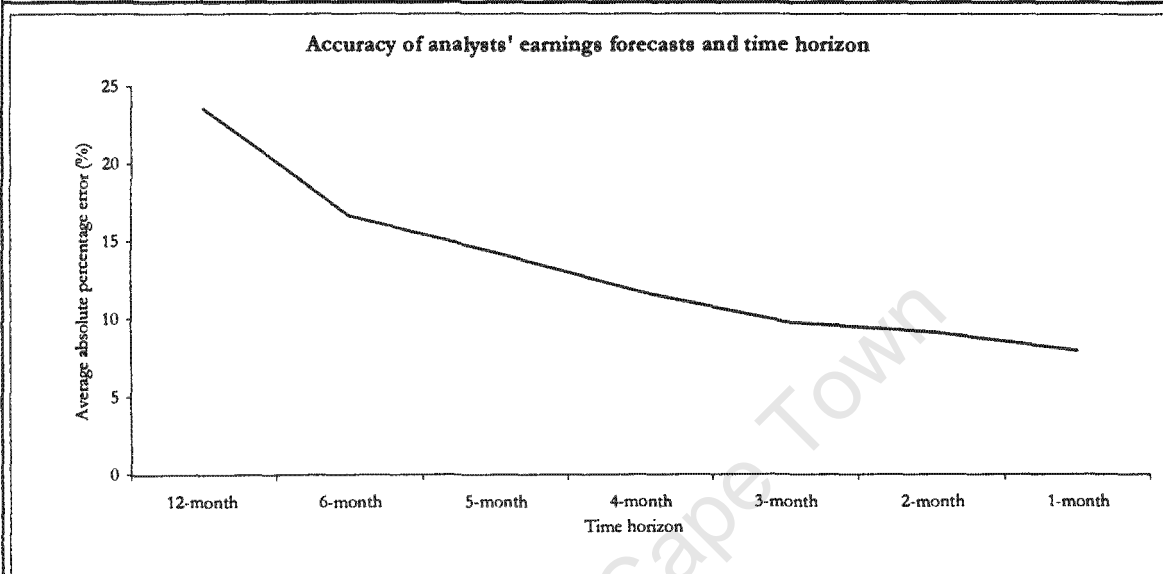
Appendix A.4: Calculation of Theil's Inequality Coefficient for Analysts' Earnings Forecasts and Forecasts Estimated using a Time-Series Model (6-month Time Horizon)

The steps to calculate Theil's inequality coefficient under each sample for analysts' earnings forecasts and forecasts estimated using a time-series model are hereby provided. The numerator of Theil's inequality coefficient is the RMS (root-mean-square error) and the denominator is scaled in such a way that Theil's inequality coefficient will always falls between 0 and 1. Sample 1, with 669 analysts' earnings forecasts and 1693 earnings forecasts estimated using a time series model, is for the years 1990-2002 and is the original sample. Sample 2, with 419 analysts' earnings forecasts and 779 earnings forecasts estimated by the time-series model, concentrates on the years 1997-2001 and is considered since more firms had an analysts' earnings forecast over this period. And finally, sample 3 has 460 analysts' earnings forecasts and 460 estimates using the time-series model. Period 3 is constructed with the aim of comparing similar number of earnings forecasts, pertaining to the same firms and earnings announcement dates. The comparison is performed using earnings forecasts estimated 6 months prior to the announcement date.

Sample	1 (1990-2002)		2 (1997-2001)		3 (1990-2002)			
Model	Analysts	Time-series	Analysts	Time-series	Analysts	Time-series		
	Formula							
Numerator	$\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s - Y_t^a)^2}$		91.49	159.37	104.79	112.72	97.24	115.61
Denominator	$\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s)^2} + \sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^a)^2}$		918.89	744.35	1079.95	817.44	959.08	1046.86
Theil's inequality coefficient	$\frac{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s - Y_t^a)^2}}{\sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^s)^2} + \sqrt{\frac{1}{T} \sum_{t=1}^T (Y_t^a)^2}}$		0.10	0.21	0.10	0.14	0.10	0.11

Appendix A.5: The Trend of the Error in Analysts' Earnings Forecasts as the Reporting Date Approaches

A 1-month time horizon represents a period of 1 month prior to the earnings announcement date. The average absolute percentage forecast error and Theil's inequality coefficient have been calculated for each horizon prior to the announcement date, from the year 1990 until the year 2002. Sample 1, which has 669 analysts' earnings forecasts is used. A graphical display of the trend in the error using both measures is hereby provided.



