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UNIVERSITY OF THE WITWATERSRAND
Faculty of Commerce, Law and Management
School of Accountancy

An Empirical Examination of the Ohlson (1995) Valuation Model in South Africa

A research report submitted in partial fulfillment (50%) of the requirements for the degree of Master of Commerce

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Declaration

I declare that this research report is my own original work and that all sources have been accurately reported and acknowledged. It is submitted for the degree of Masters of Commerce to the University of Witwatersrand, Johannesburg. This research has not been submitted for any degree or examination at this or any other university.

Gary Edward Swartz Date

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Abstract

The debate on the determinants of firm value remains unresolved in finance research. This research report contributes to the debate by examining the validity of the Ohlson (1995) valuation model in South Africa. Using Johannesburg Securities Exchange data, this research report aims to identify whether the book value of assets, accounting (accrual) earnings, and abnormal cash dividends explain the behavior of South African share prices. The Ohlson (1995) model has been successfully tested in a number of recent studies (Collins, Pincus and Xie, 1999; Garrod and Rees, 1998; Collins, Maydew and Weiss, 1997; and Kothari and Zimmerman, 1995). This study attempts to extend this body of work in an emerging market context (South Africa), to determine whether the results obtained in developed markets also hold in an emerging market setting, where required rates of return are higher, liquidity is low, and capital is scarce.

The research uses both cross sectional and panel data for 129 Johannesburg Securities Exchange listed companies over the 1992-2003 period to investigate the value relevance of the annual financial statements using the Ohlson (1995) model. Using cross-sectional data, the study indicates that the Ohlson (1995) model cannot be used for value prediction purposes, but does indicate that accrual accounting data is value relevant. However, using a panel data approach resulted in a statistically significant, robust, positive relationship for accounting earnings, book value of assets, and abnormal dividends in predicting firm value.

Chapter I : Introduction

1.1 Background

The usefulness of annual financial statements in determining a company's share price, is increasingly being questioned in the finance literature, and is evidenced in the increasing gap in book and market values of equity. Both the International Federation of Accountants (IFAC) conceptual framework and AC 000 (1990), state that the overriding objective of financial reporting and general purpose financial statements, is to provide information about the entity's financial performance and financial position, that is useful to a wide range of users, for assessing the stewardship of management and for making economic decisions. One such economic decision is the formation of a share price. A question therefore is raised as to whether the annual financial statements are relevant for price formation.

Investors are primarily interested in any information which can assist them in assessing the value of the firm for the purpose of making informed investment choices. The objective of value relevance research is to relate annual financial statement figures to a measure of firm value, and to assess the relation of such information to the determination of value.

In a paper discussing the limitations of accounting, Flegm (1989) concludes that one cannot reliably measure the value of a business or predict it's future success using annual financial statements. Two examples of major limitations of financial statements discussed by Flegm (1989) are historic cost accounting and non-recognition of internally generated goodwill. Furthermore, the paper argues that financial statements represent a summary of past events, and say very little about future prospects of the company.

The question regarding the usefulness of annual financial statements in determining firm value is also evident in the increasing gap in the book to market ratio, described by Lev and Sougiannis (1999 : 419) as "a phenomena which looms large among capital market enigmas", and has yet to be explained in modern literature. A number

of studies have attempted to explain the gap, with three dominant routes emerging. Fama and French (1995) attribute the presence of high book to market ratios for certain firms to a risk premium, suggesting that higher returns are demanded for the possibility of financial distress. Lakonishok, Schleifer and Vishny (1994) associate the gap with mispricing of 'glamour companies', while Frankel and Lee (1995) attribute the difference to error in the market's expectation of future earnings. Lastly, Kothari and Shanken (1995) attribute the phenomenon to selection bias in empirical tests. Lev and Sougiannis (1999) conclude that although these explanations of book to market provide interesting insights, they do not yield a satisfactory explanation of the association between book to market and subsequent returns.

The seminal work of Ackerlof (1970) introduces the problem of information asymmetry, where management has more information than the shareholders, and shareholders are therefore not able to determine a fair price with the limited information they have access to. The information asymmetry problem is exacerbated by the increasing role of difficult to measure, knowledge intensive intangible assets in the information age, which are not reflected in the annual financial statements as described by Holland (1998). These issues further question the usefulness of annual financial statements to users in determining share value.

A number of recent studies have attempted to empirically test whether the elements of financial statements are value relevant. Collins, Pincus and Xie (1999) discuss three competing explanations for the role that book value of assets plays in valuing companies. The first of these is the use of book value as a control for scale differences (Barth and Kallapur, 1996); secondly, using book value as a proxy for expected normal earnings (Ohlson, 1995; Penman, 1992), and lastly, as a proxy for an abandonment option, or liquidation value (Berger, Ofek and Swary, 1996; Burgstahler and Dichev, 1997). Collins, Pincus and Xie (1999) conclude that their results support the view that book value serves as a value relevant proxy for expected normal earnings, and as a proxy for abandonment value, which is the approach that this research report follows.

The question raised is therefore whether the accounting information in the financial statements is value relevant. A detailed valuation model which identifies a distinct

role for earnings, book value, and dividends in predicting the equity value of firms, is introduced in the papers of Ohlson (1995) and Feltham and Ohlson (1995, 1996). These papers devise a cohesive theory of a company's value, relying on the clean surplus relation and accounting information obtained from the financial statements. This research report aims to empirically test this model, with other variables, in an emerging market environment. The combination of regressors used in the model are of conceptual interest, as using the clean surplus relation, it brings in both bottom line items of the financial statements (total profit and total assets) into the valuation. The model further includes other information in the market, motivated by the idea that some value-relevant events may affect future expected earnings.

Clean surplus accounting satisfies dividend payment irrelevance, as discussed by Modigliani and Miller (1958), and Miller and Modigliani (1961), where dividends displace market value on a Rand for Rand basis; a dividend payment would decrease equity and book value of assets. Furthermore, dividends paid today negatively influence future expected earnings, due to less capital being available to generate further wealth.

The Ohlson (1995) model has been successfully tested in a number of studies, using different specifications of the base equation, and has been succesfully applied in markets with different attributes. Whether these conclusions hold in a South African context is untested at present, and is thus the focus of this research.

1.2 The South African context

As an emerging market, South Africa has a well developed corporate sector, as well as a sophisticated financial system. The JSE has been in existence since November 1887, while the South African Bond market, and South African Futures market, were more recently formed in 1989 and 1990 respectively. The JSE is characterized by a low level of trading liquidity.

Recent studies on the efficiency of the JSE are mixed, Ward (1994) presented a thorough review of the literature, concluding that the JSE is "operationally efficient", indicating that a small group of investors may be able to outperform the market, but

most investors will be unable to do so, which is considered to be adequate market efficiency strength for the purposes of this study.

To date no published study using the Ohlson (1995) valuation model or a similar model has been completed on the Johannesburg Securities Exchange, however, a recent research report has attempted to address whether published accounting data is related to price formation using Johannesburg Securities Exchange data (Woldegabir, 2004). The research report utilizes the Ohlson (1995) valuation model, using accounting earnings, and book value of assets, to determine whether the variables are significantly related to share price three months after year end. The work essentially follows on the works of Collins, Maydew, and Weiss (1997) among others, which attempts to test whether the association between share price and accounting variables increases or decreases over time. The study also explores whether any such associations can be explained by firm specific characteristics, and claims to have tested the Ohlson (1995) model, however, although the research performed does validate the use of the Ohlson (1995) variables of accounting earnings and book value of assets, it does not validate the model itself. To do so would require the specification of the other information variable, as is performed in this study.

This research report aims to extend the empirical studies undertaken on the value relevance of financial statement information. It uses multiple regression techniques and panel data for a sample of Johannesburg Securities Exchange listed companies during the 1992-2003 period, to investigate whether book value of assets, accounting earnings, and dividends are value relevant on both a cross sectional and time series basis. The Ohlson (1995) model forms the base of the valuation equation which includes net book value of assets, abnormal income and abnormal dividends (as a proxy for other information) as regressors. The distinguishing features of this study are firstly, that it uses panel data to combine both cross-sectional and time-series effects in the model. Most empirical value relevance studies using the Ohlson (1995) model utilize a cross-sectional model, with a crude time-series analysis performed by comparing the yearly regression results to each other manually. Although such a comparison does provide evidence of the overall annual trend, it does not include any time-series effect on a company by company basis; as such information is lost in

aggregation. Second, this study is performed on South African firms listed on the Johannesburg Securities Exchange, in an emerging market setting.

1.3 Statement of the problem

The value relevance of published accounting information in the form of accounting earnings and the book value of assets has been a popular research topic in recent years with a large body of work emerging from the seminal works of Ohlson (1995), and Feltham and Ohlson (1995, 1996). The model incorporates book value and accounting earnings to devise a cohesive theory for the determination of a company's value. Book values are assessed to be value relevant if a predictive association is detected with share prices.

The primary reason for value relevance research is to determine how close the association is between accounting book values and market prices. Based on the findings, a conclusion will be drawn as to how much investors should rely on accounting information obtained from the financial statements to determine share prices for firms.

1.3.1 Research questions

The first research question is to determine whether accounting earnings and book value explain the increases and decreases in the market value of shares on a cross sectional basis.

The second research question is to determine whether accounting earnings and book value explain the increases and decreases in the market value of shares on a combined cross sectional and time series basis.

1.4 Rationale of the study

The main aim of most companies is the creation of wealth for their shareholders, as measured by the market price of the company's shares. The share price reflects the results from trading operations, the financial position of the firm, and the expected future opportunities available to the firm. Investors are first and foremost interested in

any information which can assist them in assessing the value of the firm, for the purpose of making informed investment choices.

In order to test the value relevance of the annual financial statement information, the value of a firm is expressed as a function of accounting earnings, book value of assets, and other information using the Ohlson (1995) model. The model is modified by including abnormal dividends, as a specification for the other information variable. This model has been tested successfully in a number recent studies, for example, Collins, Pincus and Xie (1999); Garrod and Rees (1998); Collins, Maydew and Weiss (1997); and Kothari and Zimmerman (1995). Although the results of these studies provide valuable insight, the model is as yet untested in a South African market, or using a panel data approach.

1.5 Organization of the study

Chapter two consists of a literature review which discusses the origin of the model to be used, methodological developments, contextual issues, and subsequent refinements of the model, as well as an analysis of the previous empirical studies. The chapter also reviews recent South African valuation studies. The purpose of the literature review is to provide the basic theoretical and empirical foundation for the study, as well as to extend the discussion surrounding the value relevance of accounting earnings and book value to share price.

The research hypothesis is stated in chapter three. The research methodology is then examined in terms of the contribution made by each of the researchers towards improving the methodology. The exact definition of the valuation models, and the statistical models used are also discussed, the data and methodological issues are introduced, and the study period is defined. Chapter four discusses the results. Finally chapter five concludes the study with a summary of the findings, discusses limitations, and identifies areas for further research.

Chapter II : Literature Review

2.1 Introduction

The determinants of firm value in value relevance research remains an enigma. The usefulness of annual financial statements in determining a company's share price in particular has been increasingly questioned due to the increasing gap in book value, as reflected in the annual financial statements, and market prices of equity, obtained from stock markets. A large body of finance and accounting research has emerged attempting to test whether book values are related to market values of firms.

The underlying assumption of the value relevance of financial statement information is that the accounting process generates financial information which reflects the performance and financial position of the firm, which should be reflected in the share price, assuming that such information is both useful and relevant to investors attempting to estimate share prices. The Ohlson (1995) model develops an accounting based valuation model which incorporates both accrual earnings and book value of assets.

This chapter explores valuation theory, reviews the conceptual foundation of the Ohlson (1995) model, and evaluates its applicability to the Johannesburg Securities Exchange. Previous empirical findings of value relevance studies performed by different researchers in different capital markets using the same model are also summarized. The chapter also explores the dynamics of the South African economy, and the characteristics of the Johannesburg Securities Exchange, as well as the informational integrity of the annual financial statements in a continually changing regulatory environment. The chapter concludes with a summary of the key issues raised.

2.2 Valuation theory

Although there are a large number of valuation models and methods, all rely significantly on an element of judgment (determination of an asset beta, discount rate, etc), and are therefore by nature, highly subjective (Piotroski, 2000). The value placed

on a company will therefore vary depending on the assumptions made with respect to such elements. Analysts therefore often utilize a mix of approaches to estimate value, and valuation techniques may be personalized according to the style and tastes of individual analysts, such as in Luehrman (1997).

2.2.1 Fundamental analysis

The fundamental valuation techniques discussed in this section include discounted cash flow, book value of assets, and earnings multipliers (Abarbanell and Bushee, 1997; International Valuation Standards, 2005). The most theoretically acceptable valuation method is the discounted cash flow method, which involves discounting the future cash flows (such as dividends, earnings, and terminal values) that the share will bring to the investor in the foreseeable future back to present value (Abarbanell and Bushee, 1997). The appropriate discount rate takes into account all the sources of finance which the company uses, and normally includes a premium for risk. Risk premiums are calculated using a model such as the capital asset pricing model, dividend growth model, or using a suitable surrogate (Abarbanell and Bushee, 1997).

Although attractive from a theoretical perspective, the discounted cash flow approach does have a number of limitations. Examples of such limitations include the difficulty of obtaining reliable and accurate cash flow forecasts, difficulties associated with determining a terminal value occurring some time in the future, and with determining an appropriate discount rate (Correia, Flynn, Uliana, and Wormald, 2003). The determination of the discount rate involves the quantification of the risk profile of the business, and is subject to the shortcoming associated with any models used to do so, such as the capital asset pricing model (Brealey and Myers, 2003). Such limitations are particularly difficult to overcome in the valuation of minority interests, where information is difficult and expensive to obtain (Brealey and Myers, 2003).

The second fundamental valuation technique is the book value approach. Use of this method involves analyzing the assets and liabilities of the firm, obtaining a market value for each of the assets, and then subtracting the market value of all liabilities (Brealey and Myers, 2003). The result is the net book value of the firm. This type of valuation is typically used where a company has underlying assets which are easy to

value, such as an investment holding company, unit trust, or where assets are listed on a stock market, where market values are easily obtainable (Brealey and Myers, 2003). The book value technique provides a terminal value, rather than an ongoing operations value as obtained from the income valuation method, or stated otherwise, this method does not take into account the future earnings potential of the firm. The technique also requires a market value to be obtained for all assets. For many assets an active market does not exist to obtain such values. Furthermore, technological change can often result in new assets not being comparable to old ones for the determination of asset value.

