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**The Value Relevance of Accounting Earnings and Book Values
to Share Price
On the Industrial Sector of the JSE Securities Exchange**

A dissertation presented to
the Department of Accounting
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Master of Commerce

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Abstract

This paper investigates the value relevance of accounting earnings and book value of equity to share price on the Johannesburg Security Exchange (JSE) market. The research was motivated by the results of different researchers on different markets which reveal that the value relevance of accounting earnings and book value has increased on emerging capital markets while it has decreased on developed capital markets. The results of this paper indicate that the value relevance of accounting earnings and book value has increased on the JSE capital market which is consistent with the emerging capital market findings. Moreover the incremental explanatory power of accounting earnings and the incremental explanatory power of book value has increased across the study period of 1993-2002. Meanwhile the incremental explanatory power of accounting earnings is weakly significant. Even though, the value relevance of accounting earnings and book value is greater in the firms with non intangible intensive assets (transitory earnings) than the firms with intangible intensive assets (permanent earnings) respectively. However, the transitory earnings and intangible intensive firms have insignificant influence on increasing the value relevance of accounting earnings and book value to the share price.

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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. This research has not been submitted for any degree or examination at this or any other university.

Signed by candidate

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Chapter one

1.1 Introduction

This study investigates change in the value relevance of accounting earnings and book value of equity to share price for the firms listed in the Industrial Sector of Johannesburg Security Exchange (JSE) for the period of 1993- 2002. The study is motivated by the results of different researchers on the value relevance of accounting earnings and book value on different markets. The value relevance of accounting earnings and book value has declined on developed markets such as the US (*Brief & Zarowin 2000; Brown, Lo & Lys 1999; Lo & Lys 2000*), while increasing on emerging capital markets (*Bao & Chow 1999*). The professionals and the researchers claim that the value relevance of accounting earnings and book value decreased because the economy has changed from an industrialized to high tech service oriented economy, while value relevance in emerging capital markets increased because of the rapid capital market development (*Bao & Chow 1999*). Although the capital market in South Africa is an emerging capital market (*Bharath 2004*) the hypothesis of this paper hypothesises the same trend such as in emerging capital markets, which is that value relevance of accounting earnings and book value increased across time.

This broad area of research known as the capital market research encompasses a number of different areas of the research in accounting and finance. It can be broadly defined as the pool of literature that examines the relationship between financial statements information and the capital market. The association models are used for the different treatment and use of the types of accounting and market information. For example, some association models specify a relation between price on earnings, whereas others use return and earnings, or return, earnings and equity book value. This broad area of capital market research originated with seminar paper by *Ball and Brown (1968)* is conducted on the information content of accounting earnings. It is different from value relevance studies, as value relevance is a long period return measurement. However the objective of information content studies is to assess the amount of the information conveyed to investors by the announcement of the event. The main reason for the value relevance research is to describe how well accounting numbers reflect information embedded in market price

Thus, value relevance is used to investigate the relationship between accounting numbers and market price in general, accounting numbers consider value relevance if it displays a high degree of association with share price. Accounting numbers provide information for valuation that underlines the value relevance literature which adheres to the specifications of the valuation model. *Ohlson (1995)* developed a valuation framework, which expresses equity value under a given dividend valuation model and clean surplus as a linear function of both accounting earnings and book value of equity. This valuation model gives a framework for the combination valuation of the accounting earnings and book value to share price which is the underlining topic of this thesis. However, the theoretical foundation of value relevant studies is a combination of the valuation theory plus contextual accounting arguments that allows researchers to predict how accounting numbers relate to the market value of equity (*Beaver 2002*). The contextual accounting argument is the accounting standards that the firms use to prepare their financial statements.

Value relevance of accounting earnings and book value has decreased across time (*Brief & Zarowin 2000; Brown, Lo & Lys 1999; Lin & Walker 2000 and Lo & Lys 2000*). While *Collins Maydew and Weiss 1997 (1997)* have provided evidence that contradicts that of *Brown, Lo and Lys (1999)* and *Lo and Lys (2000)*, namely that the joint explanatory power of accounting earnings and book value has not decreased over time. Conversely, their results indicate that the value relevance of accounting earnings and book value has increased slightly during the last four decades. However *Brown, Lo and Lys (1999)* interpreted their results as a consequence of an upwards bias in the R^2 metric used in accounting research as a basic measure of value relevance. *Brown, Lo and Lys (1999)* recommend that the upward bias (scale) can be controlled by deflating the variable by the price at the beginning of the year. For this reason the incremental value relevance of accounting earnings decreased while the value relevance of book value is subject to debate on their research design (*Brown, Lo & Lys 1999; Lo & Lys 2000 and Collins, Maydew & Weiss 1997*). The value relevance of accounting earnings and book value has increased on emerging capital markets (*Bao & Chow 1999*). *Bao and Chow (1999)* furthermore document that incremental

value relevance of accounting earnings increased while the incremental value relevance of book value is insignificant in the emerging capital market.

However, most researchers argue that value relevance of accounting earnings and book value decreased because of the firm characteristics, performance and size (Barth, Beaver & Landsman 1998; Brief & Zarowin 2000 and Hayn 1995). Moreover, Collins, Maydew and Weiss (1997) argue that the same factors that contributed to the decline in the value relevance of accounting earnings caused the increase in value relevance of book values. Brief and Zarowin (2000); Burgstahler and Dichev (1997) and Collins, Maydew and Weiss (1997) also suggest that book value takes on increased importance relative to the earnings when earnings are transitory. Book value serves a better proxy for future earnings when the current earnings contain a large amount of transitory earnings, meanwhile the value relevance of book value decreased as the number of intangible intensive firms increased. Taken as a whole the value relevance of accounting earnings and book value against share price move systematically to one another, as the incremental value relevance of accounting earnings has declined, it has been replaced by the increase in incremental value relevance of book value and vice versa.

This paper investigates the value relevance of accounting earnings and book value over time using a framework provided by Ohlson (1995), which expresses the share price as a function of both accounting earnings and book value of equity. This paper estimates yearly cross-sectional regressions for a ten year period spanning 1993 to 2002 from the JSE market and uses R^2 as the primary metric to measure value relevance. The scale affect on the R^2 is controlled by the year beginning share price of the firm. Then, using a technique described in Theil (1971) and applied by Collins, Maydew and Weiss (1997) the explanatory power of accounting earnings and book value is decomposed into three components: (1) explanatory power common to accounting earnings and book value, (2) incremental explanatory power of accounting earnings, and (3) incremental explanatory power of book value. The common component takes into account that to some extent earnings and book values act as substitutes for each other in explaining share price, while they also function as compliments by providing explanatory power incremental to one another.

Similar with the findings from emerging capital markets, value relevance of accounting earning and book value has increased over the study period of 1993 to 2002 on the JSE capital market. This result validates the null hypothesis of the first sub-problem of this paper which is that value relevance of accounting earnings and book value increased over time. The explanatory power of accounting earnings and explanatory power of book value are found to have actually increased over the study period of time. The incremental explanatory power of accounting earnings and incremental explanatory power of book value have increased as well over the study period of time, however the increase in the incremental explanatory power of accounting earnings is weakly significant. Beside the second sub-problem of this paper hypotheses systematic change in the incremental value relevance of accounting earning and incremental value relevance of book value against share price.

Next this paper investigates a possible explanation for the observed increase in the explanatory power common to accounting earnings and book value, incremental explanatory power of accounting earnings and incremental explanatory power of book value. Firstly an examination is undertaken to determine whether firms with intangible intensive assets¹ and/ or transitory earnings can have a different affect on the value relevance of accounting earnings and book value to share price. It found that the value relevance of accounting earnings and book value is greater in the firms with non intangible intensive assets than intangible intensive firms. Moreover, the explanatory power common to both accounting earnings and book value is greater in the firms with transitory earnings than the firms with permanent earnings. As a result, the value relevance of accounting earnings and book value has increased as the percentage of firms with intangible intensive assets decreased, this also increases when the percentage of the firms with transitory earnings increases.

¹ Firms which have a greater amount of intangible assets such as research and development, information technology, employee training, brand, customers' acquisitions, unique organizational structure etc. Intangible assets according to this paper are assets which are not recognised on the book value of the firms.

Secondly, this paper documents that the incremental explanatory power of accounting earnings and incremental explanatory power of book value is greater on the firms with non-intangible intensive assets than the firms with intangible intensive assets. The value relevance of accounting earnings and incremental explanatory power of accounting earnings is greater than the value relevance of book value and incremental explanatory power of book value on the firm with intangible intensive assets respectively. The result indicates that the connotation of the primary role of the accounting earnings is providing information about the abnormal earnings on the firms with high unrecognised assets. The variability of the firms earnings is causing the increase in the relevance of book value. This is the same as the firms with low performance which increase the value relevance of book value in the Ohlson (1995) model. However, the incremental and value relevance of accounting earnings and value relevance of book value is almost equal in firms with transitory earnings although the incremental explanatory power of book value increased significantly in the firms with transitory earnings. The value relevance of accounting earnings and value relevance of book value is greater in the firms with transitory earnings than the firms with permanent earnings.

Finally, the overall results indicate that the changes in the intangible intensive and transitory earnings are insignificantly associated with variation on value relevance of accounting earnings and book value. Thus the value relevance of accounting earnings and book value increases as the firms with transitory earnings increase while it decreases in the firms with intangible intensive assets. However, the firms with transitory earnings appear to decrease across the period of study even if they show systematic change with the change in the value relevance of accounting earnings and book value. The percentage of the firms with intangible intensive assets decreased as the value relevance of accounting earnings and book value increased across the study period of time, which could explain the increase in value relevance of accounting earnings and book value. However, the change in the firms with intangible intensive assets and transitory earnings are insignificant in explaining the variation on the explanatory power of accounting earnings and book value. Even though they may contribute insignificant influence to the increase in value relevance of accounting earnings and book value across time.

1.2 Statement of the problem

Value relevance of accounting earnings and book values has been researched for many years and a large number of studies have explained the value relevance of accounting numbers. Typically their approach is to examine the association between market value and accounting summary measures such as earnings and book value. Suggestively testing whether accounting amounts explain cross-sectional variation in share price. Thus, the accounting amount is defined as value relevant if it has a predictive association with equity market value².