Appendix B

Appendix B.1: A Breakdown of each Level of Analysts' Consensus Recommendations into its Constituents

In each month, analysts' consensus buy, hold and sell recommendations are available. However, each level of recommendation is made up of different categories of changes in or recurrences of analysts' consensus recommendations from the previous month. This table breakdowns analysts' consensus buy, hold and sell recommendations into their constituents. The recurrence of a recommendation is the reiteration of a firm's recommendation over two successive months. An upgrade and a downgrade is a positive and a negative change in recommendation respectively. A reappearance occurs when a firm's recommendation is dropped from the database and then reappear in a later month either as a same or a different recommendation. A first appearance refers to a firm being first listed on the database. Finally, it may happen that a firm with a buy or hold or sell recommendation is simply dropped from the database.

	Buy Recommendations	Hold Recommendations	Sell Recommendations
Portfolio of	Buy-Buy (Recurrences)	Hold-Hold (Recurrences)	Sell-Sell (Recurrences)
	Hold-Buy (Upgrades)	Buy-Hold (Downgrades)	Buy-Sell (Downgrades)
	Sell-Buy (Upgrades)	Sell-Hold (Upgrades)	Hold-Sell (Downgrades)
	Reappearance as Buy	Reappearance as Hold	Reappearance as Sell
	First appearance as Buy	First appearance as Hold	First appearance as Sell
In each month, there are shares for which a buy or hold or sell recommendation is discontinued and no recommendation is available regarding those shares.			

Appendix B.2: Hypothesis Testing and Regression Analysis: Level of Analysts' Consensus Recommendations

Appendix B.2.1: Hypothesis Testing of the Return of Portfolios Formed on the Basis of the Level of Analysts' Consensus Recommendations							
<p>This table summarises the results of the hypothesis test performed to determine whether the mean raw and market-adjusted returns of portfolios formed on the basis of analysts' consensus buy, hold and sell recommendations are significantly different from zero. Raw returns are the arithmetic mean of the monthly returns (share price appreciation or depreciation plus any dividend declared) over the period March 2000 to April 2003. Market-adjusted returns are the arithmetic mean of the raw returns less the return on the All-share Index over the period March 2000 to April 2003.</p>							
Portfolio of	Time Horizon	1-month		2-month		3-month	
	Return	Raw	Market-adjusted	Raw	Market-adjusted	Raw	Market-adjusted
Buy	Std. Deviation	5.8959	4.1282	8.2337	6.4302	9.089	8.6418
	Mean	0.8287	0.0899	1.6381	0.0449	2.7716	0.1809
	t-Statistic	0.8665	0.1343	1.2264	0.043	1.8798	0.129
	P-Value	0.3918	0.8939	0.2278	0.9659	0.068	0.898
Hold	Std. Deviation	5.541	3.7453	8.2158	5.9197	9.2166	7.7226
	Mean	0.1944	-0.5444	0.9466	-0.6467	2.2639	-0.3269
	t-Statistic	0.2163	-0.8961	0.7102	-0.6734	1.5142	-0.2609
	P-Value	0.83	0.376	0.482	0.5049	0.1385	0.7956
Sell	Std. Deviation	11.7809	11.3123	17.8426	16.6203	22.2342	21.6007
	Mean	0.4606	-0.2783	3.8346	2.2414	7.3247	4.734
	t-Statistic	0.241	-0.1516	1.3248	0.8313	2.0308	1.351
	P-Value	0.8109	0.8803	0.1934	0.4111	0.0495	0.1849