The presence of significant intangible assets, which are difficult to value, such as intellectual capital, brand names, and knowledge bases, also detract from the use of this technique (Abarbanell and Bushee, 1997). Such assets are generally unique, difficult to identify and define, and the cash flows associated directly with these assets are difficult to determine (many such assets are internally generated rather than purchased). IAS 38 (2004) paragraph 51 only allows recognition of such assets where future economic benefits are identifiable, and can be measured reliably. IAS 38 (2004) also provides detailed guidance on specific intangibles prior to allowing recognition (business combinations, internally generated goodwill, research and development, brands, mastheads, publishing titles, and customer lists). In general therefore, only purchased or quantifiable cash costs are capitalized as assets and disclosed in the financial statements. The book value technique (on its own) is therefore useful only in a limited number of applications.

Valuations using listed stock market prices rely on the efficient market hypothesis, a large volume of transactions (liquidity) within the market, and suggests that the listed price approximates fair value. Studies on behavioral finance and technical analysis invalidate the efficient market hypothesis, and care should therefore be taken in reviewing the assumptions when using the book value approach (Abarbanell and Bushee, 1997).

The third method is the earnings multiplier approach. This approach requires the determination of a price earnings or similar multiplier, which is estimated using the price earnings ratio of similar listed firms, and then adjusting for peculiarities of the

firm being valued to compensate for differences in structure and risk profile (Brealey and Myers, 2003). The multiplier is then applied to sustainable accounting based earnings to determine the value of the firm (Brealey and Myers, 2003). Although widely used in practice, the earnings multiplier approach is theoretically weak, as it relies on two variables which are expected to summarize a complex firm, and is subject to a large amount of judgment (Piotroski, 2000). The determination of the multiplier in particular is fraught with danger, as small changes in the multiplier will have material affects on the estimated value (Piotroski, 2000).

The earnings multiplier approach does not suffer from the same limitations as the discounted cash flow approach, as the information required to perform the calculations is relatively easy to obtain, and the calculation thereof is relatively straightforward. The level of judgment required by the method can however lead to large fluctuations in the price range as assumptions are challenged, thereby making the method less attractive (Brealey and Myers, 2003).

The Ohlson (1995) model uses book value of assets, earnings, and a measure of other information to estimate the value of a firm. In the context of fundamental analysis, the model uses a combination of the principles of the discounted cash flow approach, and the book value of assets method. The model achieves this by using book value of assets as a surrogate for the normal earnings portion of the business, but recognizes that any additional future earnings, denoted by abnormal earnings, will add additional value to the firm, and therefore adds this to the book value of assets. The model is therefore based on fundamental analysis principles, although it does not preclude the inclusion of technical analysis principles in the specification of the other information variable, which is discussed next.

2.2.2 Technical analysis

Technical analysis disputes the efficient market hypothesis, and instead suggests that deviations from the fair price, as determined using methods such as those described under fundamental analysis, are common and often material (Lo, Mamasky, and Wang, 2000). Thus, in addition to fundamental economic criteria, market criteria also have to be taken into account. Valuing a company therefore requires not only an

estimation of its fair value, but also the determination of its potential price range, taking into account market behavior (defined below).

Charting or technical analysis is the use of numerical series generated by market activity, such as price, volume traded, and open interest, to predict future trends in that market (Lo, Mamasky, and Wang, 2000). The techniques can be applied to any market with a comprehensive price history. Technical analysis does not attempt to analyze the financial data of a company, such as cashflows, dividends, and projection of future dividends; because of this lack of fundamental analysis, technical analysis is controversial and described by critics as looking into a crystal ball (Lo, Mamasky, and Wang, 2000).

The biggest advantage of technical analysis occurs when combined with fundamental analysis. Technical analysis is essentially attempting to time the market once fundamental analysis has identified a good or bad firm (depending on whether you are considering going long or short). While technical analysis is widely used by both professional and amateur traders as a means of predicting future market moves, it is generally not used by economists in any academic sense (Lo, Mamasky, and Wang, 2000).

Technical analysis implicitly rejects the efficiency of the market as understood in the efficient market hypothesis. That is, using technical analysis on a particular market implicitly assumes that the market is not efficient, as defined by the efficient market hypothesis (Lo, Mamasky, and Wang, 2000). The efficient markets theories argue that existing prices reflect all available information, and that future price movements will follow a path that will approximate a random walk as they adjust to new information as it emerges (Lo, Mamasky, and Wang, 2000). The theories further assume that all participants in the stock market have equal and instantaneous access to all information that might affect securities.

Technical analysts believe that by analyzing securities price histories, they can anticipate future buying and selling events. The assumption is that there is useful information hidden within price histories, and that technical analysis is a way of

analyzing the past actions of the people participating in a particular market, as reflected by their actual transactions (Lo, Mamasky, and Wang, 2000).

Lo, Mamasky, and Wang (2000), investigate a systematic approach to technical pattern recognition using nonparametric kernel regression to evaluate the effectiveness of technical analysis. The study compares unconditional empirical distributions of daily share returns to the conditional distributions (conditioned using technical indicators), and finds that several of the technical indicators do provide incremental information and may therefore have practical value. The result is qualified so as not to imply that technical analysis can be used to generate excess trading profits, but rather raises the probability that technical analysis can add value to the investment process.

Holthausen and Larcker (1992) describe behavioral finance as an application of scientific research on human and social cognitive and emotional biases to better understand economic decisions and how they affect market prices, returns and the allocation of resources. Behavioral finance is primarily concerned with the rationality, or lack thereof, of economic agents. Behavioral models typically integrate insights from psychology with neo-classical economic theory. Behavioral analyses are mostly concerned with the effects of market decisions, but also those of public choice, another source of economic decisions with some similar biases.

Kahneman and Tversky (1979) used cognitive psychological techniques to explain a number of documented anomalies in rational economic decision making. Key observations made in their study included the lack of symmetry between decisions to acquire or keep resources, colloquially called the " bird in the bush" paradox, and the strong loss aversion or regret attached to any decision where some emotionally valued resources (e.g. a home) might be lost. Genesove and Mayer (2001) attributed the manifestation of loss aversion in investor behavior as an unwillingness to sell shares or other equity, if doing so would force the trader to realize a nominal loss.

As behavioral finance implicitly rejects the efficient market hypothesis, it should come as no surprise that the greatest critics are the proponents of the efficient market hypothesis, such as Fama and French (1993), who contend that behavioral finance is

more a collection of anomalies than a true branch of finance, and that these anomalies will eventually be priced out of the market, or explained by market microstructure arguments. Fama and French (1993) however distinguish between individual biases and social biases; arguing that the former can be averaged out by the market, while the latter can create feedback loops that drive the market further and further from the equilibrium price. Freeman and Davidson (1999) provide a specific example of this criticism when discussing the equity premium puzzle. It is argued that the puzzle simply arises due to entry barriers (both practical and psychological) which have traditionally impeded entry by individuals into the stock market, and that returns between shares and bonds should stabilize as electronic resources open up the stock market to a greater number of traders.

The Ohlson (1995) model does not attempt to time the market, and therefore does not incorporate the principles of technical analysis or behavioral finance. However, technical analysis and behavioral finance could use the Ohlson (1995) model as a base to determine the fair value of a share, and then use charting principles and share histories to time the market. When using the Ohlson (1995) model, any technical or behavioral effect will be evidenced in the error term, and the level of model fit using the coefficient of determination (R^2) if not incorporated in the other information variable.

Due to the subjective nature of valuation theory, a committee was established by the International Accounting Standards Board (IASB), and constituted as the International Valuation Standards Committee. The committee was charged with developing a set of International Valuation Standards, to be used as a guide in the valuation of assets to ensure they meet with the requirements of the official pronouncements of the IASB. The guide aims to assist practitioners in developing consistent and comparable valuations for use in reported financial information. Furthermore, the guide was developed in light of the growing signs that the accounting and auditing professions will require valuations under International Valuation Standards in order to achieve consistent and rigorous application of the International Accounting Standards, and comparability across borders.

2.3 International Valuation Standards

The International Valuation Standards (2005), as adopted by the South African Institute of Chartered Accountants (SAICA), provides a guideline for the valuation of businesses for the purpose of the preparation of financial statements, although the standard does not preclude the use thereof for the purposes of determining acquisition or disposition of business interests, mergers, valuation of shareholder ownings, and the other similar transaction (International Valuation Standards, 2005). The standard provides three approaches for valuing a firm, recommending that two or more of the methods are reconciled to conclude on the final determined value.

The first valuation method suggested by the standard is a sales comparison approach, which requires the comparison of the business to be valued to other similar businesses, business ownership interests, or securities that have been sold in an open market. The standard requires the businesses to be in the same industry, and subject and responsive to the same economic variables (International Valuation Standards, 2005). The second approach suggested by the standard is the income capitalization approach, which calculates the present value of anticipated income or benefits in view of their expected growth, timing, and risk profile (International Valuation Standards, 2005). This method converts income into an indication of value either by means of direct capitalization of a representative income level, or by a discounted cash flow analysis, or dividend method, in which case receipts are estimated for a sequence of future periods and discounted to the present using an appropriate discount rate (International Valuation Standards, 2005). The third method suggested by the standard is an asset based approach, which examines the balance sheet of businesses. This approach is only suggested where businesses report both tangible and intangible assets and all liabilities at market value. The standard cautions the use of this method when valuing going concern businesses, suggesting that this method be compared with at least one other method before concluding on a value (International Valuation Standards, 2005).

All three of the suggested valuation methods therefore fall into the fundamental valuation category, where the first valuation method represents a straight comparison between two companies, and includes a comparison using financial ratios such as

price earnings multipliers (although the standard does caution the use of this method and provides a number of approach guidelines), the second would fall under the discounted cash flow category, and the third under the book value of assets category (International Valuation Standards, 2005).

The standard also includes a separate section on the use of financial statements. The standard suggests that an understanding of the relationships that exist in the income statement and balance sheet be obtained. This should include an analysis of trends to assess the risk inherent in the business operations, and to determine the prospects for future performance (International Valuation Standards, 2005). The standard further suggests comparison with similar businesses, as well as adjustment of the historic financial statements to estimate economic abilities of, and prospects of the firm (International Valuation Standards, 2005). The standard suggests that the financial statements be analyzed in terms of monetary value, percentages, and financial ratio analysis to aid in understanding the economics of the business, and identify the risks to which it is exposed (International Valuation Standards, 2005).

The inclusion of an analysis of the financial statement in the valuation standard recognizes the importance of the financial statements in determining market value, and is of particular interest to the objective of this study, as it attempts to determine whether a relationship exists between the accounting book values as published in the financial statements and the share price.

The standard also suggests that the financial statements be adjusted in certain circumstances with common adjustments, to closer approximate the economic reality of the income statement and balance sheet. Adjustment is considered appropriate where the adjustments would be relevant and significant to the valuation process, and includes adjustments to obtain revenues and expenses for continuing operations, to achieve consistency in treatment to allow comparison, to adjust from reported values to market values, to adjust for non-operating assets and liabilities and related incomes and expenses, to adjust for non-economic revenue and expenses, elimination of non recurring events, elimination of non-essential personnel costs, and non-essential assets, or redundant assets (in certain circumstances only), and adjustments for different methods of inventory accounting (International Valuation Standards, 2005).

Such adjustments are considered to be beyond the scope of this study, but should be borne in mind in developing future research areas attempting to include all factors in determining firm value, and in specifying the other information variable further.

Although the standard is of interest from a methodological perspective, it does not bind analysts or fund managers to the use of the principles and methods therein; it is instead intended to provide guidance to ensure consistent treatment for disclosure purposes, of investments in the financial statements (International Valuation Standards, 2005). The contents of the standard are, however, useful in specifying the independent variables in the Ohlson (1995) model, particularly with respect to the other information variable.

2.4 Valuation research and value relevance

Value relevance research examines the association between accounting information, as disclosed in the financial statements, and market values of shares. This suggests testing whether financial statement information explains cross-sectional or time series variation in share prices. For the most part, valuation models that form the basis for tests in the value relevance literature are developed in terms of the level of firm value as measured by the share price (Miller and Modigliani, 1961; Ohlson, 1995). Examining changes in share prices, or returns, is an alternative approach to assessing value relevance, where the precise specification of the valuation equation depends on the model adopted, such as Ohlson (1995). Examining changes involves the elimination of the unit root of the price, and investigating the change in share price, rather than the total share price. Selection of which approach to use depends on the nature of the study performed.

Barth, Beaver and Landsman (2001) describe the key distinction between the two main streams of value relevance studies; being either examining price levels, or examining price changes, or returns. According to Barth, Beaver and Landsman (2001), the former attempts to determine what is reflected in firm value, and the latter in determining what is reflected in changes in value over a specific period of time. Thus, if the research question involves determining whether the accounting amount is timely, examining changes in value is the appropriate research design choice, whereas

if the research question attempts to determine price levels which do not involve timelines, then the examination of absolute price is more appropriate. In this research report, the first method (measuring the level of firm value) is used, although by using panel data, the time series effects are also analysed, and therefore the effect of changes in prices are also reflected in the statistical outputs. The model design and data however reflect firm value.

The distinction between research of share prices and price change approaches is an important one. Although both approaches address related, but different questions, failure to recognize these differences could result in drawing incorrect inferences. Barth, Beaver and Landsman (2001) provide an example of two such similar studies performed in Australia, using papers by Easton, Eddey, and Harris (1993) and Barth and Clinch (1998). Both papers address the value relevance of asset revaluations under Australian Generally Accepted Accounting Principles. Both studies find a significant association between the level of revaluation reserves and share prices, but a weak association between the change in the valuation reserves and returns. It is noted that Australian GAAP permits considerable discretion in the timing of revaluations. The result is that Easton, Eddey, and Harris (1993) appropriately conclude that asset revaluations are value relevant but not timely. Barth et al (2001) conclude that had the asset revaluation studies only estimated returns specifications, they might have concluded erroneously that asset revaluations are not value relevant.

2.4.1 Value relevance

Barth, Beaver and Landsman (2001) describe value relevance in the context of valuation research, by discussing how well the chosen variable reflects information used by equity investors. When using accounting information, it is suggested that the primary focus of financial statements is equity investment, and that other uses of financial statement information, such as contracting, do not diminish the importance of value relevance research.

A more specific definition of value relevance is submitted by Barth et al (2001) as to whether there is a predictive association between the estimated variables and equity market values. Although the literature examining such associations extends back over

30 years (Miller and Modigliani, 1961), the first study identified by Barth et al (2001) for the term "value relevance" to describe this association is Amir, Harris, and Venuti (1993).