The main reason for the value relevance research is to describe how well accounting numbers reflect information embedded in the market price. This paper investigates the value relevance of accounting earnings and book value to share price on the Johannesburg Security Exchange (JSE) industrial sector. Based on the findings, an assessment will be made as to how much an investor should rely on accounting information to predict for economic decision-making and to provide accounting standard setting attention with the final evidence of the change in the value relevance of accounting numbers over time.

1.2.1 Sub problems:

Sub problem one: the first sub problem is to determine whether the explanatory power of accounting earning and book value to share price increases or decreases over a period of time.

Sub problem two: the second sub problem is to compare the incremental value relevance of accounting earning and incremental value relevance of book value to share price within the industrial sector over a period of time.

Sub problem three: the third sub problem is to analyze and to interpret the data based on permanent and transitory earnings, and intangible intensive industries, so as to

² Share price and equity market value are used interchangeably.

evaluate the value relevance of accounting earnings and book value to share price in different situations.

1.3 Rationale of the study

The primary aim of most companies is wealth creation for their shareholders. Wealth for shareholders is measured by the share price traded in the market which is the reflection of the operation and finance of the firm, national economy and other factors. Therefore the value of the company depends on its operation and financial strategy, which is disclosed in their annual financial statements. The balance sheet and the income statements are the two primary components of the financial statements, representing the two basic accounting constructs: accounting earnings and book value. Accounting earnings denote the addition (or reduction) to the book value during the period from the product of all income and expense at the given period of time. While book value represents the net assets of the company, which is owned by common equity investors, at a given point in time. Both balance sheet and income statements provide valuation relevant information, which is the foundation of value relevance studies combined with the contextual accounting agreement. Therefore, the value of a firm's equity can be expressed as a function of the accounting earnings and book value (*Ohlson 1995*). Based on this model, different researchers for example, *Brown, Lo and Lys (1999)* and *Bao and Chow (1999)* conclude differently on different markets. Accordingly, this paper investigates the change in the value relevance of accounting earning and book value to share price. Value relevance means the accounting amount is associated with some measure of value, e.g., share price. If the accounting earnings and book value significantly increase the power of estimating the equation to explain equity value, then it must be relevant and measure with at least some reliability. If it is not relevant, there will be no relation with equity market value. Share price can be determined based on cash flow, dividends growth model, multipliers and / or residual earnings (economic value added) valuation methods.

The Ohlson model (OM) (1995) builds on the accounting based residual income valuation (RIV) model for equity valuation then specifies a linear information model

(LIM) for time series behaviour of residual income³. Moreover Ohlson identifies that accounting variables (accounting earnings and book value of equity) have value relevance in equity valuation. Thus, this study is motivated by the change in the value relevance of accounting earnings and book value on different markets.

1.4 Organization of the study

The next chapter (chapter two) consists of a literature review discussing various relevance issues in the value relevance of accounting information research. The purpose of this is to provide the basic theoretical and empirical foundation for the thesis and a detailed review of the value relevance of accounting earnings and book value. This chapter also reviews the factors that influence the value relevance of accounting earnings and book value to share price. The third chapter provides research methodology. Chapter four consists of the empirical research undertaken in the thesis which is the value relevance of accounting earnings and book value to share price on the JSE capital market. Finally chapter five concludes the thesis with a summary of the findings and a conclusion.

³ Residual income means the company's profit on the excess of its cost of capital multiplied by total invested capital.

Chapter two

Value relevance of accounting earnings and book value

2.1 Introduction

The broader area of the capital market research encompasses a number of areas of research in accounting and finance research. It can be broadly defined as the pool of the literature that examines the relationship between financial statement information and capital market. The five primary areas of capital market research according *Beaver (2002)* are (1) market efficiency, (2) Feltham-Ohlson modelling, (3) value relevance, (4) analysts behaviour, and (5) discretionary behaviour⁴. This thesis falls into the third stream of capital market research, examining the change in the value relevance of accounting earnings and book value to share price on JSE capital market and relies on the Ohlson 1995 model. The underlining assumption suggests that the accounting function provides information that reflects the performance of an organization and consequently should be reflected in the stock market, this metric being the relevant market measure of return to stockholders. Therefore, accounting information should be relevant and useful for the investors in pricing stock and in their asset allocation decisions.

The accounting variable that has received the most attention in the association study (such as information content, valuation relevance and value relevance studies) is accounting earnings since it has higher visibility as a measurement of the bottom line summary of measure performance. The information content of accounting earnings has been studied since *Ball and Brown (1968)*. This study was primarily concerned with timing of earnings announcements and not with the value relevance studies. There are also a number of accounting variables that have been examined for the statistical association with stock price such as cash flows, dividend pay out and book value. However, what still needs to be investigated is how the market interprets and acts upon the accounting information.

⁴ Discretionary behavior includes voluntary earnings forecasting, voluntary disclosure, choice of accounting methods, and estimating of accruals.

This chapter reviews the conceptual foundation of the value relevance of accounting earnings and book value, and the empirical findings of value relevance studies by different researchers in different capital markets. The remaining section presents the factors which influence changes in the value relevance of accounting earnings and book value to share price. The chapter concludes with a summary of the key issue raised in the chapter.

2.2 Definition

Association models allow researchers to evaluate the relevance of accounting numbers for economic decision making⁵. The term value relevance is used to evaluate accounting numbers in general; accounting numbers are considered of particular value relevance if they display a high degree of association with the market measurement of value. *Beaver (2002)* states that value relevance researchers examine the association between the security price, as dependent variable, and a set of accounting numbers. An accounting number is termed value relevant if it is significantly related to the dependent variable. *Lo and Lys (2000)* define value relevance as a specific information item of an independent variable that is value relevant only if the coefficient of variance of the identified item is non-trivial. *Barth (2000)* furthermore states that value relevance means the accounting variable is associated with some measure of value, e.g. share price. Accounting variables to be value relevant, must be relevant to investors and sufficiently reliable to be reflected in the value measures that is share price, which means that the accounting variable is relevant and can be measured at least with some reliability. Failure to detect a significant relation between the independent variables and equity value could be attributable to lack of relevance, lack of reliability, or both. *Holthausen and Watts (2001)* stated that a variable is defined as value relevant if it exhibits the predicted association with a measure of market equity. Therefore, the concept of value relevance refers to the degree of association between accounting numbers and the market value of the firm. The degree of association is measured by the R^2 of the regression of accounting numbers to

⁵Barth (2000) states as “ investors represent a large class of financial statement users and thus much academic research addressing financial reporting issue relevance to predicting accounting particularly standard setters, adopts an investors perspective ... investors are a primarily interested in information that can help them assess the value of the firm for the purpose of making informed investments choice”.

market value that the higher value of R^2 indicates the higher value relevance of accounting numbers (Beaver 2002; Brief & Zarowin 2000; Brown, Lo & Lys 1999; Collins, Maydew & Weiss 1997; Lin & Walker 2000 and Lo & Lys 2000). The comparison of accounting numbers to share price provides a measure of variable that are the inputs of equity valuation (Holthausen & Watts 2001). To achieve this, this research paper uses accounting earnings and book value implicit in the share price.

The theoretical foundation of value relevance studies is a combination of the valuation theory plus contextual accounting arguments that allow researchers to predict how accounting numbers relate to the market value of equity (Beaver 2002). Accounting numbers result from the application of accounting standards. The higher degree of association between accounting numbers and the market value of the firm produced under a specific accounting standard, the more relevant that accounting standard is considered to be. Valuation relevance is different from value relevance because the valuation denotes a process, whereas value denotes a quantity (Lo & Lys 2000). However, the valuation assumption is only half of the story. Value relevance studies typically incorporate contextual accounting arguments to predict the relation between accounting variables and market value (Beaver 2002). Therefore, as mentioned on the above the two conceptual foundations of value relevance research, valuation approach and contextual accounting arguments, are briefly mentioned below.

2.3 Valuation approaches

Value relevance literature requires the use of a valuation model to link the firm's value with the firm's specific accounting variables. This means the value relevance accounting numbers depends on the specifications of the valuation model that links the accounting numbers to the value of the firms. In this case, the variables to be investigated are the value relevance of accounting earnings and book value to the firm value using the Ohlson valuation approach. The valuation relevance of accounting earnings and book value is one of the relationship models which are used to evaluate information in financial statements against information content in stock price. This means the relationship between accounting information and the evaluation of the prices over time, which is a process, a central theme of the valuation relevance approach (Lo & Lys 2000). Holthausen and Watts (2001) identify the consequence of

an inappropriate valuation approach resulting in an incorrect predation for the sign and magnitude of the coefficient of accounting numbers in regression and an exacerbated correlated omitted variable problem.

Lo and Lys (2000) found that accounting earnings and book value have valuation relevance while there is a decline in their valuation relevance during the study period of 1972-2000. *Nwaeze (1998)* also states that earnings complement book value in explaining market value meanwhile the degree of complements can be affected by the company costing system, which is cost plus regulation or is based on the marketing and production strategy in a competitive market.

There are three major types of valuation approaches⁶. In the oldest, an earnings only approach, *Miller and Modigliani (1966)* characterizes value as the present value of permanent future earnings. The research of *Barth, Beaver and Landsman (1996)* adopts a balance sheet approach while *Ohlson (1995)* adopts the firm's value as a linear function of both book value and accounting earnings approaches which is the method most widely used by value relevance studies (*Barth, Beaver & Landsman 2001*).

Besides, in the imperfect and incomplete markets, no valuation approach will be perfect. These valuation approaches are earning approach, book value approach and Ohlson approach and will be briefly mentioned in the following section.