Appendix B.2.2: Regression Analysis Performed to Estimate the Alphas of Portfolios Formed on the Basis of the Level of Analysts' Consensus Recommendations							
This table displays the results of the regression analysis performed to estimate the risk-adjusted return (alpha), under the CAPM and a two-factor APT model. The alpha, based on the CAPM, is given by the Jensen's differential return measure. It is represented by the estimated intercept from a time-series regression of the portfolio return ($R_p - R_f$) on the market (ALSI) excess return ($R_m - R_f$). The alpha, based on a two-factor APT model, is the estimated intercept from a time-series regression of the portfolio return on the excess return of (1) the All-share ex-Resources Index (2) the Resources Index as independent variables.							
Portfolio of	Time Horizon	1-month		2-month		3-month	
	Risk-adjusted Return	CAPM	APT	CAPM	APT	CAPM	APT
Buy	Coeff.	0.0596	0.9848	-0.0927	2.0065	-0.1097	3.2761
	Std. Error	0.6101	0.4812	0.9116	0.6651	1.1412	0.8482
	t-Statistic	0.0977	2.0465	-0.1016	3.0169	-0.0962	3.8622
	P-Value	0.9227	0.0483	0.9196	0.0047	0.9239	0.0005
	Adj. R-Square	0.5941	0.7869	0.5356	0.8071	0.4031	0.7652
Hold	Coeff.	-0.5770	0.1662	-0.7084	1.1338	-0.6444	2.3465
	Std. Error	0.5315	0.4446	0.8649	0.6910	1.0376	0.8408
	t-Statistic	-1.0856	0.3739	-0.8190	1.6409	-0.6211	2.7909
	P-Value	0.2849	0.7107	0.4182	0.1098	0.5385	0.0085
	Adj. R-Square	0.6508	0.7938	0.5846	0.7931	0.5223	0.7767
Sell	Coeff.	-0.3218	-0.7264	2.1149	1.0250	4.3902	2.5925
	Std. Error	1.8241	2.0080	2.7031	3.0899	3.4712	4.1533
	t-Statistic	-0.1764	-0.3617	0.7824	0.3317	1.2648	0.6242
	P-Value	0.8610	0.7197	0.4391	0.7421	0.2141	0.5365
	Adj. R-Square	0.0956	0.0751	0.1381	0.1211	0.0907	0.0731

Appendix B.3: Hypothesis Testing and Regression Analysis: Changes in or Recurrences of Analysts' Consensus Recommendations

Appendix B.3.1: Hypothesis Testing of the Return of Portfolios Formed on the Basis of the Changes in or Recurrences of Analysts' Consensus Recommendations							
This table summarises the results of the hypothesis test performed to determine whether the mean raw and market-adjusted returns of portfolios formed on the basis of changes in or recurrences in analysts' consensus recommendations are significantly different from zero. Raw returns are the arithmetic mean of the monthly returns (share price appreciation or depreciation plus any dividend declared) over the period March 2000 to April 2003. Market-adjusted returns are the arithmetic mean of the raw returns less the return on the All-share Index over the same period.							
Portfolio of	Time Horizon	1-month		2-month		3-month	
	Return	Raw	Market-adjusted	Raw	Market-adjusted	Raw	Market-adjusted
Buy-Buy	Std. Deviation	5.5793	4.0843	7.8460	6.5618	8.9953	8.7679
	Mean	1.0212	0.0968	2.0555	0.2299	3.2838	0.5753
	t-Statistic	1.1134	0.1441	1.5935	0.2122	2.2205	0.3991
	P-Value	0.2729	0.8862	0.1198	0.8332	0.0328	0.6921
Hold-Hold	Std. Deviation	5.5255	3.8555	7.8834	6.0143	9.1159	7.6040
	Mean	0.4550	-0.4695	1.4418	-0.3848	2.5858	-0.1226
	t-Statistic	0.5009	-0.7407	1.1125	-0.3892	1.7254	-0.0981
	P-Value	0.6195	0.4637	0.2733	0.6994	0.0930	0.9224
Sell-Sell	Std. Deviation	13.8654	14.0721	20.8104	20.7244	25.8287	24.4273
	Mean	3.5150	2.5906	8.2033	6.3768	10.5037	7.7953
	t-Statistic	1.5420	1.1198	2.3978	1.8716	2.4737	1.9411
	P-Value	0.1318	0.2702	0.0218	0.0694	0.0182	0.0601
Hold-Buy	Std. Deviation	9.3646	7.3844	11.2820	8.4171	13.2842	12.0665
	Mean	1.2530	0.3285	1.0963	-0.7302	0.5487	-2.1598
	t-Statistic	0.8139	0.2706	0.5911	-0.5277	0.2512	-1.0888
	P-Value	0.4211	0.7882	0.5581	0.6009	0.8031	0.2835
Sell-Hold	Std. Deviation	20.2768	20.6586	22.6017	18.4916	57.2822	56.9216
	Mean	1.9346	1.1624	3.9369	2.5631	11.9464	9.6618
	t-Statistic	0.3816	0.2251	0.6967	0.5544	0.8342	0.6790
	P-Value	0.7081	0.8250	0.4966	0.5875	0.4172	0.5075
Sell-Buy	Std. Deviation	n/a	n/a	n/a	n/a	n/a	n/a
	Mean	0.0000	-9.8350	3.8462	-3.9483	3.8462	-2.4432
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
Buy-Hold	Std. Deviation	6.6653	5.5575	10.6825	8.4756	12.0894	12.8744
	Mean	-1.2614	-2.1859	-1.3892	-3.2157	0.0142	-2.6943
	t-Statistic	-1.1512	-2.3925	-0.7910	-2.3079	0.0071	-1.2730
	P-Value	0.2572	0.0221	0.4341	0.0269	0.9944	0.2112