Value relevance requires that both the relevance, and the reliability criteria are met before it can be concluded that there is an empirical association. The variable will therefore only have a predicted significant relation with share prices if the amount reflects information relevant to investors in valuing the firm, and is measured reliably enough to be reflected in share prices. An accounting amount only is relevant to a financial statement user if it is capable of making a difference to that user's decisions.

As the Ohlson (1995) model uses book values of assets and earnings obtained from the financial statements, the accounting standards which govern such financial statements need to be considered. Barth (2000) discusses the conceptual framework in this context, noting that the standards state that information does not have to be new to a financial statement user to be relevant. An important role of an accountant is therefore to summarize or aggregate information that may be available from other sources. It is further noted by Barth (2000) that the concepts of value relevance and decision relevance differ. In particular, accounting information can be value relevant but not decision relevant if it is superceded by more timely information. Value relevance tests are joint tests of relevance and reliability. Although finding value relevance indicates the accounting amount is relevant and reliable, at least to some degree, it is difficult to attribute the cause of lack of value relevance to one or the other attribute. Barth (2000) further suggests that neither relevance nor reliability are dichotomous, and that the conceptual framework does not specify how much relevance or reliability is sufficient to meet the stated criteria.

In discussing the purpose of value relevance research, Barth (2000) states that although findings from the value relevance literature often have implications for issues of interest to non-academic constituents, value relevance studies typically do not draw normative conclusions, or make specific policy recommendations. In fact, several studies explicitly provide caveats that policy inferences cannot be drawn. For example, Barth (1991 : 436) states, "The focus in this research is on relevance and reliability of the alternative measures for investors' use. The definitions of relevance

and reliability are complex and judgmental, and may not be fully captured in their operationalization in the research design". Value relevance studies do not therefore attempt to estimate the value of a firm, as is the objective with fundamental analysis research, the focus is rather on whether particular accounting amounts are value relevant, and therefore useful as a base in determining firm value using fundamental analysis research.

Although both types of studies use share prices as a valuation benchmark, their differing objectives result in testing different hypotheses and using different specifications of the equations. In fundamental analysis studies, estimating equations include all variables that can help explain current or predict future firm value, including those not yet reflected in financial statements. For example, fundamental analysis research is not concerned with whether information relevant to valuing the firm appears in financial statements or can otherwise be obtained. In value relevance studies, estimating equations selectively include accounting variables to learn about the valuation characteristics of particular accounting amounts.

This study uses a valuation model that is based on Ohlson (1995) model, and its subsequent refinements (Feltham and Ohlson, 1995; Feltham and Ohlson, 1996; Ohlson, 1998; Ohlson, 2001). The Ohlson (1995) model presents firm value as a linear function of book value of equity and the present value of expected future abnormal earnings. With additional assumptions of linear information dynamics, firm value can be re-expressed as a linear function of equity book value, net income, dividends, and other information. Ohlson (1995) shows that balance sheet-based and earnings-based valuation models represent the two extreme cases resulting from limiting assumptions regarding the persistence of abnormal earnings.

2.5 Valuation research in South Africa

Although a large body of empirical valuation research performed in South Africa on the Johannesburg Securities Exchange exists, there is no known literature applying the Ohlson (1995) or similar accounting based value relevance studies. The body of work discussed below does however provide insight into the environment in which the Johannesburg Securities Exchange operates, and identifies peculiarities of the market

that should be borne in mind before applying such a value relevance model. The literature also identifies some interesting future research areas which could be further explored, by combining the Ohlson (1995) model with other studies performed.

Bradfield and Swartz (2001) investigate the persistence of unit trust performance in South Africa, replicating a study by Meyer (1997). The paper examines the persistence of fund performance over consecutive years, and finds evidence of fund performance persistence, which is evidenced by consistently superior performance by the top performers. The study however notes that the persistence of poor performers is not proved. Although the study does not address value relevance directly, it does provide evidence suggesting that fund managers with significant skills, who would be utilising some form of valuation methodology to pick shares, are able to systematically outperform their peers, and therefore that valuation models are being utilised successfully in the market.

Beeson, Sutherland and Ford (2004) evaluate how the assessment of management by investment analysts and fund managers impacts on their determination of value in making investment decisions. They concluded that the assessment of managers of a company plays a critical role in making investment decisions. Their study attempts to determine the level at which human capital assets and management are incorporated into investors' valuation models. The paper emphasizes the need for an accounting based valuation model to address the financial aspects of the valuation, such as the model suggested in this research report, which is to be integrated with intellectual capital measurements, such as the Value Added Intellectual Coefficient (VAIC^{TM}) (Pulic, 1998), or the balanced scorecard developed by Kaplan and Norton (1996).

Negash (2002) focuses on a group of variables to establish a multivariable index for intangibles. Using Johannesburg Securities Exchange data, the paper examines whether intangibles are priced by the stock market. It examines five latent variables: investments in tangibles assets (example: cash, bricks and mortars); investments in intangibles (knowledge / intellectual capital, brand, patent, etc.); earnings and payout; liquidity and leverage; and a fifth latent variable for control purposes. The paper concludes that market (price) to book ratio over two time periods is explained by changes in buy-sell spreads. The changes in the buy-sell spreads were correlated with

the indicators of intangibles. The model investigated in this research report could include such intellectual capital variables as part of the other information specification. Such effects will be reflected in the error term, as incorporating the effects of intellectual capital is considered to be outside the scope of this study.

Valuation studies on the Johannesburg Securities Exchange include Firer, Sandler and Ward (1992), who conduct an empirical investigation highlighting the extent to which successful market timing can potentially enhance portfolio performance, while Bradfield (1998) extended this line by reviewing the application of the Bhattacharya and Pfleiderer (1983) model which allows the separation and measurement of selection and timing skills of fund managers in attempting to measure the abilities of South African fund managers to select and time the market. The study concludes that there exists no positive share selection or timing ability among South African fund managers. Although of interest in the specification of the other information variable, such timing issues are considered to be beyond the scope of this research report.

A branch of research attempting to price risk on the Johannesburg Securities Exchange using the capital asset pricing model, cluster analysis, and more complex multi-parameter models such as those derived from the arbitrage pricing theory includes Bowie and Bradfield (1993), Ward (1994), Page (1989), Biger and Page (1993), Van Rensburg and Slaney (1997), and Van Rensburg (1998). The papers do not reach consensus on the exact form of these multi-factor models, but do agree that multi factor models may be superior in pricing risk. Such studies may provide an interesting combination when used with the Ohlson (1995) model in determining a risk adjusted share price. The Ohlson (1995) model includes a measure of risk when determining the level of abnormal earnings. Normal earnings are determined by discounting the book value of the companies' assets, less long term liabilities, by the weighted average cost of capital (using the price earnings ratio as a surrogate). Abnormal earnings then represent any shortfall or excess over the reported earnings, and the normal earnings calculated.

In a paper discussing market segmentation on the Johannesburg Securities Exchange, Van Rensburg and Slaney (1997) suggest that the market is clearly segregated into different sub markets, and therefore the use of a multi-market model, where different

categories of the market with distinctly different attributes are separated out and analysed separately, would be more appropriate. The same argument can be applied to the use of the Ohlson (1995) model.

In analysing the beta of shares on the Johannesburg Securities Exchange, Campbell (1979) found that individual share Betas' were more stable when measured against the respective sector indices than with the market as a whole, and consequently proposed that a different securities market line existed for each sector, with each sector therefore being a separate market, thereby supporting the use of industry identifiers when applying predictive models.

In a study investigating beta estimates, Bradfield (1989) highlights the pervasiveness of thin trading on the Johannesburg Securities Exchange, while Bowie and Bradfield (1998) show that betas of individual firms are typically exposed to large estimation errors. Although this research report does not use beta estimates, it does use the price earnings ratio as a proxy for weighted average cost of capital, which includes a risk component. The presence of thin trading on the results of the output using the price earnings ratio will be borne in mind when interpreting results.

2.6 The Ohlson (1995) model

Ohlson (1995) develops a residual income valuation model using future earnings, book values and dividends, using the dividend discount model as a starting point. Feltham and Ohlson (1995, 1996) extend this work, highlighting the effects of biased accounting for net operating assets. Numerous empirical works have subsequently been published testing and extending these models in different environments.

Ohlson (1995) and Feltham and Ohlson (1995, 1996) rely on the dividend discount model, which states that a firm's equity value is equal to the present value of expected dividends discounted at the risk free rate of return:

$$P_t = \sum_{\tau=1}^{\infty} R^{-\tau} E_t[d_{t+\tau}] \quad (1)$$

Where:

P_t = value of the firm's equity at date t

R = discount rate

d_t = dividends, net of capital contributions at date t

E_t = the expected value operator conditioned on the date t information

This model assumes the clean 'surplus' relation, which states that dividends paid displace market value on a Rand for Rand basis:

$$bv_t = bv_{t-1} + x_t - d_t \quad (2)$$

where:

bv_t = Company book value at time t,

x_t = earnings for period t,

d_t = dividends for period t.

The clean surplus relation and (1) can further be restated by ruling out infinite growth in book value, implying an accounting based expression for equity value, sometimes referred to as the residual income valuation model:

$$P_t = bv_t + \sum_{\tau=1}^{\infty} R_f E_t[\tilde{x}^a_{t+\tau}] \quad (3)$$

where abnormal earnings (residual income) is defined as:

$$\tilde{x}^a_t \equiv x_t - (R_f - 1)bv_{t-1} \quad (4)$$

Abnormal earnings are therefore equal to earnings less a charge for capital. This is motivated by the concept that normal earnings are normal return on capital invested. This is calculated as the net book value at time t-1, minus a charge for the use of the capital, which is determined by multiplying by the interest rate. Any earnings in excess of normal earnings are therefore abnormal earnings.

Equation (3) therefore interprets firm value as the book value of the assets, adjusted for the present value of the anticipated abnormal earnings. This further suggests that the difference between the book value and market value of a firm is equal to the present value of the abnormal earnings, in line with the clean surplus paradigm which requires the inclusion of a "clean" X_{it}.

The third assumption made by the Ohlson (1995) model concerns the time value behavior of normal earnings. The information dynamics are formulated by adding two variables to the specification, abnormal earnings $x_t^{\sim a}$, and information other than abnormal earnings, v_t, which is yet to have an impact on the financial information available.

$$x^{\sim a}_{\tau+1} = \omega\, x^{a}_{\tau} + v_t + \acute{\varepsilon}_{1\,t+1} \qquad (5a)$$

$$v_{t+1} = \gamma v_t + \acute{\varepsilon}_{2\,t+1} \qquad (5b)$$

where the disturbance terms $\acute{\varepsilon}_{1\ t+1}$ and $\acute{\varepsilon}_{2\ t+1}$ are unpredictable, with zero mean variables. The parameters of the process ω and γ are fixed and known.

Ohlson (1995) combines equation (3) with (5a) and (5b), and yields a linear solution for P_t:

$$P_t = bv_t + \alpha_1 x^a_\tau + \alpha_2\, v_t \qquad (6)$$

where:

$$\alpha_1 = \omega / (R_f - \omega) \qquad (7)$$

$$\alpha_2 = R_f / (R_f - \omega)\,(R_f - \gamma) \qquad (8)$$

Equation (6) implies that the market value is equal to the book value of the firms assets, adjusted for abnormal earnings and other information that modifies the prediction of future profitability. The model therefore elegantly incorporates accounting variables from other valuation models such as the earnings capitalization model (abnormal earnings), Gordon's growth model (dividends), as well as the principles discussed by Modigliani and Miller (1961).

The discount rate used in the Ohlson (1995) model thus far has been the risk free rate, and therefore based on risk neutrality. The model can be modified to introduce risk in the anticipated dividend sequence. One possible approach suggested is replacing R_f with some factor ρ, which adjusts R_f for risk by introducing a risk premium. The risk premium will be determined by the company's cost of capital or the expected market return determined from models such as the capital asset pricing model (CAPM), which implies that $\rho = R_f + \beta$ (expected return on market portfolio – R_f). This approach has been criticized as being empirically inadequate by Fama and French (1996), arguing that Beta's do not explain average return, or size [using market capitalization]. They further criticize CAPM for being a single factor model, where Beta is required to be the only element for explaining expected returns. Bowie and Bradfield (1998) investigated beta stability on the JSE, and found that thinly traded environments such as the JSE caused distortions in the measure of stability of beta coefficients. Van Rensburg and Robertson (2003) in a similar study find an unambiguous empirical contradiction of the CAPM. The literature therefore suggests that the use of CAPM in a South African context is unlikely to be suitable.

Fama and French (1992) suggest using variables such as price earnings (PE), and cashflow to price as a surrogate for the discount rate. The use of PE is further supported by Cheng and McNamara (2000), arguing that the PE ratio captures the risk and growth of companies. Cheng and McNamara (2000) further suggest the use of the price to book (PB) ratio as a surrogate for discount rate. The study finds that the PE method provides stronger evidence than the PB, and further that a combined PE-PB provides the best definition.

Feltham and Ohlson (1995, 1996) extend the Ohlson (1995) model by introducing the difference between financing and operating activities, and by introducing aspects relating to the integrity of conservative accounting information in valuing a company. Financing activities involve assets and liabilities for which there are relatively perfect markets, and therefore book value equals market value. Operating assets and liabilities typically, however, are not readily individually traded in perfect markets, thus to measure their value, cash flows adjusted for accruals are required. The difference

between the book value and the market value of operating assets therefore represents the value of intangible assets.

The Ohlson (1995) model incorporates Miller and Modigliani's (1961) basic concept regarding debt, where the company's borrowing or lending activities yield zero net present value as they are financial assets. The company's equity value, therefore, equals the value of financial assets plus the value of the operating activities. In valuing operating earnings, the cash flow concept adjusts operating earnings for accruals, yielding operating cash flows. The additional adjustments required by Feltham and Ohlson (1995, 1996), therefore, determine the long term and short run expected growth in operating assets, which is not included in the accounting information due to conservative accounting practices.

The Ohlson (1995) model has gained popularity in value relevance research, as using the clean surplus relation, it brings both bottom line items of the financial statements (total profit and net total assets) into the valuation. The model therefore provides credibility to the financial statements as being value relevant.