2.3.1 Earnings approach

The earnings approach expresses the relation in terms of the permanent earnings in the light of *Miller & Modigliani (1966)* who note that net income can be viewed as a proxy for permanent earnings. The criticism of this model is that GAAP income is not intended to measure permanent earnings and consequently the usefulness of the approach will depend on the additional variables included in the model and the assumption about the difference between permanent earnings and GAAP earnings (*Holthausen & Watts 2001*). The two further potential covert problems are firstly the

⁶ See *Barth, Beaver & Landsman (2001)*; *Kothari (2001)* and *Holthausen & Watts (2001)* for further discussion of those valuation approaches.

existence of transitory earnings perhaps because of the abandonment option (e.g., Hayn 1995) and secondly the existence of conservatism in the reporting process which leads to losses being recognised sooner than gains (*Holthausen & Watts 2001*). *Lo and Lys (2000)* note that the transience of extreme earnings implies a non-linearity relation between share price and earnings.

The role of accounting earnings in valuation has been well established since Ball and Brown. *Ball and Brown (1968)* investigated the information content of accounting earnings. Thus, information content is representing an event study that the timing of the information is an overriding issue but not for the value relevance studies. *Ball and Brown (1968)* found that the sign of the earnings news available throughout the 12 months preceding their release is positively related to change in stock price. This is interpreted as indicating that earnings have valuation relevance (*Lo and Lys 2000*). Earnings have valuation relevance conveying information about the future profitability (*Burgstahler & Dichev 19997*). *Nweaze (1998)* likewise found that earnings can provide complementary information for predicting future and abnormal earnings and he identified that future and abnormal earnings can be affected not only by the book value but also depend on the company characteristics (e.g. unrestricted market entry, strikes, or technological advances).

In the earnings capitalization model, stock price is expressed as a function of the earnings or the components of earnings under the assumption that earnings reflect information about the expected future cash flow. Thus, stock price regressed on the alternative measures of earnings and the measures whose regression has a higher R^2 are considered the best performance measure or the most value relevant. However, this model has a drawback because it is difficult to predict the coefficient of earnings and because the assumption of permanent earnings (*Holthausen & Watts 2001*).

2.3.2 Balance sheet approach

This approach expresses price as a function of the assets and liabilities of a given entity. The theory is that the present value of the expected future cash flows is from the underlying asset or liability. The future cash flow discounted at appropriate cost of capital equals the net asset value of the firm. This approach can use an association

study to assess the incremental value relevance of a balance sheet item. However, *Holthausen and Watts (2001)* label this approach as the valuation model in that the market value of equity is equal to the market value of assets minus the market value of liabilities. However, this model holds only if all the relevant markets exist for assets, liabilities and stock and all markets are competitive (*Holthausen & Watts 2001*).

Book value has played a limited role in equity valuation, while the earnings role has been well established since Ball and Brown (1968). Research on the value relevance of book value has been limited and therefore of more recent origin (*Beaver 2002* and *Spermann & Gantenbein 2002*). The valuation framework, developed by Ohlson in 1995, expresses equity value under certain conditions as a function of both earnings and book value. *Ohlson (1995)* stated that book value has a valuation relevance because of book value is a long-run performance measurement of the firm value. Thus, book value has a considerable alignment to share price, which is interpreted as it having valuation relevance (*Nweaze 1998*). So, the studies which use the book value of the firm's assets and liabilities to draw inferences about the value of the firm, given the assumption that measures of assets and liabilities hold the expected result of future activities. However, the expected result could be influenced by separable and non-separable competitive advantages (*Holthausen & Watts 2001*). In a firm with non-separable competitive advantage (such as company good will, trade mark), the value of the competitive advantage determines base on the going concern of the firm and the value of abandonment option is also affected by that situation.

2.3.3 Ohlson model approach

Ohlson (1995) developed a valuation framework, which expresses equity value under a given dividend valuation model and clean surplus as a linear function of both accounting earnings and book value of equity. Ohlson model is depends on the condition known as a clear surplus accounting more fully set out in Chapter three. The residual income valuation model provided a specification of the relation between market value and future abnormal earnings and the current book value of equity. The idea is that the value created or destroyed by the firm during any time period (residual income) must take into account not only accounting expenses but also the opportunity

cost of the capital employed in the business. The Ohlson (1995) model expresses value as the sum of the current book value and the discounted present value of expected abnormal earnings, defined as forecasted earnings minus a capital charge equal to the forecasted earnings times the discount rate (*Kothari 2001*). The Ohlson (1995) model employs the current earnings and book value as explanatory variables by assuming a no growth option even if the growth options are allowed because of the model. This is simply a transformation of the discount dividend model using a clean surplus assumption. *Collins, Maydew and Weiss (1997)* employ accounting earnings as well the value of future abnormal earnings replaced by current earnings.

Holthausen and Watts (2001) state that the Ohlson model has no empirical implications for the choice of different accounting procedures, however the implication comes from value relevance literature. Thus, standard setters can get feedback from value relevance studies of accounting earnings and book value rather than valuation relevance studies of those variables based on the Ohlson's (1995) model. Because the variables used on the value relevance study are prepared based on the accounting standards. The combination of accounting earnings and book value are the most highly associated with market value of equity rather than the individual basis of the accounting earnings and book value approaches and therefore, reduces the correlated omitted variable (*Holthausen & Watts 2001*). The Ohlson model (OM) (1995) is built on the accounting based residual income valuation (RIV) model for equity valuation and then specific linear information model (LIM) for time series behaviour of residual income which is the theoretical foundation of the price and return models (refer to Chapter three for detail).

2.4 Contextual accounting agreements

Value relevance studies also require the incorporation of the contextual accounting argument to predict the relation between accounting variables and market value (*Beaver 2002*). A key role of financial statements is to summarize relevant information in a manner consistent with the underlining accounting standards. For example, the predicate that pension assets and obligations are priced as assets and obligation of the company is based on the definition of accounting standards.

Accounting standards in South Africa (Generally Accepted Accounting Practice (GAAP)) has a history of harmonisation with the International Accounting Standards (IAS). Therefore, the JSE listed companies are required to prepare their financial statement in accordance with South Africa Statements of Generally Accepted Accounting Practice (GAAP) or International Accounting Standards (IAS). Different accounting principles or rules give rise to different results (*Bao and Chow 1999*). Hence, the income statement and balance sheet are two primary statements in financial accounting and, therefore, the determinants of accounting earnings and book value respectively are presented below. Value relevance research provides evidence as to whether the income and balance sheet variables relate to value in the predicted manner (*Beaver 2002*).

2.4.1 Income statement

The income statement reports an operation that indicates performance during a given period of time and it gives information regarding turnover, after which various costs, including income tax, are subtracted to obtain the net income available to common stockholders. This means the ability of the business to earn a return for stockholders. An earnings per share (EPS) is net income over numbers of shares outstanding at the financial year-ends. EPS is the most important variable even if net income is an aggregate of components, which are not homogeneous.

The primary role of income statements for equity valuation is providing information about the firm's abnormal earnings opportunities, i.e., intangible assets. Thus to describe the value relevance of accounting earnings consideration must be given to affects of the industrial characteristics (intangible intensive or not) and performance (transitory or permanent earnings). The lack of association between earnings and stock price for good news is also defined by accounting conservatism which is a result of contracting, litigation and/ or tax issues (*Holthausen & Watts 2001*).

2.4.2 Balance sheet

The balance sheet indicates the financial situation of the company, which is what a company owes (liabilities) and what the company owns (assets) at a given point in time. It is a financial snapshot of a company and it gives information on capital (share and loan capital), current liabilities (creditors, taxation, dividends and overdraft), fixed assets (plant, building, machinery and equipment) and current assets (inventory, debtors and cash). A distinctive role of the balance sheet is to facilitate loan decisions and to monitor debt contracts. It fulfils these roles by providing information on liquidation values, the amount available to debt holders in the event of default which is linked to the value of firm abandonment option (*Barth, Beaver & Landsman 1998*). The net asset, book value of total assets minus book value of total liabilities, reflects the net stock of assets of a firm at a given point in time and is represented by the book value of equity in the balance sheet. Book value of equity is largely determined by accounting conventions but the market value of the asset reflects its earning power and expected cash flow. This indicates that the book value of an asset reflects its original cost; it might deviate significantly from market value if the earning power of an asset has decreased or increased significantly since its acquisition (*Spremann & Gantebein 2002*). Therefore, the value relevance of book value could be affected by the industrial characteristics, performance and the fact that countries adopt different Generally Accepted Accounting Practice (GAAP) which is one of the determinants for the differences in the book value and market value.

To summarize, value relevance is often used to evaluate accounting numbers, the accounting numbers are considered particularly value relevant if it displays a high degree of association with the market measurement of value. Accounting numbers provide information for valuation that underlies the value relevance literature. This value relevance literature requires the specification of a valuation model (an adequate proxy for the firm value) to link firm value with the firm specific characteristics that are in a value relevance context and hence have value to investors. *Ohlson (1995)* developed a valuation framework, which expresses market equity under a given dividend valuation model and clean surplus as a linear function of both accounting earnings and book value of equity. Ohlson model used the dividend growth model formula to develop a valuation model given clean surplus accounting. However, the

theoretical foundation of value relevance studies is a combination of the valuation theory plus contextual accounting arguments that allow researchers to predict how accounting numbers related to market value of equity (*Beaver 2002*). A primary role of financial statements is to summarize relevant information in a manner consistent with the underlying accounting standards. Thus, a primary role of income statements is to provide information about the firm's abnormal earnings opportunities and a primary role of a balance sheet is to provide information on liquidation values. Therefore, accounting earnings and book value have a valuation relevance which has decreased over time (*Lo & Lys 2000*). The following section presents the empirical evidence of the value relevance of accounting variables.

2.5 Value relevance of accounting variables.

Ball and Brown (1968) compare the informativeness of earnings and cash flow and determine whether the accrual process makes earnings more informative than cash flow. Their evidence suggests that the annual abnormal return adjustment is greater for the earnings change than for cash flow change consistent with the accrual process making earnings more informative. *Bernard (1995)* furthermore compares the explanatory power of the model in which share price is explained by book value and accounting earnings versus a model of share price based on the dividends, and find that the accounting variables dominate dividends. *Brief and Zarowin (2000)* also conclude that value relevance of accounting earnings and book value is dominant for the book value and dividends model except in the firms with transitory earnings and intangible intensive companies. These results suggest that accounting variables based on accrual are dominant in their value relevance. The following section presents the empirical evidence of the value relevance of accounting, value relevance of book value, and value relevance of the combination of both accounting earnings and book value.