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Hold-Sell	Std. Deviation	15.5434	14.3610	23.0109	22.2398	26.6822	26.5262
	Mean	-6.0514	-5.2525	-9.5277	-10.4920	-3.3374	-5.7447
	t-Statistic	-1.8261	-1.7155	-1.9421	-2.2128	-0.5867	-1.0158
	P-Value	0.0821	0.1010	0.0657	0.0381	0.5637	0.3213
Buy-Sell	Std. Deviation	n/a	n/a	n/a	n/a	n/a	n/a
	Mean	3.8462	5.7040	3.8462	7.0742	111.5380	118.8026
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
Buy-Dropped	Std. Deviation	17.3458	16.8119	37.4725	35.9011	36.3814	36.9151
	Mean	-0.2518	-1.8404	8.4379	5.3160	8.2113	3.8694
	t-Statistic	-0.0795	-0.5996	1.2333	0.8110	1.2362	0.5741
	P-Value	0.9372	0.5534	0.2274	0.4240	0.2263	0.5703
Hold-Dropped	Std. Deviation	10.1819	8.3994	12.6612	10.5186	19.7913	19.2894
	Mean	0.8299	0.4815	1.9453	2.0402	0.3081	-0.4564
	t-Statistic	0.4235	0.2979	0.7983	1.0078	0.0809	-0.1229
	P-Value	0.6754	0.7682	0.4319	0.3228	0.9361	0.9031
Sell-Dropped	Std. Deviation	23.0149	21.8869	21.2479	23.1942	37.9453	41.1204
	Mean	8.7802	9.2136	-0.9078	-1.8523	3.0806	0.3076
	t-Statistic	1.2653	1.3962	-0.1417	-0.2649	0.2693	0.0248
	P-Value	0.2345	0.1929	0.8901	0.7965	0.7932	0.9807
Reappear as Buy	Std. Deviation	14.9481	14.8871	23.2297	18.4520	28.5173	26.0385
	Mean	2.2732	2.4488	2.6605	1.8337	2.0574	-0.0670
	t-Statistic	0.5044	0.5456	0.3799	0.3296	0.2393	-0.0085
	P-Value	0.6249	0.5973	0.7120	0.7485	0.8157	0.9934
Reappear as Hold	Std. Deviation	8.9717	7.4934	16.4828	14.0906	23.1694	22.7913
	Mean	-0.1329	-1.3900	-0.0085	-2.3699	4.1712	-0.3669
	t-Statistic	-0.0574	-0.7184	-0.0020	-0.6514	0.6973	-0.0623
	P-Value	0.9551	0.4843	0.9984	0.5253	0.4971	0.9512
Reappear as Sell	Std. Deviation	14.3928	0.9330	26.8817	12.3163	33.4781	9.3302
	Mean	-10.0318	-14.5803	-19.8162	-21.0542	-16.7966	-17.5970
	t-Statistic	-0.9857	-22.0998	-1.0425	-2.4175	-0.7095	-2.6672
	P-Value	0.5046	0.0288	0.4868	0.2497	0.6071	0.2284
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First appearance as Buy	Std. Deviation	15.9489	15.9790	16.5592	16.0607	19.0302	22.3012
	Mean	-3.9338	-5.4324	-4.7540	-8.0474	-3.7127	-10.4604
	t-Statistic	-0.8893	-1.2258	-1.0351	-1.8066	-0.7034	-1.6912
	P-Value	0.3913	0.2438	0.3210	0.0959	0.4952	0.1166
First appearance as Hold	Std. Deviation	12.4183	14.3499	23.8440	24.8743	23.5863	27.2831
	Mean	-0.5427	-2.2220	6.4832	1.7936	5.0388	-2.5180
	t-Statistic	-0.1449	-0.5136	0.9018	0.2391	0.7085	-0.3061
	P-Value	0.8876	0.6187	0.3884	0.8158	0.4948	0.7658
First appearance as Sell	Std. Deviation	n/a	n/a	n/a	n/a	n/a	n/a
	Mean	n/a	n/a	n/a	n/a	n/a	n/a
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a