2.7 Empirical history

Stober (1999) reviews the application of the Ohlson (1995) and Feltham and Ohlson (1995, 1996) valuation models, and considers the directions that such valuation models are likely to take in the future. The paper discusses the implications of the promise of a suitable point of departure for such empirical works. The paper concludes that the collective models provide a rigorous conceptual foundation for regressions of equity values using earnings and book values of assets, and, therefore, provides a point of departure for empirical work. The paper further emphasizes the need for close attention to specification issues when dealing with the other information variable *v*.

Ohlson (1998) further discusses the specification of the other information variable *v*. The paper emphasises the crucial role of this variable in predicting the next period's abnormal earnings. While *v* is not directly observable, the paper illustrates how it can be inferred from expectations of future abnormal earnings. Specification issues are

discussed further still by Ohlson (2001), addressing residual income and the concept of other information, and their importance as specifications. The paper emphasises the need for the other information variable, arguing that current residual income is unlikely to substantially explain goodwill, and should therefore be included. The paper suggests the following valuation model which includes future earnings as a predictor of other information.

$$P_t = bv_t + (\alpha_1 - \omega\alpha_2)x_t^a + \alpha_2 Et(x_{t-1}^a) \quad (9)$$

Hand and Landsman (1998) take a different view on the other information specification. Their empirical tests set *v* at zero, and split net dividends into cash dividends and other capital flows (share repurchases and issuances). Their studies conclude that including cash dividends is consistent with information theories of dividends, where dividends signal future profitability, and therefore act as a surrogate for *v*.

Collins, Pincus and Xie (1999) discuss the valuation of firms which report losses, addressing the anomaly of negative price earnings relations for these firms. The paper uses the book value of equity in the specification to eliminate the negative relation. They further examine the importance of book value as a control for scale differences, a proxy for normal earnings, and as a proxy for loss firms abandonment option. Their results support using book value as a value relevant proxy for expected future normal earnings for loss firms in general. The paper uses the Ohlson (1995) valuation model as a base, and adjusts the equation by using normal earnings x_t instead of abnormal earnings x_t^a, and as a result of this change uses beginning of the year book value bv_{t-1} to avoid double counting of earnings. The following model was derived:

$$(p_t + d_t) = \delta_0 + \delta_1 x_t + \delta_2 bv_{t-1} + \varepsilon_{t*} \quad (10)$$

where δ_0 is an intercept, δ_1 and δ_2 are regression co-efficients, and ε_{t*} is an error term. The result is that the unspecified "other information" variable v_t from the Ohlson (1995) model is removed, and replaced with an intercept term and an error term. The intercept allows for non zero mean pricing effects of the omitted other information, which becomes part of the error term.

Garrod and Rees (1998) use the Ohlson (1995) model to determine the value of international expansion. Their analysis reveals that earnings and net assets are more highly valued for multinational firms than for domestic firms, and also that there is no clear difference between the valuation of domestic and multinational earnings and net assets. The result therefore indicates that the apparent superiority of multinational firms is not restricted to their multinational operations. The study is restricted to UK firms during the period 1991-1996. The only anomaly from the results above was that the US appears to be more highly valued than other areas of operation.

Cheng, Hwang and Merchant (2000) perform a study on the effectiveness of using Economic Value Added (EVA) for firm valuation. The study focuses specifically on the Stern Stewart Generally Accepted Accounting Practice's (GAAP) adjustments to evaluate how effective these are in improving the accounting information for valuation purposes. The paper concludes that EVA based measures are superior to GAAP based measures in predicting firm value for more than 70% of their sample. The study further examines the value relevance of the alternative measures, and concludes that on average, that EVA based book value and residual income measures are less value relevant than those of GAAP, indicating that the first result does not therefore imply that the EVA approach is more value relevant.

Recent studies using the Ohlson (1995) model have used different forms of the valuation equation for predictions. Studies by Amir (1996), Amir and Lev (1996) and Collins, Maydew, and Weiss (1997) use equation (6) in the form:

$$P_{it} = \alpha_1 bv_{it} + \alpha_2 x_{it} + e_{it}$$

where i is a firm subscript for cross sectional estimation. The model therefore ignores both dividends and other information.

Studies incorporating dividends include Amir (1993) and Louder, Khurana, and Boatsman (1996) in the form $P_u = b_1 bv_{it} + b_2 x_{it} + b_3 d_{it} + e_{it}$, although in Amir (1993) the dividends are eliminated by the clean surplus relation in their final empirical model.

Amir and Lev (1996) use Equation (6) in determining the value relevance of financial and non-financial information for cellular telephone companies. They conclude that, on a stand alone basis, earnings and book values do not explain share prices, but that non-financial indicators such as total population in a service area, and market penetration are highly value relevant. This suggests that application of the model should be performed on an industry specific basis.

Lev and Sougiannis (1999) attempt to explain the increasing gap in the book to market ratio by regressing research and development in science-based companies in an attempt to quantify the future abnormal profits of these companies. They conclude that there is a significant association between research and development expenditure and the book to market ratio in these firms, suggesting that the book to market ratio reflects the non-recognition of internally generated intangibles in the form of goodwill. Although of interest to the nature of the companies, the study emphasizes that the result cannot be extrapolated to non-science companies.

Brief and Zarowin (1999) use Ohlson (1995) in a cross sectional study using New York stock exchange data over a twenty year period from 1978 to 1997. Although the primary purpose of their research is the comparison of the value relevance of book value and dividends versus book value and reported earnings, an interesting aside is that the value relevance of accounting data over time in developed markets declined in the period analyzed. The study suggests that this may be due to the changing firm characteristics within the market studied, where the profile of the market has changed from being industrialized to being a more high tech service oriented economy, and therefore being more intangible intensive.

In a similar study performed in an emerging market setting using data from China, Bao and Chow (1999) find an increase in the value relevance of both earnings and book values. The apparent contradiction with the results of Brief and Zarowin (1999) is attributed to the fact that emerging markets are subject to rapid capital development, and therefore that the markets characteristics are different from those of the developed market's studied by Brief and Zarowin (1999).

Collins, Maydew and Weiss (1997) investigate the systematic changes in the value-relevance of earnings and book values over time. They find that the combined value-relevance of earnings and book values has not declined over the past forty years and, in fact, appears to have increased slightly. This result was criticized by Brown, Lo and Lys (2000), interpreting their results as being the consequence of an upward bias in their coefficient of determination (R^2).

In an unpublished Master of Commerce research report from the Department of Accounting of the University of Cape Town, Woldegabir (2004) finds that the value relevance of accounting data in South Africa has increased across the period 1993-2002, using data from the Johannesburg Securities Exchange Industrial Sector, concluding in line with Bao and Chow (1999). Although the research report is based on the Ohlson (1995) model, it only tests book value of assets and accrual earnings, and does not include dividends or any other surrogate for the other information variable.

The literature indicates a number of successful value relevance studies have been performed in different markets, using different forms of the Ohlson (1995) model. Although the literature indicates conflicting results as to whether there is an increasing or decreasing trend in the value relevance of accounting data, none of the studies disprove that a relationship exists. Although the presence of an increasing or decreasing trend does not affect the relevance of this study, the relationships detected will be borne in mind when interpreting the results.

The literature also emphasizes that care should be taken in the specification of the other information variable v_t. This study follows the approach of Hand and Landsman (1998) and Garrod and Rees (1998), using cash dividends as a surrogate for other information variable.

2.8 Market efficiency

Previous studies applying the Ohlson (1995) model in developed markets are silent on market efficiency, and appear to make inferences based on the implicit assumption

that the stock market is efficient in the semi-strong form. In an emerging market setting, concerns regarding the effect of the market not efficiently processing information are more pronounced. This raises the doubt as to whether the Ohlson (1995) model can be applied should the market be inefficient. Such concern is well described by Holthausen and Watts (2000), who identify the above reliance on market efficiency, asserting that in order to interpret the evidence from value-relevance studies as communicating anything regarding the relevance and reliability of some component of a financial statement, it must be that the market is capable of processing the relevance and reliability of that particular component.

In a paper exploring the measurement of value relevance in an inefficient market setting, Aboody, Hughes and Liu (2002) derive a procedure for estimating value relevance using accounting variables. The procedure is applied in both efficient and inefficient market settings. They find that although their empirical findings suggest that market inefficiencies do affect the measurement of value relevance, the presence of arbitrage mitigates the magnitude of these effects. Secondly, they also find that because share price reflects the accumulation of information since the inception of the firm, and market inefficiencies are likely to be associated only with "new information," the impact of such inefficiencies on price levels will be small when measured in percentage terms. Evidence from value relevance studies that employ regression models, such as Holthausen and Watts (2000), and Pfeiffer and Elgers (1999), control market inefficiency effects by lengthening the time horizon over which price effects are measured. Pfeiffer and Elgers (1999) in particular implement such an approach and found accruals have less value relevance than cash flows as measured by coefficients in return regressions. The 12-year period of this study achieves the same result through the number of periods examined in the time-series modelling. Their conclusion suggests that the Ohlson (1995) model can be applied in an inefficient market without major noise from the inefficiency effect.

2.9 Regulatory environment

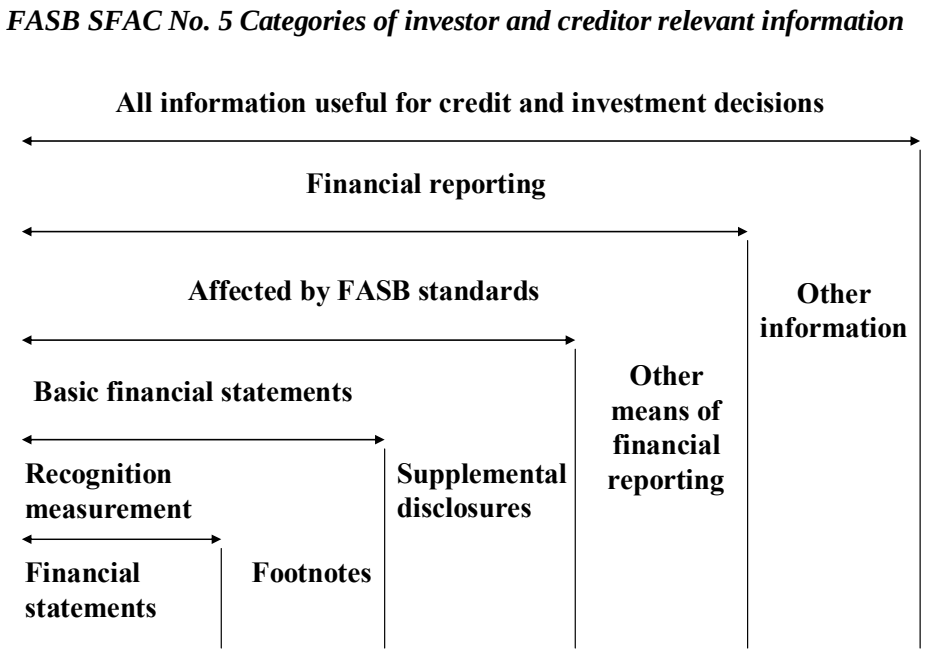
Although the literature review provides evidence supporting the use of the Ohlson (1995) model, the regulatory environment which underpins the key variables used by

the model needs to be considered in order to evaluate the integrity of the underlying data in the context of this study.

The theoretical foundation of value relevance studies consists of a combination of valuation theory and contextual accounting issues that allow researchers to predict how accounting disclosures are constructed. Barth (2000) discusses the relation between financial reporting, standard setting, and valuation research, relating major financial reporting issues currently facing the profession and academic valuation research. The paper highlights that financial reporting standards are not only concerned with valuation issues, they also require financial reporting to address the needs of other users such as creditors and other external parties. Financial reporting standards attempt to meet the needs of society as a whole, presumably catering to the needs of a wide range of users, as opposed to a pure valuation intention.

Barth (2000) further provides the following diagram, extracted from SFAC No. 5, recognition and measurement of business enterprises, illustrating the various forms of information available to users.

Figure 1 – Categories of information



There is little doubt as to whether all of the forms of information as reflected in Figure 1 are value relevant. The question we seek to answer is whether the annual financial statements, represented in the bottom left block, provide value relevant information, and if so, the strength of such information in the presence of the other forms of information represented in the diagram. In the Ohlson (1995) model, this other information is represented by v_t, the variable for other information, and will also be reflected in the size of the error terms if not included in v_t. According to Barth (2000), the standard setters typically focus on items included in the annual financial statements, which are directly under their jurisdiction. They are concerned with issues surrounding reliable measurement, whether to recognize an item or merely disclose it, or whether items should be included at all. In this study, our interest is in accounting information as a source of value relevant information, and how accounting fits into the firms overall information environment, which encompasses more than just the financial statements.

The presence of such other purposes for the annual financial statements is in fact the source of the hypothesis of this study. The outcome will determine whether the annual financial statements are useful in valuing companies, or alternatively, whether they have become too general purpose (servicing the needs of a multitude of users) to be value relevant. Other forms of reporting include management earnings forecasts, analysts buy and sell recommendations, press releases, planned acquisitions and court actions.

Barth (2000) also discusses the current major topics and current issues which are being dealt with by accounting academics and practitioners. The four issues identified are fair value accounting, cash flows versus accruals, recognition versus disclosure, and the effect of harmonization of accounting standards. Although there is little doubt that these issues are value relevant, this study does not attempt to address the effects thereof. In fact, should these issues render book values to be non-value relevant, this will be obvious in the statistical results. Such issues will be borne in mind when evaluating the results of the statistical testing.

2.10 Critical appraisal of the model

Although the Ohlson (1995) model is widely accepted in value relevance literature, it has not been immune to criticism. There are two main criticisms of the model, the first of which involves the abnormal earnings specification, which is calculated using accounting earnings as a base, and subtracting a charge for normal earnings using the book value of assets and a discount rate as a surrogate for the weighted average cost of capital. The first criticism deals with the estimation of this discount rate. The second criticism involves the specification of the "other information" variable, which is a source of all information other than the book value of assets and abnormal earnings, and is therefore difficult to specify.

The first criticism focuses on the need of the model to estimate a discount rate to determine abnormal earnings. Discount rates are by nature difficult to estimate, and are also generally not static over a period of time. The criticism, therefore, suggests that the model relies on a discount rate which may not be appropriate, and also assumes that the discount rate is static [this problem arises due to the time series

portion of the panel data approach]. In this research report the price to earnings ratio has been used as a surrogate for the discount rate in line with Cheng and McNamara (2000). In order to test the appropriateness of price to earnings as a surrogate, the statistical model was tested using the book to market ratio (Cheng and McNamara, 2000), combination price earnings and book to market (Cheng and McNamara, 2000), and finally using the risk free rate (although the use of a risk free rate is theoretically inferior as it does not incorporate any measurement of risk). Results from both panel data and cross sectional data confirmed the inferiority through weaker significance (measured by the standard t-statistic) in the predictive variable for book to market, combined price earnings and book to market, and the risk free rate, and therefore justifies the use of price to earnings. Although the discount rate is stationery for a one period analysis, the regression was run using a price to earnings ratio as determined for each year, allowing the price to earnings ratio to vary on an annual basis. Although this does not compensate for short term shifts in the ratio, it is considered to be sufficiently robust for the purposes of this study.