2.5.1 Value relevance of accounting earnings

Ball and Brown (1968) study emphasises the information content of accounting earnings and the degree of association between accounting earnings and share price

which is the foundation of value relevance of accounting earnings studies. *Strachan (1984)* compares accounting earnings and book value of equity to assess the monitor for wealth creation and he finds that an earning per share (EPS) growth is a far better monitor of shareholders' wealth creation than ratio of economic value to book value. However his sample selection may be unreliable because of the 30 JSE listed sample companies from the 'top 100' published in the Sunday Times according to earning per share (EPS) compound growth over the study year of 1978-1982. *Bao and Chow (1999)* furthermore test the association between accounting earnings and book value of equity to share price over a period of time and they find that the incremental explanatory power of accounting earnings increased over time while the incremental explanatory power of book value was not significant until 1995.

Brief and Zarowin (2000) whose study covered two ten year sub periods found a decline in the relevance of reported earnings over the study period of time and, by implication, the decision usefulness of earnings also declined over the study years of 1978-1997. In addition *Collins, Maydew and Weiss (1997)* found that while the incremental value relevance of bottom line earnings declined, it was replaced by increasing value relevance of book values. *Brown, Lo and Lys (1999)* findings are consistent with the *Collins, Maydew and Weiss (1997)* study that the value relevance of accounting earnings decreased over time. However, unlike *Collins, Maydew and Weiss (1997)*, the rates of decline are more than double and they conclude that information conveyed by reported earnings and information relevance to investors has decreased over time.

The declining contemporaneous linear relation between share price and accounting earnings is largely explained by the increase in earnings lags and asymmetry over time (*Ray & Zarowin 2003*). *Ray and Zarowin (2003)* conclude that both lags and asymmetry could result from the nature of accounting rules, managerial reporting choice, non-earnings information, market inefficiency or competition. In contrast, *Collins, Maydew and Weiss (1997)* conclude that the temporal shift of relative importance of earnings to book value is because of the percentage increase in intangible intensive firms, the magnitude of nonrecurring items, frequency of negative earnings, and average firm size. However the argument by *Brown, Lo and Lys (1999)* is to the contrary emphasising the actual decrease in the value relevance of accounting

earnings. Thus, the percentage increase in intangible intensive firms, the magnitude of nonrecurring items, frequency of negative earnings, and the average firms size have insignificant influence on the decrease on the value relevance of accounting earnings.

2.5.2 Value relevance of book value

Fama and French (1992) found that there is a strong relationship between average returns and book value of equity. They established, in examining the cross-section of expected stock return between 1963 and 1990, that the positive relation between price to book ratio and average return persists in both the univariate and multivariate test. They found a strong relationship between the average returns on the stock and size as well as a strong cross-sectional relationship between average returns and book to share price. Book value of equity per share contributes incremental explanatory value which is both statistically and economically significant (*Lin & Walker 2000*). *Brief and Zarowin (2000)* also found that book value is the dominant valuation variable, both in terms of its own value relevance and its incremental value relevance with respect to either earnings or dividends but nevertheless decreased in relevance over time. *Collins, Maydew and Weiss (1997)* furthermore found that, over time the incremental value relevance of bottom line earnings had declined, while the value relevance of book values had increased. However, the increase in explanatory power of book value is entirely explained by the increase in scale (the size of share price) meanwhile the incremental explanatory power of book value increased because of the faster rate of decrease in the value relevance of accounting earnings compared to the total value relevance of both accounting earnings and book value (*Brown, Lo & Lys 1999*). On the contrary *Bao and Chow (1999)* found that the incremental explanatory power of book value was not significant until 1995. *Bao and Chow (1999)* conclude that the insignificance of the book value prior to 1995 may be explained by the high inflation rate in 1993 (20%) and 1994 (35%) in major cities of China.

To summarize, the incremental value relevance of accounting earnings has declined in US over the past four decades (*Brief & Zarowin, 2000; Brown, Lo & Lys, 1999* and *Collins, Maydew & Weiss, 1997*). The evidence on balance sheet variables, however, is the subject of debate as *Collins, Maydew and Weiss, (1997)* found a small increase

in value relevance over time while *Brief and Zarowin, (2000)* and *Brown, Lo and Lys, (1999)* found the opposite. The issue here is one of research design which is mentioned in next section. However, *Bao and Chow (1999)* found that the incremental explanatory power of accounting earnings increased over time while the incremental explanatory power of book value was not significant until 1995. Whereas this result was found in the emerging capital market of China, the focus is now on how value relevance is common to both accounting earnings and book value to share price.

2.5.3 Value relevance of accounting earnings and book value

Penman (1998) considering the two numbers together makes sense: book value is the balance sheet measure of net assets that generate earnings and earnings is the income statement measure of returns for those assets. Thus, *Beaver (2002)* the combination of both accounting earnings and book value of equity are significant pricing factors. This indicates that the value relevance of the combination of both accounting earnings and book value of equity are relevant to explain share price on the market. The empirical evidence of the research motivated by the Ohlson (1995) model, which is the combination of both accounting earnings and book value, is presented below:

Collins, Maydew and Weiss (1997) investigated the change in the value relevance of earnings and book value of equity from 1953-1993 on a sample size of 115,154 firms year observations from NYSE, AMEX and NASDAQ. They found that the combined value relevance of earnings and book value of equity had not declined over the period investigated, but in fact, it appeared to have increased slightly. However, *Brown, Lo and Lys (1999)* replicated the work of *Collins, Maydew and Weiss (1997)* and interpreted the result as a consequence of an upward bias in the R^2 metric used in the accounting research as the basic measure of value relevance. They argue that the increase in value relevance of accounting information reported by *Collins, Maydew and Weiss (1997)* is attributed to the increase experienced in the coefficient of variation of scale over time, due to the existence of the scale biases when per share data is used in statistical analysis. *Brown, Lo and Lys (1999)* approach did not entirely eliminate the problem and the level of explanatory power remains overstated, and the relationship between R^2 and coefficient of variance is complex (not linear) (*Lo & Lys 2000*). Nevertheless, the complexity of the regression is outside the scope of this

paper and could be an area of further research. Complexity could be affected by the firm's contractual agreement with various claimholders and the underlining contract (*Hothausen & Watts 2001*).

To control the scale variance bias, *Brown, Lo and Lys (1999)* used logged price as a scale proxy to deflate per share value. They found that in fact there has been a decrease in the relationship between price and fundamental accounting variables over the last forty years that is not due to the fact that price leads earnings, but to a significant loss in the relevance of accounting information for equity valuation. *Lo and Lys (2000)* findings are consistent with the results of *Brown, Lo and Lys (1999)* who showed that there has, indeed, been a significant decline in the value relevance of accounting earnings and book value over the study period of the 1972-2000 of the sample from NYSE, AMEX and NASDAQ.

Brief and Zarowin (2000) conducted their research on 48,920 firm-year observations, from Compustat files covering the twenty year period from 1978 to 1997, to compare the value relevance of book value and dividends to value relevance of book value and reported earnings. They found that the explanatory power of book value and reported earnings is dominant when compared to the explanatory power of book value and dividends except in the situation of transitory earnings and intangible intensive companies. The explanatory power of the model with earnings and book value is, in all samples, greater than that of earnings, book value or dividends alone, but was found to decrease over a period of time. However, *Brief and Zarowin (2000)* did not control the scale effect and their finding were still consistent with these of *Brown, Lo and Lys (1999)*. *Brief and Zarowin (2000)* concluded that deciding whether book value, earnings, dividends and the combination of these variables are the most important valuation signals depends on the firm's (or industry's) overall characteristics and its performance in the particular period. *Lin and Walker (2000)* in the study of 1,521 companies quoted on the London Stock Exchange for the period 1990 to 1996, found a similar decrease in the value relevance of accounting earnings and book value as reported in US studies.

Bao and Chow (1999) investigated the relevance of accounting earnings and book value valuation in emerging capital market using data from Taiwan Economic Journal

(TEJ) database of the companies listed in the People Republic of China. They conducted an association test between “B”⁷ share price and the two sets of earnings and book value reported by the same company from 1992-1996 on a sample size of 213 firm-years observations. They found that accounting earnings and book value are significant toward share price on both domestic⁸ and International Accounting Standards (IAS). However, value relevance of accounting earnings and book value is dominant where the accounting information is based on IAS. In addition, they found that the explanatory power of both earnings and book value to share price had been increased over the period investigated. The impact of scale was found to be insignificant because the cross-sectional distribution of variance from mean is small (*Brown, Lo & Lys. 1999*).

Different authors arrived at different conclusions based on different markets and firms’ year end observations (see table-1). This paper investigates the value relevance of accounting earnings and book value on the JSE, which is a unique market and, unlike *Collins, Maydew and Weiss (1997)* the research design of this paper will control the impact of scale proposed by *Brown, Lo and Lys (1999)*. The focus is on the causal factors behind the evidence change in value relevance over time. Early research suggestions are intangible intensive assets, permanent and transitory earnings, and average size of firms.

Table 1
Summary of different authors’ conclusions

Author	Years	Country	Value relevance of accounting earnings and book value
Collins et al.	1997	USA	Increased over time
Bao and Chow	1999	China	Increased over time
Brief & Zarowin	2000	USA	Decreased over time
Brown et al.	1999	USA	significantly decreased over time
Lin & Walker	2000	UK	Decreased over time
Lo & Lys	2000	USA	Decreased over time

⁷ The companies trade ‘B’ share required to prepare the annual financial statements base on the internal and IAS accounting standards.

⁸ Accounting variables reported on the annual financial statements of the firms based on the General accepted accounting practice (GAAP) People of Republic of China

2.6 Factors affecting the value relevance of accounting earnings and book value

When viewed as a whole, recent research presented below suggests at least three factors that are likely to contribute to change in the value relevance of accounting earnings and book value over time. These are investment in intangible assets, permanent and transitory earnings, and average size.