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Appendix B.3.2: Regression Analysis Performed to Estimate the Alphas of Portfolios Formed on the Basis of the Changes in or Recurrences of Analysts' Consensus Recommendations							
This table displays the results of the regression analysis performed to estimate the risk-adjusted return (alpha), under the CAPM and a two-factor APT model. The alpha, based on the CAPM, is given by the Jensen's differential return measure. It is represented by the estimated intercept from a time-series regression of the portfolio return (Rp-Rf) on the market (ALSI) excess return (Rm-Rf). The alpha, based on a two-factor APT model, is the estimated intercept from a time-series regression of the portfolio return on the excess return of (1) the All-share ex-Resources Index (2) the Resources Index as independent variables.							
Portfolio of	Time Horizon	1-month		2-month		3-month	
	Risk-adjusted Return	CAPM	APT	CAPM	APT	CAPM	APT
Buy-Buy	Coeff.	0.1066	-0.6045	0.2407	2.2188	0.5762	3.7430
	Std. Error	0.5854	0.7845	0.9106	0.6244	1.1460	0.8058
	t-Statistic	0.1821	-0.7705	0.2644	3.5533	0.5028	4.6453
	P-Value	0.8565	0.4463	0.7930	0.0011	0.6183	0.0000
	Adj. R-Square	0.5936	0.3060	0.5041	0.8151	0.4030	0.7870
Hold-Hold	Coeff.	-0.4601	-1.9879	-0.3743	1.2838	-0.1219	2.4666
	Std. Error	0.5503	0.7420	0.8458	0.6551	1.0234	0.8040
	t-Statistic	-0.8360	-2.6791	-0.4425	1.9596	-0.1191	3.0680
	P-Value	0.4088	0.0113	0.6609	0.0583	0.9058	0.0042
	Adj. R-Square	0.5337	0.4550	0.5768	0.7987	0.5382	0.7943
Sell-Sell	Coeff.	2.5075	4.7048	6.3904	4.4960	7.7956	4.9495
	Std. Error	2.2688	1.7582	3.3839	3.7970	4.0588	4.7721
	t-Statistic	1.1493	2.6759	1.8885	1.1841	1.9207	1.0372
	P-Value	0.2582	0.0114	0.0673	0.2446	0.0629	0.3070
	Adj. R-Square	0.0145	0.4777	0.0326	0.0342	0.1015	0.1037
Hold-Buy	Coeff.	0.3314	-0.4365	-0.7250	1.2011	-2.1591	0.6272
	Std. Error	1.2269	1.4660	1.3776	1.3350	1.8801	2.0163
	t-Statistic	0.2701	-0.2977	-0.5263	0.8997	-1.1484	0.3111
	P-Value	0.7886	0.7677	0.6020	0.3746	0.2586	0.7576
	Adj. R-Square	0.3668	0.1316	0.4489	0.5896	0.2571	0.3834
Sell-Hold	Coeff.	1.0842	-4.2434	2.6620	2.2951	9.5235	17.8573
	Std. Error	5.2283	6.7202	4.7411	5.6855	14.7000	18.1262
	t-Statistic	0.2074	-0.6314	0.5615	0.4037	0.6479	0.9852
	P-Value	0.8387	0.5387	0.5834	0.6930	0.5276	0.3425
	Adj. R-Square	-0.0594	-0.0211	0.3051	0.2408	-0.0504	-0.0771
Sell-Buy	Coeff.	n/a	n/a	n/a	n/a	n/a	n/a
	Std. Error	n/a	n/a	n/a	n/a	n/a	n/a
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
	Adj. R-Square	n/a	n/a	n/a	n/a	n/a	n/a