The second criticism involves the specification of the "other information" variable, which represents the idea that the forecasting of future accounting data realizations depends on information beyond the current accounting data. Hence, other information represents all other information not included in the book values. Such a variable is by nature difficult to quantify, and therefore represents a severe limitation of the Ohlson (1995) model. However, this study attempts to validate the Ohlson model as a base, and to assess whether book values are in fact value relevant. The specification of the "other information" variable, although still important, is not essential to the outcome.

A number of criticisms of value relevance research in general, as well as specific criticism of the Ohlson (1995) model, are raised in the study of Holthausen and Watts (2000). Barth Beaver and Landsman (2001) was the main response to the paper. Both criticisms and responses follow.

Holthausen and Watts (2000) suggest that the Ohlson (1995) model is dependent on the economic concept of permanent earnings, which are not sufficiently defined by using the book value of assets. Barth Beaver and Landsman (2001) argue that the model does not depend on the concept of permanent economic earnings, but instead,

that the model is expressed in terms of accounting earnings and equity book value. They conclude that any empirical implementations using the Ohlson model will not require the specification of a link between accounting amounts and economic constructs such as permanent earnings, and therefore such concerns are irrelevant to the model.

Barth et al (2001) further discuss the use of simplifying assumptions in the Ohlson (1995) model that permit parsimonious representations of a complex real world. Consistent with this, is a partial equilibrium model that takes the accounting system as given. Holthausen and Watts (2000) argue that using simplifying assumptions in the model does not allow the model to derive an optimal solution, and to do that would require deriving a general equilibrium in a multi-person, regulatory context. The Ohlson (1995) model assumes a clean surplus, a general equilibrium model would require modeling dirty surplus (the clean 'surplus' relation states that dividends paid displace market value on a Rand for Rand basis, dirty 'surplus' therefore implies that such a Rand for Rand displacement would not take place, and that in addition to the value of a dividend, there would be an intangible, informational value of dividends, or likewise earnings, which would be worth more in market value terms than the Rand paid). It is not the intention of value relevance research to address such additional issues; empirical research performed by Hand and Landsman (1998), indicates that adjusting for dirty surplus, which can be large for some firms, has negligible effects on estimates or inferences. Barth et al (2001) argue further that although none of the valuation models included in value relevance research explicitly derives an optimal accounting system, or even a demand for accounting information, this does not preclude use of such models to assess the value relevance of accounting amounts. Barth et al (2001 : 342) use the following analogy to explain further:

> "Even though the capital asset pricing model does not include a role for financial intermediaries, this does not preclude financial intermediaries from viewing as relevant the risk-return predictions and evidence derived from that model."

Holthausen and Watts (2000) further criticize the Ohlson (1995) model as being based on a valuation model that does not include the possibility of economic rentals. Barth

et al (2001) argue that a key feature of the Ohlson model and its extensions (Feltham and Ohlson, 1996) is that economic rents, i.e., returns in excess of the cost of capital for a finite number of periods, are captured by the persistence parameter on abnormal earnings, as well as by the other information specifiation. Although economic rents can be viewed within the Ohlson framework as being reflected in the persistence of abnormal earnings, rents also can be reflected in the model by including the present value of the future cash flows attributable to those rents—incremental to those cash flows attributable to recognized assets—as a component of equity book value.

Holthausen and Watts (2000) further criticize the Ohlson (1995) model for being based on a linear, rather than nonlinear, valuation model. Barth et al (2001) argue that although the Ohlson (1995) model represents firm value as a linear function of equity, book value, and abnormal earnings, the persistence of abnormal earnings enters into the model nonlinearly. The result is therefore, for given levels of equity book value and abnormal earnings, that marginal differences in persistence are not associated with constant marginal differences in equity value. Barth et al (2001) further discuss studies that permit valuation coefficients to vary cross-sectionally or across components of equity book value and abnormal earnings, which are explicit attempts to control for nonlinearity, and can be viewed as being implicitly based on the nonlinearity in abnormal earnings in the Ohlson model. Many empirical studies adopt such methodologies (Barth, Beaver, and Landsman, 1992, 1996, 1998; Burgstahler and Dichev, 1997; Aboody, Barth, and Kasznik, 1999; Barth, Beaver, Hand, and Landsman, 2000).

Barth et al (2001) state that the Ohlson model yields a particular form of nonlinearity in the valuation equation. The model assumes perfect and complete capital markets, and the use of the discounted cash flow model, resulting in a linear valuation relation, as there is no well accepted model of equity valuation in imperfect and incomplete markets. Thus, value relevance research uses perfect and complete market models as a basis for tests, but often makes modifications to estimating equation specifications to incorporate potential effects of nonlinearities in the particular setting being examined. As previously discussed, the JSE is “operationally efficient” (Ward, 1994), indicating that a small group of investors may be able to outperform the market, but most investors will be unable to do so, which is considered to be adequate market

efficiency strength for the purposes of this study. Furthermore, the use of panel data allows coefficients to vary cross-sectionally, which relaxes the effect of linearity factors across the population, and maintains linearity within each partitioning.

Holthausen and Watts (2000) assert that conservative accounting practices by firms can undermine what can be learned from value relevance research by sanitizing the results to reflect conservative accounting numbers rather than economic reality. Conversely, Barth et al (2001) suggest that valuation models used in value relevance research can accommodate and be used to assess the effects of accounting conservatism. The Ohlson (1995) model does this by reflecting in the abnormal earnings term both unrecognized assets and assets with fair values in excess of book value. In addition, subsequent refinements of the Ohlson model explicitly model the effects of conservatism (Feltham and Ohlson, 1995; 1996), and therefore provide a basis for examining the empirical implications of conservative accounting. Barth et al (2001) identify examples of empirical value relevance studies which directly incorporate conservatism, and assess its effects on the relation between accounting amounts and firm value (Barth, Beaver, Hand, and Landsman, 1999; and Beaver and Ryan, 2000). Moreover, many empirical studies seek to explain why equity market value exceeds equity book value. These studies can be viewed as examining conservatism in accounting. Barth et al (2001) further question the assertion that accounting practices are deliberately conservative, suggesting that such conservatism may merely be a by-product of applying accounting standards, and not necessarily the result of an explicit objective that accounting be conservative. An example of this is the treatment of fair value estimates and intangible assets currently that are not recognized in financial statements due to concern regarding the reliable measurement of such amounts.

Finally, Holthausen and Watts (2000) argue that value relevance research requires the assumption that the market is efficient. Barth et al (2001) argue that value relevance research need only assume that share prices reflect investors' consensus beliefs. Value relevance research does not, therefore, need to assume that equity market values are "true" or unbiased measures of the unobservable "true value" of equity, or that they reflect unbiased measures of unobservable "true" economic values of firms' assets and liabilities or income generating ability. With this assumption, the resulting

inference relates to the extent to which the accounting information under study reflects the amount implicitly assessed by investors as reflected in equity prices. Investors' consensus beliefs are of interest because of the extensive literature, beginning with Ball and Brown (1968), documenting that share prices impound quite accurately the valuation implications of publicly available information. With the further assumption of market efficiency, the resulting inference relates to the extent to which the accounting information under study reflects the true underlying value.

2.11 Summary

This chapter has presented the relevant literature and evidence illustrating that the Ohlson's (1995) valuation model provides a rigorous conceptual foundation for regressions of equity values using earnings and book values of assets. The literature reveals that the Ohlson's (1995) model is continually being revised and re-specified for specific purposes and environments, and has been empirically tested extensively.

Empirical works generally find significant relationships between share price and both book value and accounting earnings, although some of the works find a decreasing trend in the value relevance. Specification issues arising from the other information variable are, however, highlighted as being key to the successful use of the model, and will be borne in mind in developing the equation for this study. The next chapter presents the research hypothesis, framework, and data that underpin the hypothesis for this study.

Chapter III : Research Methodology and Data

3.1 Introduction

The literature review indicates that studies using the Ohlson (1995) and Feltham and Ohlson (1995, 1996) models have been widely applied in determining the value of firms in developed countries. There are however limited studies in emerging economies. Due to the different institutional structures, it is unclear as to whether the conclusions reached in the developed country studies can be applied to an emerging economy setting. This can however be tested by performing similar studies in emerging economies such as South Africa.

This research report therefore follows the approaches of previous studies using the Ohlson (1995) valuation model, such as Collins, Pincus and Xie (1999), to determine whether accounting information is relevant to price formation, and subsequently, whether fundamental analysis is suitable for stock exchange price valuations. The research report further utilizes a panel data approach to combine cross sectional and time series relationships.

Before the statistical model is introduced, some salient aspects of the South African market are of relevance. Besides being a developing economy, South Africa has been described by Mitchell Williams (2000) as being a virtual microcosm of the world in a number of ways, including its ethnic diversity, level of economic development, standard of living, and economic infrastructure. Such diversity provides a broad base for the development of general conclusions relating to emerging markets. Furthermore, despite its economic status, the African continent is likely to play an important role in future global prosperity in the new millennium, with South Africa likely to form a gateway in this regard. Research of this region is however underrepresented in the value relevance literature, further studies in this region therefore need to be undertaken to establish if findings, based on findings from other global regions, can be broadened to encompass the African continent.

The period covered by the study includes a number of prominent reformation events and characteristics peculiar to the Johannesburg Securities Exchange. South Africa has gone through considerable social infrastructure changes, including with the elimination of apartheid during the 1990's, and the installation of a democratic government. The result has been financial liberalization (Makina and Negash, 2005), foreign listing and integration, pyramid structures, subsequent unbundlings to reduce the extent of the existence of pyramid structures, and the emergence of black economic empowerment structures. The current business environment in South Africa has been described as being close to a developing nation, with an abundant supply of natural resources, and possessing well-developed financial, legal, communications, energy, and transport sectors; with a stock exchange ranked amongst the 10 largest in the world (Mitchell Williams, 2000); although gaps in income distribution, crime and poverty are still issues. Despite the aforementioned, being an emerging market, liquidity is a major issue, and income in the form of dividends therefore dominates investment patterns, driven by the signaling theories of dividends. Also, prior studies have shown that the capital asset pricing model is not a good predictor of price, and market microstructure studies have indicated that trading costs are higher than developed economies.

This chapter provides a discussion of the methodological issues relating to the empirical section of this study, and includes discussion of the valuation models, the theoretical foundation of the valuation models, hypothesis, and data selection.

3.2 Valuation model

Two valuation models are introduced in this section, the first of which is a cross sectional model adapted from the Ohlson (1995) model. The second model essentially takes the first model a step further by introducing time series data, and running a panel data model to include both the cross sectional and time series relationships.

In the context of the empirical testing of the Ohlson model, abnormal earnings and book value information are relatively straightforward to obtain, the specification of the other information variable v_t in the South African environment is however more difficult. As mentioned above, liquidity in the market is a major issue, and therefore

the signaling effect of dividends is possibly stronger in South Africa than in more developed markets. Because of this strong role of dividends, v_t can be specified to variables such as abnormal dividends, merger news, and redundancies.

The difficulty in defining and measuring v_t is however increased by other factors affecting share price which are not captured in the financial statements. Information that is firm specific may well be partially captured by a variable such as abnormal dividends, however, industry, macro and global information is more difficult to quantify, and is not reflected in the financial statements. As the research report specifically tests the Ohlson (1995) model, in order to determine the usefulness of financial statement data, these variables will not be quantified. To avoid the methodological complications, v_t is specified as abnormal dividends.

A further valuation difficulty arises in the form of discretionary accruals. The Ohlson (1995) model does not take into account the fact that the manipulation of discretionary accruals by management may distort earnings, and therefore affect share price (Holthausen and Watts, 2000). One approach would be to adjust for such accruals by disaggregating abnormal earnings (X_t^a) into normal earnings and discretionary earnings ($X_t^a = X_t^n + X_t^d$). This research report however specifically tests the Ohlson (1995) model, and, therefore, no adjustment will be made. The lack of adjustment for such accruals will however be noted when interpreting results.

The model will be used in both a cross sectional multiple regression format, as well as a panel data format combining both cross sectional and time series data. Regression analysis is essentially a statistical technique used to study the dependence of one variable on one or more other variables, to estimate the parameters of the model, which may then be used to estimate and predict the former variable. In this case the predictive variable (dependant variable) is share price, and the explanatory variables are abnormal earnings per share, book value per share, and abnormal dividends per share.

3.2.1 Specification of the other information variable

This study uses dividends as a surrogate in specifying the other information variable in line with Cheng and McNamara (2000). To avoid double counting with the abnormal earnings variable, the informational content of dividends has been estimated by using the annual change in dividends, rather than the absolute dividend amount for the year, this allows the dividend signaling aspect to be isolated, yielding abnormal dividends.

The informational content of dividends hypothesis emerged from the work of Lintner (1956) and Miller and Modigliani (1961). This hypothesis states that firm managers use dividend announcements to signal their beliefs about the future prospects of the firm. More specifically, the announcement of an increase in dividends reflects the belief of managers that the future earnings will be sufficiently high to sustain payment of the dividend at the increased amount. Conversely, the announcement of a decrease in dividends is made only when the managers are extremely pessimistic about the ability of future earnings to sustain such dividends at their current rate. The theoretical implication of the informational content hypothesis is that the announcement of a change in dividends conveys price relevant information, in addition to other information provided by management, regarding the future prospects of the firm. The validity of the hypothesis depends on the belief that information asymmetry exists, where the firm management have additional information about the future potential earnings of the firm which the market does not possess, and communicates this information by means of a dividend announcement.

Black (1976) reports that several researchers' regard the informational value of dividends as unimportant, suggesting instead that there are equally efficient and cheaper means of signaling such additional information to shareholders. Bhana (1991), in a paper using data from the Johannesburg Securities Exchange, suggests that although other methods are available for disseminating additional information, dividend policy provides a simple, comprehensive signal of management's interpretation of the company's recent performance and its future prospects. Unlike other announcements, dividends must be backed by cash payments, which the company either needs to generate, or convince the capital market to supply. Dividends

are, therefore, backed by tangible substance in the form of cash. Dividend declarations are also highly visible compared with other announcements, and due to the annual nature thereof, provide a fixed periodic signal.