2.6.1 Investment in intangible assets

Amir and Lev (1996) argue that financial accounting information is of limited value to investors when valuing service and technology based companies (e.g., telecommunications, biotechnology or software products) that invest in intangible assets (e.g., research and development, human capital, franchise and brand development). While intangibles may contribute to the market value of those entities, current accounting rules only record intangible assets in limited circumstances (i.e., purchased intangibles). Consequently, financial accounting may not be very useful when assessing the values of companies with large amounts of unrecognized intangibles. *Collins, Maydew and Weiss (1997)* however, found that the explanatory power of the accounting earnings and book value of equity was slightly higher for intangible intensive firms compared with non-intensive firms. Though, this result suffers from the coefficient of variation of scale (*Brown, Lo & Lys 1999*).

Barth, Beaver and Landsman (1998) found that the relative importance of earnings and book value of equity differs across industries due to the degree of unrecognized intangible assets, that means that the greater the amount of unrecognized assets, the lower the relevance of book value of equity. They found that for pharmaceuticals compared to (financial services), the explanatory power of net income is significantly higher (lower) than that of book value meanwhile the incremental explanatory power of net income and book value are statistically indistinguishable for durable manufacturers. Consistent with this concern, *Brief and Zarowin (2000)* replicated their own statistical analysis on two intangible intensive industries, pharmaceuticals and chemicals, and found that earnings is a dominant valuation variable compared with book value and dividends. This indicates that value relevance of book value is

relatively poor in the industries with a large amount of unrecognized assets on their balance sheet. Also when earnings are permanent, the dominance of earnings is even greater. *Brief and Zarowin (2000)* also conclude the following regarding the combination of the permanent / transitory earnings with intangible intensive and non intangible intensive firms. Where earnings are permanent, for the firms with intangible intensive and non intangible intensive the model using book value and accounting earnings is more significant than the model using book value and dividends, whereas on transitory earnings the model using book value and dividends is more significant *Amir and Lev (1996)* further found that earnings, book value, and cash flow are largely irrelevant on a stand-alone basis when valuing companies in the cellular telephone industry. If those findings are generalized to other intangible intensive industries, then, as the incidence of these firms' increases over time, there should be a temporal decrease in the value relevance of earnings, book value or both.

2.6.2 Permanent and transitory earnings

Brief and Zarowin (2000) found that for the permanent earnings firms, earnings are the dominant individual value relevant variable and the book value and earnings combination dominates the book value and dividends combination. While for transitory earnings firms, book value is the leading variable. Even though dividends are superior to earnings on an individual basis in transitory earnings firms, book value compensates for loss of the value relevance of accounting earnings and rescues the accounting earnings and book value model. *Collins, Maydew and Weiss (1997)* evaluated the combined effect of negative/ positive and with/without one time earnings and found that the incremental explanatory power of earnings was high for the firms' positive earnings and without one-time items while book value provided the least explanatory power. However, the combinations of negative earnings and once off items (transitory earnings) produce the biggest shift to book value. *Hayn (1995)* also points to the losses being transitory. She argues that the firm has an abandonment put option to discontinue the loss making operation and recoup the book value. *Collins, Maydew and Weiss (1997)* and *Hayn (1995)* arguments imply that the major determinants of permanent and transitory earnings are nonrecurring items, negative earnings and the financial health of the firm.

2.6.2.1 Nonrecurring items

Unusual items may obscure the information content in reporting earnings numbers and therefore distort a company's earnings picture. For example, firms might transfer normal components of operating expenses into the special item and thereby artificially increase both current and future earnings before special items. Such reporting may complicate the assessment of core earnings, recurring earnings, and other valuation constructs (*Spremann & Gantenbein 2002*). *Lin and Walker (2000)* also found that the market gives more weight to earnings reported before special items. This is consistent with transitory earnings being of low quality in terms of investors' investment decisions. *Elliott and Hanna's (1996)* findings are consistent with the results of *Lin and Walker's (2000)* who document the increased prosperity of the firms which report special items across time and also demonstrate that the frequency of reported negative special items are up to three times higher than the incidence of the positive special item. *Elliott and Hanna's (1996)* and *Lin and Walker's (2000)* evidence indicates that nonrecurring items could provide at least a partial explanation for an observed decline in the value relevance of earnings across time.

Nonrecurring items could also affect the value relevance of book value across time. It is reasonable to expect that a firm divesting itself of a non-core line of business and firms in financial difficulty report nonrecurring items more frequently than other firms. If abandonment value is more salient in those types of firms and if abandonment value is associated with an increased value relevance of book value, one would expect the value relevance of book value to be increased in nonrecurring items (*Collins, Maydew & Weiss 1997*). *Collins, Maydew and Weiss (1997)* document that book value has a superior explanatory power and an increase in the magnitude of special items could provide evidence to decrease the value relevance of accounting earnings across time. However they found that the explanatory power of accounting earnings and book value did not deteriorate. *Collins, Maydew & Weiss (1997)* finally argue that regardless of the reason why the firms report nonrecurring items, these items are likely to be more transitory than earnings before special items ('core' earnings). Decreased persistence can lead to less weight on earnings and more weight on book value in relation between price, earnings and book value (*Ohlson 1995*).

2.6.2.2 Negative earnings

Hayn (1995) documents that firms reporting negative earnings have smaller earnings response coefficients than firms reporting positive earnings. She hypothesized that this is because shareholders always have an option of liquidating the firm and, as a result, negative earnings cannot persist indefinitely. She also presents evidence that the frequency with which firms report negative earnings has increased over time. *Beaver (2002)* also documents that, the coefficient of earnings is lower for the firms with a low return on equity. Furthermore, he found that the coefficient on positive earnings is positive and significant while the coefficient on negative earnings is insignificantly different from zero. *Ray and Zarowin (2003)* examine the role of the lags and asymmetry in accounting information and find that because of the asymmetric treatment of bad and good news, earnings decline is more transitory than earnings increase. Moreover *Ray and Zarowin (2003)* find that the earnings have a weaker association with current price changes and a strong association with lagged price changes which is price lead earnings. This means losses tend to be recognized and fully written off at the time of the bad news, however, profit is not fully recognised at the time and its affect is spread over the current and future years. *Ryan and Zarowin (2003)* find that the importance of asymmetry, with respect to lagged price changes, increases over time. Combined with Hayn's (1995) and Beaver's (2002) results, these finding suggest that the increased frequency of negative earnings over time could contribute to the temporal decline in the incremental value relevance of accounting earnings.

Negative earnings cannot be sustained indefinitely (*Hayn 1995*): a firm must become profitable or it will cease being a viable entity. In the event of liquidation, book value is a natural proxy for liquidation value. Thus it is reasonable to hypothesize that for loss firms, book value can provide information about expected future normal earnings and/or liquidation value. *Collins, Maydew and Weiss (1997)* also documented that a temporal shift in value relevance from accounting earnings to book value is a frequent occurrence of negative earnings and find that for the firms with negative earnings book value has a higher explanatory power than accounting earnings. This result is consistent with abandonment⁹ value becoming more relevant for assessing a firm's

⁹ Abandonment option is an option to put assets to outside purchasers at a strike price equal to the liquidation value of the asset

shareholders' value as the firm experiences losses and financial difficulties. Option value is different because the strike price varies over time with economic conditions and alternative productive opportunities for the firm's assets (*Barth, Beaver & Landsman 1998*).

2.6.2.3 Financial health

Barth, Beaver and Landsman (1998) investigated the relative valuation role of book value of equity and net income as a function of financial health. To conduct their research, they first identified firms from the 1994 Compustat database as having delisted because of bankruptcy during the period 1974 to 1993. They found that book value of equity provides greater incremental explanatory power than net income for equity market value in the year immediately preceding bankruptcy. Secondly they used the sample from the population of firms comprising all non-bankrupt publicly traded firms on Compustat with net income, total assets, and book value of equity greater than one million dollars for the years 1998-1993. They classified the firms into two categories (low and high) based on the bond rating and then tested based on the bond rating categories. They found that incremental explanatory power of book value (net income) is higher (lower) for the firm classified, as been less financially healthy than other firms. Finally, they conclude that investors implicitly place more weight on book value or net income depending on the firms' differences relating to financial health. This provides support for the contention that the balance sheet and income statement fulfil different roles. *Beaver (2002)* consistent with *Barth, Beaver and Landsman (1998)* finds that the value relevance of book value is inversely related to the financial health of the company.

2.6.3 Firm size

Smaller firms are more likely to include start-up companies whose value is driven by their future earnings growth potential (i.e., abnormal earnings) than by the current earnings realizations (*Spremann & Gantenbein 2002*). Moreover, *Hayn (1995)* shows that smaller firms are more likely to report losses than are large firms. Consequently, their earnings persistence is lower, which according to *Ohlson's (1995)* valuation framework leads to an increase in the importance of book value of equity relative to earnings in valuation.

Collins, Maydew and Weiss (1997) also expect that smaller firms face a greater likelihood of encountering financial distress or of failing than do large firms. Therefore, investors may place greater weight on a book value of equity as a proxy for abandonment or liquidation value when valuing smaller companies. However, this alone would not explain change in the value relevance of earnings versus book value over time unless there were systematic changes in the proportion of smaller firms represented in the sample. They find that the proportion of small firms in the Compustat database has increased over time as its coverage expanded to include smaller NASDAQ firms. Along with this they find that the explanatory power of book value (earnings) declines (increases) with firm size. *Brown, Lo and Lys (1999)* however, rejected this because the size was not significant after deflating the size of per share by the year beginning share price. Moreover, *Lo and Lys (2000)* argue that classification of size by market price, which is the dependent variable of the equation, results in estimates bias.

2.7 Summary

To summarize the chapter the conceptual foundations of the value relevance of accounting earnings and book value are the valuation approach and the contextual accounting arguments. Ohlson (1995) valuation approach expresses share price under a given dividend model and clean surplus as a linear function of both accounting earnings and book value. Accounting earnings and book value is the product of the two primary financial statements and are prepared according to the underlining accounting standards as a JSE capital market requirement. Thus, the value relevance of accounting earnings and book value increased on the developed capital markets while decreasing on emerging capital markets. Though, the value relevance of accounting earnings decreased while the incremental value relevance of book value is subject to research design debate with reference to the developed capital market (*Brown, Lo & Lys 1999; Lo & Lys 2000 and Collins, Maydew & Weiss 1997*). However, the incremental value relevance of accounting earnings increased while the incremental value relevance of book value is insignificant on emerging capital markets (*Bao & Chow 1999*).