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Buy-Hold	Coeff.	-2.1756	-2.3900	-3.2079	-1.2892	-2.6933	1.3407
	Std. Error	0.8527	0.9515	1.3557	1.3096	1.8482	1.7389
	t-Statistic	-2.5516	-2.5118	-2.3662	-0.9844	-1.4572	0.7710
	P-Value	0.0152	0.0169	0.0236	0.3319	0.1540	0.4460
	Adj. R-Square	0.3922	0.3063	0.4025	0.5579	0.1304	0.4445
Buy-Sell	Coeff.	n/a	n/a	n/a	n/a	n/a	n/a
	Std. Error	n/a	n/a	n/a	n/a	n/a	n/a
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
	Adj. R-Square	n/a	n/a	n/a	n/a	n/a	n/a
Hold-Sell	Coeff.	-5.3796	-3.8338	-10.7203	-8.3218	-5.8800	-4.7789
	Std. Error	3.2460	3.4664	4.8498	5.3940	5.6560	7.3027
	t-Statistic	-1.6573	-1.1060	-2.2105	-1.5428	-1.0396	-0.6544
	P-Value	0.1131	0.2825	0.0389	0.1394	0.3109	0.5207
	Adj. R-Square	0.1053	0.1262	0.0337	0.0441	0.0170	-0.0252
Buy-Dropped	Coeff.	-1.6343	-0.5013	5.0758	9.9294	4.9551	8.3654
	Std. Error	3.1197	3.2753	6.7349	6.8000	6.8041	7.6372
	t-Statistic	-0.5239	-0.1531	0.7537	1.4602	0.7283	1.0953
	P-Value	0.6045	0.8795	0.4573	0.1558	0.4725	0.2830
	Adj. R-Square	0.0408	0.0476	0.0521	0.1637	-0.0247	-0.0218
Hold-Dropped	Coeff.	0.4701	0.7895	1.7868	2.1925	-1.2877	2.4237
	Std. Error	1.6561	1.8623	2.1095	2.5419	3.7326	4.6546
	t-Statistic	0.2839	0.4239	0.8470	0.8625	-0.3450	0.5207
	P-Value	0.7788	0.6754	0.4050	0.3969	0.7330	0.6073
	Adj. R-Square	0.2915	0.2682	0.2934	0.2620	0.0709	0.0925
Sell-Dropped	Coeff.	9.1427	0.0000	-2.6471	7.6591	0.5808	6.0415
	Std. Error	7.0667	5.2803	6.7629	6.5191	11.9469	19.5838
	t-Statistic	1.2938	2.5700	-0.3914	1.1749	0.0486	0.3085
	P-Value	0.2280	0.0331	0.7046	0.2738	0.9623	0.7656
	Adj. R-Square	-0.0056	0.4795	-0.1109	0.3321	-0.0900	-0.2130
Reappear as Buy	Coeff.	1.9485	8.3627	2.5649	10.8147	-0.1244	26.0999
	Std. Error	4.6243	3.8000	5.4531	7.1133	8.2675	12.7577
	t-Statistic	0.4214	2.2007	0.4704	1.5204	-0.0150	2.0458
	P-Value	0.6834	0.0589	0.6493	0.1669	0.9883	0.0750
	Adj. R-Square	-0.0291	0.5004	0.4046	0.5245	0.0828	0.4218
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Reappear as Hold	Coeff.	-1.2735	0.7026	-2.3411	-0.5206	0.4678	1.3910
	Std. Error	1.9116	2.0406	3.7831	4.4073	6.0012	8.7240
	t-Statistic	-0.6662	0.3443	-0.6188	-0.1181	0.0779	0.1594
	P-Value	0.5169	0.7366	0.5467	0.9079	0.9391	0.8760
	Adj. R-Square	0.3149	0.4340	0.2148	0.2240	0.0215	-0.0491
Reappear as Sell	Coeff.	n/a	n/a	n/a	n/a	n/a	n/a
	Std. Error	n/a	n/a	n/a	n/a	n/a	n/a
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
	Adj. R-Square	n/a	n/a	n/a	n/a	n/a	n/a
First appearance as Buy	Coeff.	-5.1200	-4.4733	-7.4337	-5.2263	-6.3191	0.0541
	Std. Error	4.5431	4.4619	4.6132	4.7358	5.7479	5.5079
	t-Statistic	-1.1270	-1.0025	-1.6114	-1.1036	-1.0994	0.0098
	P-Value	0.2837	0.3397	0.1354	0.2956	0.2951	0.9924
	Adj. R-Square	-0.0502	0.0186	0.0082	0.0980	-0.0904	0.2426
First appearance as Hold	Coeff.	-1.3707	-2.0372	4.3293	1.3227	5.3605	6.7310
	Std. Error	3.9817	5.2103	8.1267	9.7242	8.3579	9.4286
	t-Statistic	-0.3442	-0.3910	0.5327	0.1360	0.6414	0.7139
	P-Value	0.7386	0.7060	0.6071	0.8952	0.5373	0.4956
	Adj. R-Square	-0.1107	-0.2420	-0.1084	-0.1731	-0.0516	-0.1474
First appearance as Sell	Coeff.	n/a	n/a	n/a	n/a	n/a	n/a
	Std. Error	n/a	n/a	n/a	n/a	n/a	n/a
	t-Statistic	n/a	n/a	n/a	n/a	n/a	n/a
	P-Value	n/a	n/a	n/a	n/a	n/a	n/a
	Adj. R-Square	n/a	n/a	n/a	n/a	n/a	n/a