In a study performed on the Johannesburg Securities Exchange listed firms using data from the period 1970-1988, Bhana (1991) found strong support for the informational content of dividends hypothesis, where investors revise their expectations, and therefore share price, in response to announcements of significant dividend changes. The paper therefore suggested that large changes in dividends on the Johannesburg Securities Exchange conveyed valuable information to investors over and above that contained in earnings announcements. The evidence suggests that there is a strong informational content to dividends on the Johannesburg Securities Exchange, and that the use of abnormal dividends as a surrogate for the other information variable v_t is therefore appropriate.

3.3 Research Method

3.3.1 Cross sectional multiple regressions

In the spirit of Ohlson (1995) and Feltham and Ohlson (1995, 1996), earnings, book values and dividends have been analyzed. These independent variables have been tested using South African data. Equation 11, derived from Ohlson (1995), forms the basis for the empirical results. The equation considers the following variables:

- Dividends, measured by using cash dividends per share;
- Abnormal earnings, measured by using accounting earnings less a cost of capital charge representing normal earnings; cost of capital is obtained using the P/E ratio in line with Cheng and McNamara (2000).
- Book value of assets, measured using accounting book values of assets;
- Debt, measured using long-term debt instruments.

In order to provide scalability, cash dividends per share have been used to measure dividends, earnings per share to measure earnings, and book value per share to measure book value of assets.

Share prices have been used as a measure of firm value. Although these are subject to other market forces, even if the Johannesburg Securities Exchange is not totally efficient in incorporating all publicly available information in share prices, at worst the share price will reflect the consensus beliefs of investors, which is considered to be sufficient for the purposes of this study.

The following valuation model has been used for the yearly cross sectional analysis:

$$P_t^* = \delta_0 + \delta_1 X_t^a + \delta_2 bv_t + v_t + \varepsilon_{t*} \quad (11)$$

Where:

P_t^* = value of the firm's equity at year t + 3 months

δ_0 = an intercept

X_t^a = abnormal earnings at time t (per share)

bv_t = book value of the firms assets at time t (per share)

v_t = a proxy for other information

ε_{t*} = an error term

Abnormal earnings is calculated using normal earnings (bottom line income statements earnings) less a charge for capital. The weighted average cost of capital is estimated using the P/E ratio as a base, charged on the net book value of the company's assets. Abnormal earnings is defined as:

$$X_t^a = X_t - WACC.TA$$

Where:

X_t = Operating earnings after taxation and finance charges

WACC = Weighted average cost of capital

TA = Total assets – total debt

Total debt is subtracted from total assets, because the operating earnings are after finance charges, and therefore to avoid double counting of the cost of debt, this is removed as a form of finance by subtracting the value from total assets. The use of a discount rate, WACC, to determine the persistence of abnormal earnings, facilitates thinking about the relative importance of bv_t and X_t in the valuation. Since the relationship between these factors can vary both by firm and across time for firms, bv_t or X_t may be more value relevant depending on the financial health of the firm. Barth (1998) points out that book value may become more value relevant than X_t as firms approach bankruptcy or liquidation, while firms with increasing earnings may have a

higher persistence than other firms, resulting in a larger coefficient on X_t, or for financially weaker firms, bv_t might be relatively more important for valuation than X_t. Such relationships may weaken the significance of the cross sectional model, but will be compensated for in the panel data model.

The other information variable, v_t, can be either other financial statement information, or any other publicly available information. Other information v_t is estimated using dividends as a proxy following the results of Cheng and McNamara (2000) and Garrod and Rees (1998). Dividends as a form of information are particularly important on the Johannesburg Securities Exchange, as in other emerging markets, where liquidity is important, and markets tend to be dividend driven. The use of brokers consensus forecasts was considered, but due to a lack of both historical and complete forecasts, it was concluded that dividends would provide a more robust result. The results of the regressions support this approach. Changes in dividends are used to avoid conflict with the abnormal earnings variable. Other information is defined as:

$$V_t = DPS_t - DPS_{t-1}$$

Collinearity between abnormal earnings and abnormal dividends should not be an issue, as earnings are accrual earnings, and dividends per share are only movement in dividends, and therefore only represent the informational effect.

As the model is essentially predictive using historical information, a problem of leads and lags is present for the dependent variable P_t. The study therefore uses share prices three months after each company's year-end to allow for the publication and analysis of historic financial statements. This period has been chosen in spite of the assumption of the efficient market hypothesis, and evidence of efficiency of the Johannesburg Securities Exchange, due to the time lag in preparation, audit, and publication of the annual financial statements. The Johannesburg Securities Exchange requires results to be published within three months of year end, and therefore this period was considered to be appropriate.

3.3.2 Panel data

A panel data approach has been used in a second regression model to analyze both the inter-firm and inter-temporal variations in the data. According to Baltagi and Badi (2001), panel data holds a number of advantages over using only cross sectional data or time series data. First, panel data controls unobserved variables much better by either removing the observations, or by providing more instruments. Second, panel data allows dynamic models with lagged response variables and regressors. Third, where cross sectional models show a snapshot at a given time, panel data shows whether the cross section image is stable over time.

Both time-series and cross sectional studies do not control for heterogeneity and therefore run the risk of biased results. Panel data is able to control for individual heterogeneity. To illustrate, consider the resources sector in this study. The sector typically has a larger investment in capital assets than most other sectors, and therefore a high book value. Controlling for the resource sector in a cross sectional study may be done with a dummy variable which has the effect of removing the observations from the regression. Panel data is able to control for all sector specific characteristics without omitting the variables. According to Baltagi and Badi (2001), panel data provides more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency. Panel data is also able to study the dynamics of adjustment, and is better able to identify and measure effects that are not detectable in pure cross section or time series data. The effect is that the panel data analysis will include industry specific anomalies in the variables, and will compensate for events which affect all firms in a given year, such as changes in generally accepted accounting practice, which may affect the predicting variables.

The panel data model tries to go further in the quantitative analysis by following the aggregate approach, and takes into account not only time and cross-sectional dimensions of the panels, but also the nesting effects caused by the division of companies into sectors. The unit of analysis is a company, but companies are grouped in a natural way into larger divisions – sectors, where the behavior of two intra-sector companies have more in common than that of two companies in different sectors.

The panel of data includes net book value of assets (bv) for company i in year t, abnormal earnings (x^a) for company i in year t, and abnormal dividends (v) for company i in year t. The model, which is assumed to be linear, is written as follows:

$$P^*_{it} = \tau_t + \beta_1 x^a_{it} + \beta_2 bv_{it} + \beta_3 v_{it} + \delta_i + u_{it} \qquad (12)$$

Where:

P^*_{it} = the value of firm i's equity at year t + 3 months

τ_t = an intercept

x^a_{it} = abnormal earnings per share for firm i at time t

bv_{it} = book value of the firm i assets at time t (per share)

v_{it} = a proxy for other information, abnormal dividends of firm i at time t (per share)

δ_i = an unobservable individual specific effect

u_{it} = an error term (remainder disturbance)

Note that δ_i is time-invariant and accounts for any firm-specific effect that is not included in the regression. The remainder disturbance u_{it} varies by firm and with time and can be thought of as the usual disturbance in the regression, representing unobservable stochastic variables comprised of several components.

Variable definitions for X^a_t, and v_t in section 3.2.1. apply equally to x^a_{it} and v_{it}.

3.4 Limitations of the study

This study investigates the value relevance of accounting earnings and the book value of assets as reported in the annual financial statements of firms listed on the Johannesburg Securities Exchange. The study has been confined to firms continually listed throughout the study period from 1992 to 2003. All surviving firms have been incorporated in the study irrespective of the sector they trade in, in spite of the fact that the relationships between the different sectors are likely to be considerably

different. The panel data approach used in this study is able to take such sector influence into account in generating the panel data output by grouping sectors together where relationships are detected. As only surviving firms are included, survivorship bias is a limitation of this study.

This study does not attempt to include the impact of other factors in the market, which could influence the share price, but which are not included in the three predicting variables. Such other variables are considered to be outside the scope of this research report, and will be reflected in the error terms of the respective models, and will be evidenced in the measures of fit of the models.

3.5 The Hypothesis

The research problem of this study is to determine whether the Ohlson (1995) valuation model is significant in an emerging market setting, and in particular in South Africa. The research problem is therefore to determine the explanatory power of book values, accrual based earnings, and dividends in predicting share price.

The hypothesis for the value relevance of accounting earnings, book value, and abnormal dividends to share price is:

H_0 : The Book Value of assets, earnings, and abnormal dividends are significantly related to share price.

H_1 : The Book Value of assets, earnings, and abnormal dividends are not significantly related to share price.

Value relevant can be defined as when an accounting amount is associated with some measure of value, in this study, share price. If the amount significantly increases the power of the estimating equation to explain the equity value, then it must be relevant, and measured with at least some reliability. If it is not relevant, there would be no relation with equity value. If the amount contains significant measurement errors, then there will be no statistical relation.

3.6 Data selection

The data required to test the research problem consists of a population of all companies share prices, accounting earnings, book values, and dividends per share (other information) in the period from 1992 to 2003. Data analysis is based on Equation 11 for the cross sectional analysis, and Equation 12 for the panel data analysis. The standard t-statistic is used to determine the value relevance of each of the variables, and the coefficient of determination (r^2) is used to measure the model fit.

Cross sectional financial statement data for all Johannesburg Securities Exchange listed firms was obtained from a BFA McGregor database, and from publicly available annual financial statements of the companies (also extracted from the BFA database). Financial statement data included categories of assets, weighted average shares, cash dividends, earnings per share, profits attributable to ordinary shareholders, price earnings and price to book ratios. Month end share prices, financial year-end, and sector data were also extracted from the database. Year-end details were used to obtain share prices for three months after year-end to allow lead for dissemination and adjustment for information to ensure the predictive power of the model.

The population selection criterion for this study is as follows:

- Assets, weighted average shares, cash dividends, earnings per share, profits attributable to ordinary shareholders, price earnings and price to book ratios and month end share prices must be available on the McGregor BFA data resource.
- Cases with missing data were eliminated.
- Non surviving firms were eliminated from the sample in order to provide data for a balanced panel.
- In line with Collins, Maydew, and Weiss (1997), to control for extreme observation, the sample was trimmed for outliers by eliminating the top and bottom two percent of observations of either abnormal earnings per share, book value per share, or abnormal dividends per share.

The selection process decreased the sample of companies to 129 firms over a period of 12 years, which provides 1 548 year-end observations. To maintain comparability across tables and figures, all tests in this study were performed using the final sample of 129 firms, and 1 548 year end observations.

Panel data uses stacked cross-sectional data with time-series identifiers. The primary reason for using this data arrangement is its ability to allow lag processing. Annual dated panels with regular frequency have been used in a regular balanced panel arrangement. No internal balancing was necessary as only companies surviving through the entire period were included in the sample.

3.7 Methodology

The basic tests of the Ohlson (1995) model involve performing regressions using the valuation models noted in the previous chapter, to determine whether the valuation models reliably predicts the share price. Two regression models will be tested. The first model uses equation 11 and performs a cross sectional analysis on a yearly basis. The results for each year are evaluated separately, and then compared to the results of other years to identify any obvious time series trends. The second model uses a panel data approach, based on equation 12, combining both cross sectional and time series data in a single valuation model, thereby evaluating both cross sectional and time series relationships.

Consideration will be given to methodological issues (model specification, sample size), data screening issues (including the detection of outliers), model estimation and model re-specification.

3.7.1 Calculation of abnormal earnings

In order to calculate abnormal earnings, normal earnings were first extracted, using earnings after interest and taxation. As discussed in Chapter 2, three alternative surrogates for cost of capital were considered.

First, the risk free rate was considered, using monthly treasury bill rates. Use of the risk free rate is theoretically inferior as it does not incorporate any measurement of risk. Results from both panel data and cross sectional data confirmed this inferiority through weaker significance (measured by t-statistic) in the predictive variable. Second, the book to market ratio was considered in line with Cheng and McNamara (2000), but was also found to display a weaker predictive significance. Third, price earnings was considered, also in line with Cheng and McNamara (2000), displaying the strongest relationship for abnormal earnings in predicting share price three months after year end, thereby validating its use as the surrogate for cost of capital. A final test was performed using a combined price earnings and book to market ratio. Results however displayed an inferior relationship to that of price earnings alone. This study therefore adopts price earnings as a surrogate for cost of capital in determining abnormal earnings.

Total earnings extracted from the BFA McGregor datastream is in the form of earnings after interest and taxation. In order to obtain abnormal earnings, normal earnings have been subtracted. As interest and taxation have already been subtracted in the base figure, normal earnings is determined using the cost of capital as discussed above, multiplied by the asset base. The asset base used in determining normal earnings is total assets less total liabilities, to avoid double counting on the cost of interest.

3.7.2 Calculation of abnormal dividends

In order to isolate the informational content of dividends from the earnings influence, abnormal dividends have been calculated by subtracting the previous year's dividend from current year dividend, yielding changes in dividends. Such information is then used in line with the signaling theory of dividends as a surrogate for other information.

Dividends include only cash dividends which provide stronger information to shareholders in line with signaling theory. Any script dividends, or non cash dividend equivalents were, therefore, excluded. Although useful as a surrogate, abnormal dividends is not intended to quantify all other information, and such other information

which has not been quantified, is considered to be a limitation of this study, but does not affect the validity or outcome.

3.8 Summary

The first section of this chapter specifies the Ohlson (1995) valuation model as a base for the multiple regression models used to investigate the determinants of share price, and outlines the research environment (on the Johannesburg Securities Exchange). In the second section, the multiple regression and panel data models were introduced, including the detailed specification of the variables within the models. Thereafter, an explanation was provided as to how the critical questions in the research report are analyzed. The research method was discussed in the third section, while the general assumptions and delimitations are explored in the fourth section. The hypotheses of the study for book value of assets and accounting (accrual) earnings are developed in the fifth section based on the discussion in the previous chapter (literature review), and data and sample selection issues are discussed in section six. Data and methodological issues of the study are discussed in section 7. The specification and calculation of the abnormal earnings and abnormal dividend variables are also discussed. The next chapter discusses the results of the regression models, and is followed by a summary and conclusion.