The value relevance of accounting earnings and book value has been affected by the firms' performance (transitory and permanent earnings), characteristics (intangible intensive and non intangible intensive firms) and size (*Barth, Beaver & Landsman 1998; Brief & Zarowin 2000; Collins, Maydew & Weiss 1997; Hayn 1995 and Lin & Walker 2000*). The primary role of accounting earnings is providing information for unrecognised assets, as the incremental value relevance of accounting earnings is greater than book value in the firms with unrecognised assets while the incremental value relevance of book value is higher in the firms with financial difficulties. Thus, most researchers conclude that the temporal shift from value relevance of accounting earnings to book value is because of industrial characteristics, performance and size. According to *Brown, Lo and Lys (1999)* however, their affect is insignificant after controlling the scale variance by the year beginning share price.

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Chapter three

Research methodology

3.1 Introduction

The previous chapter illustrated the issue of the foundation of the value relevance studies and their empirical results in different markets. Their results, and predominantly their research design, form the centre of the development of capital market research in accounting. This chapter provides a discussion of the methodological issues relevant to the empirical research conducted for this thesis. Issues discussed include measurements of value relevance, valuation models, the theoretical foundation of those valuation models and their base for the development of the Ohlson (1995) model. Furthermore, this chapter presents the hypothesis and data and sample selection of this thesis.

3.2 Measurement of value relevance

Value relevance of accounting information is measured by the R^2 of the simple regression and/or multiple regressions of the dependent variables such as share price, firms value etc. against independent variables such book value, accounting earnings etc. Moreover incremental value relevance is defined as the R^2 of multiple regressions minus R^2 of simple regression. The theoretical foundation of this research paper is based on the *Ohlson (1995)* residual linear information model, which is a combination of the value relevance of accounting earnings and book value to share price on the JSE market. This means value relevance as R^2 from regression of deflated stock prices on deflated per share values of accounting earnings and book value.

A regression equation is a statistical technique used to explain or predict the behaviour of dependent variables, in this case behaviour of share price related to accounting variables. However each regression equation has its own assumption in order to provide a valid measurement of the value relevance of accounting

information (*Van den honert 1999*) and test and analysis using the statistica 6 packages. Those are:

- Linearity- regression equation assumes that the relationship between variables is linear. This is conformed to by this research by observing that in the scatter plot the relationship between the variables is not a curvature.
- Normality- regression equation assumes that the residual (predicted minus observed value) are distributed normally. The assessment of a normal distribution is determined by evaluating at the histogram of each variable. However heteroskedasticity¹⁰ refers to unequal variance in the residuals. Heteroskedasticity of the residuals is controlled by deflating the variables in this research by the year beginning market price and standardized residuals greater than four standard deviation from zero.

The data set of this research paper is cross sectional and time series analysis. The cross sectional of yearly share price is regressed on accounting earnings and book value. The time series means of those yearly regression slopes or results, along with their time series standard error, are used to construct standard t- statistics which indicate whether the accounting earnings and book value are related to share price in a statistically significant manner. The time series data analysis may be exposed to an autocorrelation problem which is that the residual resulting from a regression model constructed on time series data which are correlated with each other. The degree of autocorrelation is measured by the Durbin-Watson test, that is, $D=2$ means no autocorrelation, $D>2$ negative autocorrelation and $D<2$ positive autocorrelation. The test on the time series of the data on the JSE indicates, have a positive autocorrelation. Hence, regressions were corrected for the first autocorrelation in the residual, the time series analysis of this paper is using a generalized least squares approach developed by *Prias and Winsten (1954)* and described in *Greene (1990)* cited in *Collins, Maydew and Weiss (1997)* to control the autocorrelation problem found on the JSE capital market data. However regression equation has a major conceptual limitation in that one can only ascertain relationships but never be sure about the underlining causal relationship.

¹⁰ Heteroskedasticity means the affect of regression results is that a firm with high market capitalization dominates the out come of the regression, which is high market capitalization in absolute terms displaying high price variance and firms with low market capitalization display lower price variance.

3.3 Assumption

- The main purpose of accounting statements is to provide investors and creditors with the relevant information, which is useful for their decision-making and efficient resource allocation.
- All shares activity traded on the JSE are influenced by accounting information.

3.4 The delimitations

This research paper investigates the change in the value relevance of accounting earnings and book values to share price in the industrial sector of the Johannesburg Securities Exchange (JSE).

This study is confined to the industrial sector because, the mining sector is extremely volatile with respect to world market fluctuation in metal prices. Moreover, the reason for the exclusion of financial sectors from the population is because of the complexities in their accounting system.

The study is not determining the impact of other factors in the market that could influence share price which is outside the scope of this paper.

3.5 Definition of terms:

Earning per share: earning per share used in this study is reported by BFA McGregor data service as earning per share, which is as the headline earnings per share reported by the firms. This is consistent with the Ohlson (1995) model which relies on clean surplus accounting.

Book value per share: book value is the value of equity that is owned by common shareholders as reflected in the balance sheet at the financial year-end of the company. This means that the difference between total book value of assets and total book value of liabilities divided by the number of common shares outstanding at

financial year-end of the company. Book value per share is also extracted from the BFA McGregor data service.

Intangible intensive firms: intangible intensive firms are the firms which have measurable intangible assets such as research and development, information technology, employee training, brand, customers' acquisitions, unique organizational structure etc. Intangible assets, according to this paper are intangible assets which are not recognised on the book value of the firms. The difference between the book value and the market value of the firm is defined as intangible assets value of the firm. Thus the firms with high market to book value ratio are defined as the intangible intensive firms (*Barth, Beaver & Landsman 1998* and *Brief and Zarowin 2000*). Therefore, the companies categorized as intangible intensive firms are the firms which have a high market value to book value ratio.

Transitory or permanent earnings: Transitory earnings are earnings which show high variability from the standard earnings. The transitory earnings are the earnings which are identified as high and low compared with other observations. Transitory and permanent earnings in this paper are identified based on the earning beginning price ratio which is three inner quintiles considered as permanent earnings and two outer quintiles considered as transitory earnings (*Brief and Zarowin 2000*).

3.6 Valuation models

There are two types of valuation methods commonly used to investigate value relevance, namely the price model and the return model (*Barth 2000* and *Barth, Beaver & Landsman 2001*). The price model examines the relationship between stock price, book value and accounting earnings (which is reflected in the firm value). The return model examines the relationship between stock return, earnings and earnings change, which is reflected by the change in the firm value over a specific period of time. The return model has, however been found to have problem in the recognition lags and transitory earnings (*Ryan & Zarowin 2003*). For example, current price may not be recorded in current earnings because of accounting principles such as reliability, objectivity and conservatism. Moreover, the transitory component of

earnings is not expected to perpetuate and therefore will have a weaker association (Hayn 1995).

Unlike the return model, the price model could avoid the error variables problem due to current earnings containing all relevant information in regard to future earnings. Hence, this reduces the bias of earnings response coefficient, however, it faces econometric problems such as correlated omitted variables, scale and heteroskedasticity¹¹ (Kothari & Zimmerman 1995). Omitting these variables reduces the explanatory power of the model and hence the assumption can be made that these omitted variables are uncorrelated with the included independent variable, and that the coefficients in the included variable are not biased due to the correlated omitted variable (Kothari 2001). Moreover, the scale effect is controlled by deflating the year beginning price of the firms, which is proposed by Brown, Lo and Lys (1999). The theoretical foundation of price and return models is from the Ohlson (1995) linear information model. Extensive research such as Barth (2000) and Barth, Beaver & Landsman (2001) has found inconsistent results through the use of price and return models. Nevertheless, in this research paper the price model is used as a valuation method and further research is required to investigate the return model in the South African context.

3.6.1 Ohlson model

The Ohlson model (OM) (1995) was based on the accounting based residual income valuation (RIV) model for equity valuation and with the adoption of specific linear information model (LIM) to account for the time series behaviour of residual income. As a result, stock price is related through a simple linear formula to current book value, current and future profitability. This model determines the value of the company to be a product of the current book value plus present value of future residual earnings discounted by target cost of capital and current residual earnings.

¹¹ To solve the problem of heteroskedasticity one could standardized the stock prices. One method uses may be to deflate the price by the period opening stock price.

3.6.1.1 Residual income valuation model

Under the neo-classic multi-period framework (*Fisher 1930*), the market value of the firm's equity $P(t)$ at year t equals the present value of expected dividends $d(t)$ discounted at constant factor R .

$$P(t) = \sum \frac{E[d(t+T)]}{(1+R)^T} \quad (a)$$

Where: $P(t)$: value of the firm at date t ,

$E[d(t+T)]$: the expected dividends received at date $t+T$

R : the discount rate that is assumed to be constant

The clean surplus¹² concept dictates that entries to retain earnings are limited to record only periodic earnings and dividends. Clean surplus means that the amount of net income of a period is equal to net dividends plus the change in book value of equity (*Brief & Peasnell 1996*). This definition ensures that the clean surplus accounting concept will hold as only the accounting transaction that affects the owners' interest in the business can by pass the income statement, e.g. retaining earnings. If those flows are not included in the income statement then change in equity plus dividends pay out will not be equal to the sum of income in each period.

This would entail dirty surplus accounting where total income over the life of the firm will not equal net cash flows (*Brief & Peasnell 1996*). According to *O'Hanlon and Pope (1999)* the value relevance of dirty surplus flows in a UK setting has little incremental explanatory power over and above earnings even over a cumulative period of up to 20 years. However, dirty surplus does not have an operational nature and obscures the prediction ability of accounting numbers. Therefore, in this research paper the assumption is made that dirty surplus does not have value relevance consistence with *O'Hanlon and Pope (1999)* who find that a non-recurring temporary item should not affect the usefulness of accounting information. However, further research is required to investigate the value relevance of dirty surplus in the South African context. Then, the relation between book value of equity, earnings, and dividends can be expressed as follows:

$$bv(t) = bv(t-1) + x(t) - d(t) \quad (b)$$

¹² The relation between book value, earnings and dividends is known as the clean surplus relation, which is a result that the sum of the accounting earnings and beginning book value minus current year dividends is equal to year end book value.