Appendix B.4: Percentage Returns Earned by Upgrade and Downgrade Portfolios Formed on the Basis of Changes in Analysts' Consensus Recommendations

This table displays the one, two and three-month percentage monthly returns achieved by upgrade and downgrade portfolios formed on the basis of changes in analysts' consensus recommendations. Only shares with a recommendation in the previous month, are considered (Reappearances and first appearances are ignored). The mean raw return is the arithmetic mean of the monthly returns achieved by each category of changes in recommendations. The mean market-adjusted return is the arithmetic mean of the raw returns less the return on the All-share Index. The risk-adjusted return under CAPM is the estimated intercept from a time-series regression of the portfolio return ($R_p - R_f$) on the market (ALSI) excess return ($R_m - R_f$). The risk-adjusted return under the two-factor APT model is the estimated intercept from a time-series regression of the portfolio return on the excess return of (1) the All-share ex-Resources Index (2) the Resources Index as independent variables. Each t-statistic (displayed in brackets below each return) relates to the null hypothesis that the associated return is zero. The t-statistics for returns that are significant at a level of 10 percent or better are shown in bold. For those categories of changes in analysts' consensus recommendations that have no or insufficient data points, a 'n/a' has been displayed.

Holding period		One-month				Two-month				Three-month			
Portfolios	Changes in Recommendations	Mean Raw Return	Mean Market-adjusted Return	Intercept from		Mean Raw Return	Mean Market-adjusted Return	Intercept from		Mean Raw Return	Mean Market-adjusted Return	Intercept from	
				CAPM	APT			CAPM	APT			CAPM	APT
Upgrades	From Hold to Buy	1.25 (0.81)	0.33 (0.27)	0.33 (0.27)	-0.44 (-0.30)	1.10 (0.59)	-0.73 (-0.53)	-0.73 (-0.53)	1.20 (0.90)	0.55 (0.25)	-2.16 (-1.09)	-2.16 (-1.15)	0.63 (0.31)
	From Sell to Hold	1.93 (0.38)	1.16 (0.23)	1.08 (0.21)	-4.24 (-0.63)	3.94 (0.70)	2.56 (0.55)	2.66 (0.56)	2.30 (0.40)	11.95 (0.83)	9.66 (0.68)	9.52 (0.65)	17.86 (0.99)
	From Sell to Buy	0.00 (n/a)	-9.84 (n/a)	n/a (n/a)	n/a (n/a)	3.85 (n/a)	-3.95 (n/a)	n/a (n/a)	n/a (n/a)	3.85 (n/a)	-2.44 (n/a)	n/a (n/a)	n/a (n/a)
Downgrades	From Hold to Sell	-6.05 (-1.83)	-5.25 (-1.72)	-5.38 (-1.66)	-3.83 (-1.11)	-9.53 (-1.94)	-10.49 (-2.21)	-10.72 (-2.21)	-8.32 (-1.54)	-3.34 (-0.59)	-5.75 (-1.02)	-5.88 (-1.04)	-4.78 (-0.65)
	From Buy to Hold	-1.26 (-1.15)	-2.19 (-2.39)	-2.18 (-2.55)	-2.39 (-2.51)	-1.39 (-0.79)	-3.22 (-2.31)	-3.21 (-2.37)	-1.29 (-0.98)	0.01 (0.01)	-2.69 (-1.27)	-2.69 (-1.46)	1.34 (-0.77)
	From Buy to Sell	3.85 (n/a)	5.70 (n/a)	n/a (n/a)	n/a (n/a)	3.85 (n/a)	7.07 (n/a)	n/a (n/a)	n/a (n/a)	111.54 (n/a)	118.80 (n/a)	n/a (n/a)	n/a (n/a)