Chapter IV : Results and Discussion

4.1 Introduction

As noted in the previous chapters, limited research on the determinants of firm value has been performed in emerging markets, and in particular in South Africa, no works have been published attempting to estimate firm value using the Ohlson (1995) model, or a version of the model. This study will assist in developing an understanding of the determinants of firm value in an emerging market setting, and provide insight into the differences, if any, in valuing firms in developed and emerging markets. It will determine whether information included in financial statements is value relevant. The results of applying the cross sectional and panel data models to the South African database are set out in this chapter. All calculations were performed using e-views 5.1 for windows.

4.2 Overall results

4.2.1 Cross sectional model

The estimates for the cross sectional coefficients on a yearly basis are gathered in Table 1, representing separate cross sectional regressions performed on each of the 12 years. An analysis of the t values is summarized in the Table 2 below.

Table 1 – Multiple regression output summary

Model: $P_t^* = \delta_0 + \delta_1 X_t^a + \delta_2 bv_t + \delta_3 v_t + \varepsilon_{t^*}$

Year	Obs.	P_t	δ_0	δ_1	δ_2	δ_3	R^2	Adj R^2
2003	129	Price	2 546.337	1.312	579.031	10.440	0.451	0.438
			6.138	*1.491*	*2.191*	*9.932*		
2002	129	Price	2 289.296	5.308	329.196	6.938	0.462	0.449
			5.914	*0.925*	*1.360*	*10.235*		
2001	129	Price	2 424.181	0.894	151.356	3.128	0.235	0.217
			5.104	*0.519*	*0.513*	*6.179*		
2000	129	Price	2 099.707	(22.670)	83.202	2.034	0.122	0.101
			5.580	*(0.270)*	*0.323*	*4.154*		
1999	129	Price	1 787.802	32.466	39.110	7.032	0.219	0.201
			7.207	*0.273*	*0.246*	*5.905*		
1998	129	Price	(471.791)	13.569	837.840	2.189	0.371	0.356
			(1.442)	*0.696*	*6.451*	*2.707*		
1997	129	Price	(1 220.987)	33.882	1 312.672	0.912	0.432	0.419
			(3.083)	*2.256*	*8.800*	*0.659*		
1996	129	Price	(550.397)	40.178	1 048.472	0.746	0.368	0.353
			(1.586)	*2.762*	*7.859*	*0.678*		
1995	129	Price	(648.250)	75.770	1 042.249	0.450	0.356	0.341
			(1.881)	*2.706*	*7.658*	*0.468*		
1994	129	Price	(160.875)	55.480	747.576	1.704	0.246	0.228
			(0.436)	*1.686*	*5.094*	*1.127*		
1993	129	Price	56.563	38.774	495.702	1.854	0.199	0.180
			0.211	*1.575*	*4.497*	*1.161*		
1992	129	Price	(130.997)	29.000	484.108	1.626	0.243	0.225
			(0.642)	*2.038*	*6.160*	*1.027*		

Notes: T-statistics are in italics.

Table 2 – Multiple regression results summary

Coefficient	Significant	Not-significant
δ_0	6	6
δ_1	4	8
δ_2	8	4
δ_3	6	6

Using t-statistics to evaluate significance, Tables 1 and 2 display a weak result for the model, with the constant being significant in only 6 instances, abnormal earnings in 4, book value in 8, and abnormal dividends in 6 instances. Also of interest was that in no year were all variables significant simultaneously. Further, explanatory power of the model was measured using the multiple coefficient of determination (R^2), it is noted that the R^2 and adjusted R^2 ranged from 0.122 to 0.462, and 0.101 to 0.449 respectively, indicating that at best, around 46%, and at worst 12% of the share price is described by the independent variables.

The t statistics for bv_t (δ_2) display a significant relationship for the period 1992 to 1998. The subsequent period from 1999 to 2003 displays a weak insignificant relationship for bv_t, possibly indicating declining importance of book value of assets in determining share price three months after year end, with a shift in emphasis occurring in the 1999 year.

A visible change was also evident in the predictive value of abnormal dividends, where the period 1992 to 1997, no relationship was evident, while from 1998 to 2003, a significant relationship was present in each of the years. It would therefore appear that a shift in importance of dividends and book value occurred over the 1997 to 1998 period, where dividends became more important than book value.

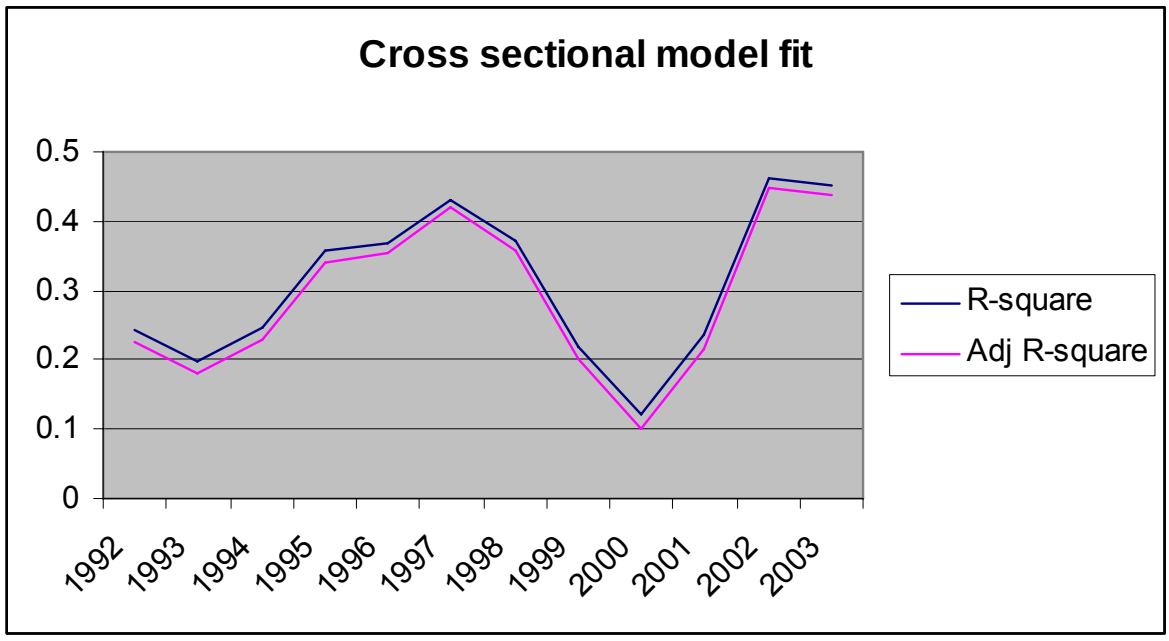
Although not as clear, a shift in significance of earnings also occurred in the 1997 year. In the period 1992 to 1997 evidence of significance existed in the t value, with the exception of 1993 and 1994 (although in these years significance was still displayed at a 15% and 10% level respectively). The significant relationship is no

longer present from 1998 to 2003, indicating that dividends possibly replaced earnings as a determinant of share price three months after year end.

The results therefore indicate that the Ohlson (1995) model, on a cross sectional basis, provides a poor fit for the data, although shifts in emphasis between the regressor variables do appear to be occurring over the study period. The poor fit may be as a result of sectoral differences, and time series influences which are not incorporated in the model. The next section discusses the panel data model, which does incorporate both of these effects.

An interesting increasing trend in the cross sectional R^2 was observed across the time horizon examined, as evidenced in Table 3. The trend reflects a constant increase in R^2 from 1993 to 1997, with a decline from 1998 to 2000, and then a steady increase from 2001 to 2003. This trend could possibly indicate that accounting information is becoming increasingly important in the determination of share price, with the exception of the period 1998 to 2000, where a marked decline is noted.

Table 3 – Cross sectional model fit



The annual results reflected in tables 1, 2, and 3 do not take into account any time-series relationship which may be present in the data. The next section includes the

time-series effects in a panel data model. Before the panel data approach was applied, the data was adjusted as stated below, and the panel data effect was approximated using the multiple regression models used above in order to provide credibility to the panel data result.

This approach should not provide a result as strong as the panel data approach, as panel data compensates and includes nested effects across the time series and cross sectional data (Gujarati and Damodar, 2003). The approach therefore uses a multiple regression model, and brings in the time series effect by using dummy variables to identify each of the different years. The data was converted to real terms using the producer price index obtained for Statistic South Africa, and all observations were then included in the sample, providing a sample size of 1,548 observations.

The results of the multiple regression model are presented in Table 4. The results reflect that all the regressors have a positive, statistically significant, and robust effect on the dependent variable, with the exception of the constant, which does not display a significant relationship as is reflected by the t-statistic of 0.426432. The equation explains around 23% of the variation in share price over the sample period, indicating a weak relationship for the model as a whole, although this does not invalidate the significance of the individual regressors. The results are weaker than the panel data model results as documented in the next section, as was expected. In addition, all coefficient estimates are of the expected signs and all of them are significantly different from zero at reasonable confidence levels.

Table 4 – Pooled Least Squares regression results

Model: $P_t^* = \delta_0 + \delta_1 X_t^a + \delta_2 bv_t + \delta_3 v_t + \varepsilon_{t^*}$

Dependent Variable: P_t^*

Method: Least Squares

Sample: 1548

Variable	Coefficient	Std. Error	t-Statistic	Prob.
δ_0	87.03773	204.1070	0.426432	0.6699
δ_1	1.681406	0.548404	3.065996	0.0022
δ_2	363.5564	35.59270	10.21435	0.0000
δ_3	3.734088	0.211714	17.63742	0.0000
NUM2003	1540.276	282.8284	5.445975	0.0000
NUM2002	1314.882	280.0281	4.695534	0.0000
NUM2001	1448.254	278.5200	5.199822	0.0000
NUM2000	1300.107	278.3014	4.671581	0.0000
NUM1999	1165.679	278.4772	4.185907	0.0000
NUM1998	225.7568	265.6376	0.849868	0.3955
NUM1997	516.6643	265.5991	1.945279	0.0519
NUM1996	524.7345	265.6500	1.975285	0.0484
NUM1995	478.4890	265.6223	1.801388	0.0718
NUM1994	420.0763	265.5728	1.581775	0.1139
NUM1993	151.8867	265.5498	0.571971	0.5674

R-squared	0.228153	Mean dependent var	1260.915
Adjusted R-squared	0.221099	S.D. dependent var	2416.318
S.E. of regression	2132.530	F-statistic	32.34636
		Prob(F-statistic)	0.000000

4.2.2 Panel data model

An Augmented Dickey-Fuller (ADF) test was used to test all variables for the presence of a unit root. The hypothesis for the standard ADF test states that the variable has a unit root, and should therefore be deflated; the null hypothesis consequently states that the variable does not have a unit root, and therefore no adjustment is necessary. For all variables the ADF critical value was greater at 1%, 5% and 10% levels, the null hypothesis that the variables have a unit root at conventional test sizes, is therefore rejected. Results are shown in Table 5.

The ADF statistic value is -1.417 and the associated one-sided p-value (for a test with 221 observations) is 0.573. In addition, E-Views reports the critical values at the 1%, 5% and 10% levels. It is worth noting that the statistic value is greater than the critical values, and therefore the null hypothesis of the presence of a unit root at conventional test sizes is rejected.

Table 5 – Augmented Dickey-Fuller Results

Null Hypothesis: Abnormal earnings has a unit root

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-19.42332	0.0000
Test critical values:	1% level	-3.434443	
	5% level	-2.863235	
	10% level	-2.567720	

Null Hypothesis: Dividend per share has a unit root

Augmented Dickey-Fuller test statistic		-20.64995	0.0000
Test critical values:	1% level	-3.434404	
	5% level	-2.863217	
	10% level	-2.567711	

Null Hypothesis: Net book value per share has a unit root

Augmented Dickey-Fuller test statistic		-18.75691	0.0000
Test critical values:	1% level	-3.434406	
	5% level	-2.863219	
	10% level	-2.567712	

Null Hypothesis: Net book value per share after removing debt has a unit root

Augmented Dickey-Fuller test statistic		-18.75619	0.0000
Test critical values:	1% level	-3.434406	
	5% level	-2.863219	
	10% level	-2.567712	

Null Hypothesis: Share price three months after year end has a unit root

Augmented Dickey-Fuller test statistic		-17.30862	0.0000
Test critical values:	1% level	-3.434423	
	5% level	-2.863226	
	10% level	-2.567716	

Heteroskedasticity refers to the unequal variance of residuals. Heteroskedasticity could arise in this study if one firm with high market capitalization dominates the

outcome of the regression. This has been controlled by deflating the variables to reflect per share information.

The results of the panel data analysis are presented in Table 6. The results reflect that all the regressors have a positive, statistically significant, and robust effect on the dependent variable. The regression statistics indicate that the panel equation fits the data relatively well. The equation explains around 35% of the variation in share price during the sample period, which although low, does not invalidate the model. We therefore reject the null hypothesis that book values do not affect share price at a confidence level of 1% as indicated by the F statistics of 0.000000. In addition, all coefficient estimates are of the expected signs and all of them are significantly different from zero at reasonable confidence levels.

Table 6 – Panel data results

$$\text{Model: } P_{it}^{*} = \tau_t + \beta_1 x_{it}^{a} + \beta_2 bv_{it} + \beta_3 v_{it} + \delta_i + u_{it} \qquad (12)$$

Dependent Variable: P_{it}^{*}
Method: Panel Least Squares
Sample: 1992 2003
Cross-sections included: 129
Total panel (unbalanced) observations: 1547

Variable	Coefficient	Std. Error	t-Statistic	Prob.
τ_t	1564.947	88.16460	17.75029	0.0000
β_1	5.603298	1.855391	3.020009	0.0026
β_2	0.843406	0.286619	2.942599	0.0033
β_3	3.671510	0.789086	4.652867	0.0000

R-squared	0.351986	Mean dependent var	3532.759
Adjusted R-squared	0.346064	S.D. dependent var	4208.217
S.E. of regression	3403.030	F-statistic	59.43891
		Prob(F-statistic)	0.000000

The coefficient of X_{it}, presented in Table 6 as β_1, is positive, and significantly different from zero at a significance level of 1%, as evidenced by the t-statistic of

3.02, suggesting that abnormal earnings has a positive and statistically significant effect on firm share price three months after year-end. This positive coefficient is consistent with the results of earlier research that find a similar positive relationship (Collins, Pincus and Xie, 1999; Garrod and Rees, 1998; Collins, Maydew and Weiss, 1997; and Kothari and Zimmerman, 1995).

Similarly, the coefficient of bv_{it} in Table 6, displayed as β_2, is positive, and significantly different from zero at a significance level of 1%, evidenced by the t-statistic of 2.94, suggesting that book value of assets has a positive and statistically significant effect on firm share price three months after year-end, also consistent with studies as above.