Where: $bv(t)$: book value equity at date t

$x(t)$: earning for the period t

$d(t)$: dividends paid at date t .

Residual income $ax(t)$ is defined as the difference between net income and capital charge at discount rate R :

$$ax(t) = x(t) - R * bv(t-1) \quad (c)$$

Where: $ax(t)$: residual earnings for the period t

Residual income is a measure of whether the company is creating or destroying value, which is the difference between the return on the investment and its cost times the total asset of the firm. Thus, this research paper has used earnings per share as determined by the BFA McGregor as proxy for the residual income as defined in the Ohlson (1995) model.

Simple algebraic manipulation allows equation (b) and equation (c) to be rewritten as

$$d(t) = ax(t) + (1+R)bv(t-1) - bv(t) \quad (d)$$

Using this expression to replace $d(t+T)$ in equation (a) yields the residual income valuation model. Thereafter residual income valuation (RIV) model is use as

$$P(t) = bv(t) + \sum \frac{E[ax(t+T)]}{(1+R)^T} \quad (e)$$

Where: $P(t)$: value of the firm at date t ,

$E[ax(t+T)]$: residual earnings for the period $t+T$

R : the discount rate that is assumed to be constant

RIV implies that a firm's value equals its book value of equity and the present value of future residual earnings. This means RIV shifts the focus from wealth distribution (dividends) to wealth creation (residual income) (Pariente 2003). In that sense, equity valuation reconciles with the Modigliani and Miller (1961) theory of dividends irrelevancy.

3.6.1.2 Linear information model (LIM)

Ohlson's contribution lies in the additional specification of the time series behaviour of residual income. A simple linear information model formulates the dynamics of

residual income and information “other than” residual income. Which is defined as the stochastic process for abnormal and non-accounting information as follow:

$$ax(t+1)=wax(t) +v(t)+\varepsilon_1(t) \quad - \quad - \quad - \quad - \quad - \quad (f)$$

$$v(t+1)=\gamma v(t)+\varepsilon_2(t) \quad - \quad - \quad - \quad - \quad - \quad (g)$$

Where: $v(t)$: information other than residual earnings

w : persistent parameter of the residual earnings $ax(t)$; ($0 \leq w < 1$)

γ : Persistence parameters of other information $v(t)$; ($0 \leq \gamma < 1$)

ε_1 & ε_2 : error terms

Combining the RIV in equation (e) with *Ohlson (1995)* LIM in equations (f) to (g) yields the following valuation function:

$$P(t) = bv(t) + \alpha_1 ax(t) + \beta_1 v(T)$$

$$\text{Where: } \alpha_1 = \frac{w}{1+R-w}, \text{ and } \beta_1 = \frac{1+R}{(1+R-w)(1+R-\gamma)}$$

w : persistent parameter of the residual earnings $ax(t)$; ($0 \leq w < 1$)

γ : Persistence parameters of other information $v(t)$; ($0 \leq \gamma < 1$)

R : the discount rate that is assumed to be constant

Therefore, the value of equity can be expressed as a function of its accounting earnings and book value (*Ohlson 1995*). *Ohlson (1995)* autoregressive time series argument emphasises that the abnormal earnings will in a competitive market event to normal earnings. *Collins, Maydew and Weiss (1997)* are used the same formula as *Ohlson (1995)* where share price is positively associated with both accounting earnings and book value. However, *Collins, Maydew and Weiss's (1997)* work was influenced by the scale factor (*Brown, Lo & Lys 1999*). *Brown, Lo and Lys (1999)* employed a deflated variable in order to control scale factors by dividing each variables by the share price at the beginning of the year. As the market price plays a central role in market based accounting research, the best measurement of the scale is the market price of the firm (*Easton & Sommers 2000*). Thus, current price contains information in current earnings plus, some future looking information that is missing from current earnings, which is a price leading earnings (*Kothari 2001*). Therefore, each variable in this research is deflated by the year beginning share price of the firms.

$$P(it) = \alpha_0 + \alpha_1 x(it) + \alpha_2 bv(it) + \varepsilon(it) \quad (1)$$

Where: $P(it)$ is the deflated price of firm i three months after fiscal year end t to ensure that it reflects the impact of the earnings figure and to control impact of first quarter financial report.

$x(it)$ is the deflated earnings per share of the firm i during the year t

$bv(it)$ is the deflated book value per share of firm i at the year end of year t and

$\varepsilon(it)$ is the other value relevant information of the firm i for the year t .

Other information on the Ohlson (1995) model formulated the idea that the share price reflects richer information than the transaction base accounting earnings (Kothari 2001).

To compare the explanatory power of accounting earnings and book value to share price, this paper decomposes the value relevance of accounting earnings and book value into the value relevance of accounting earnings and the value relevance of book value to share price. This decomposition is theoretically derived by Theil (1971). Let

$$P(it) = \beta_0 + \beta_1 x(it) + \varepsilon(it) \quad (2)$$

And

$$P(it) = \gamma_0 + \gamma_1 bv(it) + \varepsilon(it) \quad (3)$$

In addition to this, the incremental value relevance of accounting earnings, incremental value relevance of book value, and incremental value relevance of both accounting earnings and book value will be measured by coefficients of determination from equation (1) to (3) as are denoted by R_1^2 , R_2^2 and R_3^2 respectively. Then the incremental explanatory power of accounting earnings with respect to book value is:

$$R_E^2 = R_1^2 - R_3^2 \quad (4)$$

And, likewise, the incremental explanatory power of book value with respect to accounting earnings is:

$$R_B^2 = R_2^2 - R_3^2 \quad (5)$$

Finally, the explanatory power of both accounting earnings and book value is:

$$R_C^2 = R_1^2 - (R_E^2 + R_B^2) \quad (6)$$

Therefore, the decomposition of R^2 is used to investigate whether the value relevance of accounting information has changed over time, and also R_E^2 , R_B^2 and R_C^2 are used

to examine whether the incremental explanatory power of earnings, book value, and earnings and book value for the price has changed over time, which is the time trend variable as follows:

$$R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + \varepsilon(t) \quad (7)$$

Where TIME= 1...10 corresponding to the years 1993-2002. The value relevance and incremental explanatory power is said to have increased (decreased) over time if θ_1 is significantly positive (negative). Further on in this paper the above regression will be re-estimated after adding variables that control for temporal change in intangible assets and transitory earnings. It will then be examined whether these additional control variables are significant in explaining the change in the explanatory power of accounting information and whether the time trend variables are insignificant.

3.6.2 Limitation of the Ohlson model

Capital market research is primarily empirical rather than theoretical (*Kothari 2001*). However, the Ohlson (1995) has attempted to develop of theoretical model and it is a controversial research area (*Beaver 2001*). Some of the limitations highlighted in the empirical research are:

- The model is based on simplifying assumptions that permit a parsimonious view of the complex real world. For example, a proxy for expected abnormal earnings throughout the life of the firm needs to be defined, which also relies on assuming a particular time series process for abnormal earnings and other information (*Barth 2000*). However his model provides a framework for representing valuation in terms of accounting numbers (*Beaver 2002*).
- The model is a partial equilibrium model that takes the accounting system as given. *Holthauson and Watts (2001)* point out that it does not drive an optimal accounting system. However this model provided rich basis for empirical accounting researches (*Beaver 2002*)
- The model does not preclude financial intermediaries from viewing as relevant the risk return trade-off and evidence derived from the model. However, it is unreasonable to expect the Ohlson model to be rich enough to encompass all issues of interest to accounting research (*Beaver 2002*).

Despite these apparent limitations this model is widely used in value relevance literature. *Barth, Beaver and Landsman's (2001)* comment on this model is that no valuation model operating in an imperfect market will be perfect due to the necessity of a market simplifying assumption of a complex environment.

3.7 The hypotheses:

3.7.1 First sub- problem

Sub problem one. The first sub problem is to determine whether the explanatory power of accounting earnings and book value to share price increases or decreases over a period of time.

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

- H_0 : the explanatory power of accounting earnings and book value increased over time.
- H_1 : the explanatory power of accounting earnings and book value decreased over time.

The data needed to test the first sub-problem is all the sample companies' share prices, accounting earnings and book values in the sample periods of 1992-2002. Data analysis is based on equation (1) (refer to pp. 39) of this research and R^2 is used to measure the value relevance of accounting earnings and book values on yearly, pooled five years, and total years basis. Yearly cross-sectional regression results present a time series analysis (equation (7) refer to pp.40) and by looking at the standard t-statistics it can be determined whether the relationship between the independent variables of accounting earnings and book value to share price are changed in a statistically significant manner.

3.7.2 Second sub-problem

Sub problem two: the second sub-problem is to compare the incremental value relevance of accounting earnings and the incremental value relevance of book value to share price within the industrial sector over a period of time.

The hypothesis to compare the incremental value relevance of accounting earnings and the incremental value relevance of book value to share price is:

- H_0 : over time, as incremental value relevance of accounting earnings decreases, incremental value relevance of book value increases.
- H_1 : over time, as incremental value relevance of accounting earnings increased, incremental value relevance of book value decreased.

The same data set is needed as for sub- problem one. However the data is analysed based on the equation (4) and (5) (refer to pp.39) where the value relevance of accounting earnings and value relevance of book value is measured by R^2 of equations (2) and (3) (refer to pp. 39) respectively, on yearly and pooled five years, and total years' basis. The incremental value relevance of accounting earnings and the incremental value relevance of book value is measured by coefficients of determination from equations (1) to (3) as denoted by R_1^2 , R_2^2 and R_3^2 respectively. Then the incremental explanatory power of accounting earnings with respect to book value and the incremental explanatory power of book value with respect to earnings is analyzed by the equations (4) and (5) respectively (refer to pp.39). The value of the incremental value relevance results puts through the time series analysis (equation (7) refer to pp. 40) in order to decide whether the incremental value relevance of accounting earnings and the incremental value relevance of book value is decreased and/or increased by looking at the significances of standard t-statistics and their sign. In addition to this, the incremental value relevance common to both accounting earnings and book value is measured by the equation (6) (refer to pp.39).