The other information variable v_{it}, estimated using abnormal dividends as a surrogate (β_3), is also positive and significantly different from zero at a 1% level as evidenced by the t-statistic of 4.65, and therefore suggests a positive and significant effect on share price three months after year-end. The positive relationship of this coefficient, and the significance at a 1% level is consistent with the results of Cheng and McNamara (2000) and Garrod and Rees (1998) who also use abnormal dividends in their specification of the Ohlson (1995) model. Finally, the constant variable, denoted as ς_t, is also positive, and significantly different from zero with a t-statistic of 17.75.

Based on the results reflected in Table 6, abnormal earnings, book value of assets, and abnormal dividends, all have a significantly positive and robust effect on the share price three months after year-end for South African listed firms.

This result is significantly better and more robust than the model using cross sectional data only, and the model using multiple regression including time series effects using dummy variables to simulate a panel data approach. The reason for the strength of the model lies in the panel data estimation approach, which incorporates not only both cross sectional and time series data, but also accommodates the nesting effects caused by division of companies into sectors. The unit of analysis is a company, but companies are grouped in a natural way into larger sectors, where the behavior of two intra-sector companies have more in common than that of two companies in different

sectors. Panel data also compensates for specific cross sectional biases caused by unusual events or circumstances in a single year, such as changes in accounting regulations in a specific year, which would distort a time series analysis.

The results of this study are, therefore, in line with previous studies in developed markets testing the Ohlson (1995) model such as Collins, Pincus and Xie (1999); Garrod and Rees (1998); Collins, Maydew and Weiss (1997); and Kothari and Zimmerman (1995). The results confirm the value relevance of book numbers, and support the value relevance of financial statements in determining share price.

The study also has research implications, indicating that it is necessary for researchers using the Ohlson (1995) model to either use a panel data approach, or to be mindful of the effect of time series relationships in any cross sectional model, although the use of a cross sectional model is not recommended in an emerging market setting. Secondly, researchers should be aware of the specification problems when choosing a surrogate for the other information variable. Although this study finds a strong relationship when using abnormal dividends, it is clear from the measure of model fit (R^2 and adjusted R^2) presented in Table 6, that there are other variables not included in the model which also affect share prices three months after year-end which need to be added to the model. Although the R^2 of 0.352 and adjusted R^2 of 0.346 indicates that the predictive power of the model is low, the purpose of this study was not to provide a comprehensive valuation model, instead, it sought to validate or invalidate the Ohlson (1995) model as a base for a fully specified valuation model, and for the model being value relevant, which has been achieved.

4.3 Summary

The results from applying the cross sectional model indicated a weak relationship with all predicting variables across the 12 year period. Looking at each year individually, in none of the years were all three variables and the constant significant at a 1% confidence level. The panel data model, however, revealed a robust positive and significant relationship between all three regressors and the dependent variable. The panel data model incorporated cross sectional, time series, and nested effects, resulting in a strong overall relationship over the 12 years.

The R^2 and adjusted R^2 of the panel data model does however reflect that there are other variables that should be included in the model in order to provide a more robust predictive model, but the results do confirm that the Ohlson model, using book values, provides rigorous conceptual foundation for regressions of equity values, and therefore a point of departure for further valuation studies in South Africa.

Finally, the overall findings on the value relevance of the book value of assets, accounting earnings, and abnormal dividends, is consistent with international studies performed in developed markets, such as Collins, Pincus and Xie (1999); Garrod and Rees (1998); Collins, Maydew and Weiss (1997); and Kothari and Zimmerman (1995). These studies found significant relationships for book value of assets and accounting earnings, while Cheng and McNamara (2000) and Garrod and Rees (1998) similarly found a significant relationship for abnormal dividends. The results obtained and conclusions reached in developed market settings therefore are mirrored in an emerging market setting.

The next chapter concludes the research report, discusses the limitations of the study, and provides suggestions for future research.

Chapter V : Summary and Conclusion

5.1 Summary

This empirical study had as its objective the determination of the value relevance of the book value of assets, accounting earnings, and cash dividends using the Ohlson (1995) model. There are no previous studies that have been performed on the Johannesburg Securities Exchange using the Ohlson (1995) or similar value relevance research. A review of the literature was performed in chapter two, including a description of the conceptual foundation of the Ohlson (1995) model, subsequent refinements and developments, as well as criticism and adaptations of the valuation model. The empirical history of the model in various markets and in different contextual settings was examined, followed by a review of the regulatory environment in which book value information is prepared.

In chapter three the research methodology was discussed, including the background of the valuation model, the research methods applied, and the limitations and delimitations of the study. The three variables were defined as being abnormal earnings, calculated by charging normal earnings with a cost of capital estimated using the price earnings ratio, book value of assets, and abnormal dividends, determined by taking the difference in dividends from year to year in order to isolate the information content of the dividend. Chapter three also discusses the data, determination of the population, and defining of study periods. The study was limited to surviving JSE listed firms over the period from 1992 to 2003. The size of the sample for this research report was 129 firms, over a 12 year period, consisting of 1 548 year end observations.

Chapter four sets out the findings, starting with the cross sectional model, followed by the panel data model.

5.2 Results

This study investigates the value relevance of accounting data in determining share price using the Ohlson (1995) valuation model. The results indicate that using a cross

sectional model that incorporates abnormal earnings, net book value and abnormal dividends, displays a weak relationship in providing information relevant to the establishment of market prices. However, when using a panel data approach incorporating cross sectional, time series and nested effects, there is evidence of statistically significant, robust, positive relationships for accounting earnings, book value of assets, and abnormal dividends in predicting firm value. All independent variables therefore prove information relevant to the establishment of market prices in an emerging market environment.

The inclusion of a time series analysis may be distorted by fundamental changes in the structure or operational nature of companies during the period which may lead to changes in the risk profile and financial relationships as measured in the model. The incorporation of such changes are considered to be beyond the scope of this study, and are therefore accepted as being reflected in a decreased measure of fit for the model.

5.3 Conclusion

The overall results support the hypothesis that book value of assets, earnings, and abnormal dividends are significantly related to share price. Although a significant relationship exists, the presence of other factors which affect the other information variable should be acknowledged. The poor fit in both the cross sectional and panel data models suggests that the model should not be used for predictive purposes. The Ohlson (1995) model does however provide a robust point of departure for such further works.

5.4 Limitations

The specification of abnormal dividends as a surrogate for the other information variable is a considerable limitation of this study. Although the study validates the use of the Ohlson (1995) model as a base for further valuation relevance research, it admits that the complete specification of the other information variable is a considerable task, and is not addressed in this research report.

Furthermore, the use of panel data, and resulting inclusion of time series relationships, raises an additional concern regarding the presence of fundamental changes in the structure and operational nature of companies that would undoubtedly lead to changes in the risk profile and financial relationships (as measured in the model). Such changes are of particular interest considering the significant structural changes which have occurred in South Africa during the period of the study, including the abolition of apartheid in the 1990's, the installation of a democratic government, and financial and stockmarket liberalization. The result of such structural changes on the Johannesburg Securities Exchange are manifested in foreign listing and integration, pyramid structures, and subsequent unbundlings, all of which would change company structure significantly. Lastly, the limitations of financial reporting, and the quality of information available in the annual financial statements has been questioned. The results of this research however add weight to the argument in favour of the usefulness of GAAP based financial statements as being value relevant.

5.5 Directions for future work

The annual financial statements do not only report earnings and the book value of equity, they also report many other accounting information, such as various revenues and expenses, and different assets and liabilities, each of which have different measurement attributes and thus, different characteristics with respect to any particular valuation model. Valuation differences can, therefore, arise between cash flows and accruals, which can be viewed as two earnings components, and their differential valuation implications are of a fundamental interest to accountants. This study only focuses on the two summary measures, bv_t and X_t. Dissagregation of these measures following the proof thereof in this study provide a rich area for future research, mainly in the area of discretionary accruals.

A second area for future research involves the specification of the other information variable. There is little doubt that the use of abnormal dividends should be complimented by further variables to incorporate other aspects of business.

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Appendix - Companies included in sample

Name	Ticker
AMALGAMATED BEVERAGE INDUSTRIES LTD	ABI
ADONIS KNITWEAR HOLDINGS LTD	ADO
ADCORP HOLDINGS LTD	ADR
AECI LTD	AFE
ANGLO AMERICAN PLC	AGL
AFROX HEALTHCARE LTD	AHH
ALEX WHITE HOLDINGS LTD	ALX
ANGLO AMERICAN PLATINUM CORPORATION LTD	AMS
AFRICAN & OVERSEAS ENTERPRISES LTD	AOO
ASPEN PHARMACARE HOLDINGS LTD	APN
AFRICAN RAINBOW MINERALS LTD	ARI
ABSA GROUP LTD	ASA
ASSORE LTD	ASR
ALLIED ELECTRONICS CORPORATION LTD	ATN
ATLAS PROPERTIES LTD	ATS
AVI LTD	AVI
BARLOWORLD LTD	BAW
BARPLATS INVESTMENTS LTD	BPL
BRANDCORP HOLDINGS LTD	BRC
BEARING MAN LTD	BRM
BASIL READ HOLDINGS LTD	BSR
BIDVEST GROUP LTD (THE)	BVT
CANADIAN OVERSEAS PACKAGING INDUSTRIES LTD	CAN
CAXTON CTP PUBLISHERS AND PRINTERS	CAT
CROOKES BROTHERS LTD	CKS
COMBINED MOTOR HOLDINGS LTD	CMH
CONCOR LTD	CNC
CONTROL INSTRUMENTS GROUP LTD	CNL
CONAFEX HOLDINGS SOCIETE ANONYME	CNX
CORPCAPITAL LTD	CPA
CAPITAL PROPERTY FUND	CPL
CAPITAL ALLIANCE HOLDINGS LTD	CPT
CARGO CARRIERS LTD	CRG
CERAMIC INDUSTRIES LTD	CRM
CORWIL INVESTMENTS LTD	CRW
CASHBUILD LTD	CSB
CULLINAN HOLDINGS LTD	CUL
DIMENSION DATA HOLDINGS PLC	DDT
DELTA ELECTRICAL INDUSTRIES LTD	DEL
DON GROUP LTD	DON
DISTELL GROUP LTD	DST
EDGARS CONSOLIDATED STORES LTD	ECO
ELLERINE HOLDINGS LTD	ELH
ELB GROUP LTD	ELR
EUREKA INDUSTRIAL LTD	EUR
FOSCHINI LTD	FOS
FIRSTRAND LTD	FSR
GOOD HOPE DIAMONDS (KIMBERLEY) LTD	GDH
GENCOR LTD	GMF
GRINDROD LTD	GND

GRINTEK LTD	GNK
GROUP FIVE LTD	GRF
ALLAN GRAY PROPERTY TRUST	GRY
HOSKEN CONSOLIDATED INVESTMENTS LTD	HCI
HUDACO INDUSTRIES LTD	HDC
HIGHVELD STEEL & VANADIUM CORPORATION LTD	HVL
HYPROP INVESTMENTS LTD	HYP
ISPAT ISCOR LTD	IIS
ILLOVO SUGAR LTD	ILV
IMPALA PLATINUM HOLDINGS LTD	IMP
INDEPENDENT FINANCIAL SERVICES LTD	IND
INMINS LTD	INM
IMPERIAL HOLDINGS LTD	IPL
ITALTILE LTD	ITE
JOHNNIC COMMUNICATIONS LTD	JCM
JIGSAW HOLDINGS LTD	JGS
JASCO ELECTRONICS HOLDINGS LTD	JSC
KWV BELEGGINGS BPK	KWV
LABAT AFRICA LTD	LAB
LA GROUP LTD	LAR
LONDON FINANCE & INVESTMENT GROUP PLC	LNF
LONMIN PLC	LON
MUTUAL & FEDERAL INSURANCE COMPANY LTD	MAF
MASONITE (AFRICA) LTD	MAS
MEDI-CLINIC CORPORATION LTD	MDC
MR PRICE GROUP LTD	MPC
MORIBO LEISURE LTD	MRB
MARSHALLS LTD	MSS
METAIR INVESTMENTS LTD	MTA
MURRAY AND ROBERTS HOLDINGS LTD	MUR
NICTUS LTD	NCS
NEDCOR LTD	NED
NORTHAM PLATINUM LTD	NHM
NAMIBIAN SEA PRODUCTS LTD	NMS
NAMPAK LTD	NPK
NU-WORLD HOLDINGS LTD	NWL
OCEANA GROUP LTD	OCE
OCTODEC INVESTMENTS LTD	OCT
PALS HOLDINGS LTD	PAL
PALABORA MINING CO LTD	PAM
PANGBOURNE PROPERTIES LTD	PAP
PRETORIA PORTLAND CEMENT COMPANY LTD	PPC
PUTCO PROPERTIES LTD	PPR
PASDEC RESOURCES SA LTD	PSC
PSG GROUP LTD	PSG
PUTCO LTD	PTC
RAINBOW CHICKEN LTD	RBW
REUNERT LTD	RLO
RELYANT RETAIL LTD	RLY
REX TRUEFORM CLOTHING COMPANY LTD	RTO
SABMILLER PLC	SAB
SA EAGLE INSURANCE COMPANY LTD	SAE
STANDARD BANK GROUP LTD	SBK
SABLE HOLDINGS LTD	SBL

SEARDEL INVESTMENT CORPORATION LTD	SER
SASFIN HOLDINGS LTD	SFN
SAGE GROUP LTD	SGG
SHOPRITE HOLDINGS LTD	SHP
SANTAM LTD	SNT
SPANJAARD LTD	SPA
SUPER GROUP LTD	SPG
SPESCOM LTD	SPS
SUN INTERNATIONAL LTD	SUI
TIGER BRANDS LTD	TBS
TONGAAT-HULETT GROUP LTD	TNT
TRANSPACO LTD	TPC
TRANS HEX GROUP LTD	TSX
UNITED SERVICE TECHNOLOGIES LTD	USV
UNITRANS LTD	UTR
VAALTRUCAR LTD	VCR
VAALAUTO LTD	VLT
VENFIN LTD	VNF
VENTER LEISURE & COMMERCIAL TRAILERS LTD	VTL
WANKIE COLLIERY COMPANY LTD	WAN
W B HOLDINGS LTD	WBH
WILSON BAYLY HOLMES-OVCON LTD	WBO
WOOLTRU LTD	WLO
WINHOLD LTD	WNH
YORK TIMBER ORGANISATION LTD	YRK