3.7.3 Third sub-problem

Sub problem three: the third sub problem is to analyze and to interpret the data based on permanent and transitory earnings, and intangible intensive and non intensive firms, so as to evaluate the value relevance of accounting earnings and book value to share price in different situations.

The data needed to analyse the third sub-problem is the same sample of data. However, the data is classified based on company performance or intangible intensive and non-intangible intensive firms as defined below.

A company's performance is determined by their earnings per beginning price ratio and divided into two, which are transitory and permanent earnings. As with *Brief and Zarowin (2000)*, transitory and permanent earnings are identified based on earnings beginning price ratio which is three inner quintiles considered as permanent earnings and two outer quintiles considered as transitory earnings. As defined the intangible intensive firms in *Barth, Beaver & Landsman (1998)* and *Brief and Zarowin (2000)* is the firms with high market to book ratio. Thus, an intangible intensive firm in this paper is identified based on the price to book ratio of the sample companies, with below (above) 50% considered as a non-intangible intensive firms (intangible intensive firms) observation. Therefore, equations (1) to (3) (refer to pp.39) are run on this data to test the influence of company performance, and intangible intensive and non-intensive firms on the value relevance of accounting earnings, book value, and accounting earnings and book value. Moreover, to control those factors that influence value relevance, the data is analyzed into yearly percentage increases and/or decreases on each factor. Additionally, incremental value relevance is analyzed based on equations (4), (5) and (6) (refer to pp. 39), on the result of each factor that is analyzed in this paper.

Like *Lo and Lys's (2000)* on this paper have not examined the value relevance of the size sub samples for the reasons following *Lo and Lys's (2000)* argument are:

- (1) The partitions are based on market value which is a dependent variable, resulting in estimation biases,
- (2) The amount of the scale affects differ across classifications so that a comparison is more problematic than with the time series analysis of the entire sample. While it is possible to control for the coefficient of variance of the scale factor within each time series, it is difficult to do the same across the deciles classifications, and
- (3) The coefficient of variations does not fully capture the affect of scale on R^2 . It is in the light of these reasons that comparisons, which may not be meaningful, have not been pursued.

3.8 Data and sample selection

The data for this research is secondary source data, which has been collected from the Internet, textbooks, journals and the publicly available financial statements of the companies. The publicly available financial statements of the companies have been extracted from McGregor BFA data resource and Thomson Advance DataStream. The data is only from companies, in the industrial sector, listed on the JSE.

The sample for this research was selected from the industrial sector on JSE from 1993 to 2002. The sample selection criteria are:

- (i) Annual earnings, book value, price earnings ratio and price book ratio must be available on the McGregor BFA data resource and the adjusted share price information must be available on Thomson Advance DataStream. Thus firms included in the sample are with at least five years worth of financial data on McGregor BFA and Thomson Advance DataStream. In addition to that, the company should have the latest year's financial information for all variables in this research.

- (ii) Adjusted¹³ share price must be available on the Thomson Advance DataStream on a monthly basis for the last day of the third month after the fiscal year end of the firms.

The selection process decreased the sample of the firms from 221 to 134, which provides 1125 firms' year end observations. As with *Collins, Maydew and Weiss (1997)*, to control for extreme variables, this study removed observations that are in the top and bottom two percent of either price to earnings or market to book value and estimates first pass regressions on the respective samples, and then deletes the observations with (absolute value of) standardized residual greater than 4.0 standard deviations from zero in any year and total regression of price on earnings, price on book value, or price on earnings and book values. This result in a final sample of 1026 firms' year ends observations. To maintain comparability across tables and figures, all tests in the paper are based on the final sample of 1026 firms' year ends observations. As the main data comparison of this research is the accounting earnings per share and book value per share reported on the BFA McGregor data source at financial year ends and the share price reported on Thomson Advance DataStream three months after financial year-ends, all variables are deflated by the year beginning share price.

Table 2

Summary of sample size based on year of observations

Years	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	total
Observations	73	84	90	91	104	115	117	116	118	118	1026

¹³ Adjusted share price for the stock split and dividends.

Chapter four

Data presentation and analysis

4.1 Introduction

The value relevance study is used to investigate the degree of association between accounting variables and the market value of the firm. The degree of association is determined by examining the product of the regression equation (R^2) of dependent variables to independent variable. This paper investigates the value relevance of accounting earnings and book value to share price based on the price model on the JSE capital market. The combination of accounting earnings and book value model was developed by Ohlson (1995) who also provided the foundation of the price model which expresses share price under a given dividend valuation model and clean surplus as a linear function of both accounting earnings and book value of equity. Using this model conclusions about value relevance have been made by researchers in different types of capital markets. The value relevance of accounting earnings and book value decreases on developed markets (*Brief & Zarowin 2000; Brown, Lo & Lys 1999; Lin & Walker 2000 and Lo & Lys 2000*) while increasing on emerging capital markets (*Bao & Chow 1999*). Most researchers furthermore propose that the factors which most influence the value relevance of accounting earnings and book value to share price are firms' performance and the characteristics (intangible and non intangible intensive firms) of the firms' operation (*Barth, Beaver & Landsman 1998; Brief & Zarowin 2001; Collins, Maydew & Weiss 1997; Lin & Walker 2000 and Hayn 1995*).

This chapter presents and analyses the value relevance of accounting earnings and book value against share price on the JSE capital market. This is done before investigating whether the value relevance of accounting earnings and book value is different by comparing the firms' with transitory earnings (intangible intensive firms) to firms with permanent earnings (non-intensive firms) respectively. An examination is undertaken to determine whether the value relevance of accounting earnings and book value has been influenced by the change in the percentage of firms with transitory earnings and intangible intensive assets over a period of time.

The analysis discussed in this chapter was undertaken: firstly to determine the correlation of variables by examining the sign of correlation coefficient between dependent and independent variables. This highlights the positive or negative impact of the variables on the value of the firms; secondly to determine the value relevance of accounting earnings and book value as measured by R^2 and assess the change in the value relevance of accounting earnings and book value, incremental explanatory power of accounting earnings and incremental explanatory power of book value across time; thirdly to explain the temporal change in the value relevance of accounting earnings and book value in terms of the level of intangible intensive firms and transitory earnings of the firms; and fourthly to explain the temporal variation in the change in the value relevance of accounting earnings and book value in terms of the transitory earnings and intangible intensive firms.

4.2 Sign of the correlation coefficient between independent and dependent variables.

The sign of the calculated correlation coefficient determines the direction of the dependent and independent variables. The negative sign indicates the inverse correlation of the variables while the positive sign indicates direct correlation of the variables. For example, if the correlation between the independent variables of accounting earnings and book value and the dependent variable of share price is negative, as the value of the independent variables (accounting earnings and book value) increases, the value of the dependent variable (share price) should have to decrease. Likewise, a negative sign between the independent variables also indicates of the inverse correlation between the independent variable which is, for example, the value of book value increases while decreasing the value of accounting earnings. Thus, this section presents descriptive statistics and Spearman and Pearson correlation coefficient.

Table 3 and 4 present descriptive statistics and the correlation for the sample data 1026 firms' year end observations. The median value is smaller than the mean value of all variables indicating the skewness of the observations to left of the mean. This indicates the data observations have a larger amount of variables less than mean value

of the total observations. However, in looking at the number, it is not significant for price and earnings, though it is significant for book value.

Table 3

Descriptive statistics of the pooled observations for the year ends 1993-2002 ^x

Variable ^y	Mean	Standard deviation	Min	Lower quartile	Median	Upper quartile	Max
Price (P)	1.23	0.70	0.01	0.76	1.12	1.59	4.23
Earnings (x)	0.16	0.57	-10.14	0.06	0.11	0.21	5.19
Book value (bv)	1.34	2.29	0.00	0.28	0.65	1.52	25.24

^x The numbers of firms' year end observations with fitting the criteria of the tests data on McGregor BFA and Thomson Advance DataStream is 1026 after deleting the following: (1) the top and bottom two percent ranked by the price to earning ratio and market to book value ratio, (2) observations with standardized residual greater than four standard deviations from zero in any yearly and total regression of the price on earnings, price on book value and price on earnings and book values.

^y P is the deflated price of a share three months after year end t. x is the deflated earnings per share of the firm i for year t. bv is the deflated book value per share of the firm i at year-end t.

Table 4

Correlation between independent and dependent variables ^x

Variables ^y	Price (P)	Earnings (x)	Book value (bv)
Price (P)	1.000	0.503	0.326
Earnings (x)	0.224	1.000	0.546
Book value (bv)	0.223	0.214	1.000

^x The number of firm-year observations is 1026. Pearson correlations are in the bottom left three cells and Spearman correlations are in the upper right three cells. All of the above are significant at the 0.05 level.

^y P is the deflated price of a share after three months after year end t. x is the deflated earnings per share of the firm i for year t. bv is the deflated book value per share of the firm i at year-end t.

The upper right (lower left) hand side of table 4 contains the Spearman (Pearson) correlation coefficient. The correlation coefficients of the two explanatory variables, (accounting earnings and book value) are positively correlated with stock price and with each other. Accounting earnings have a higher Spearman (Pearson) correlation

coefficient of 0.503 (0.224) than book value of 0.326 (0.223) against share price.. Thus the correlation coefficient indicates the strength of the correlation between dependent and independent variables which are determined by the significant difference from zero. *Brimble (2003)* argues that the low correlation coefficient is 0.141 to 0.224 which means that the explanatory power of variable is only explain by 2% to 5% of the market value. Therefore, the correlation coefficient of accounting earnings and book value on the JSE market categorized as low because of the low explanatory power of the variables on the first five years of the study. The accounting earnings have a stronger correlation than book value to share price on the JSE capital market. However, there is a positive correlation between accounting earnings and book value which indicates that the value of the book value increases while increasing the value of accounting earnings. The expected result is a consequence of the systematic relationship between the two independent variables instead of a direct relationship between the incremental explanatory power of accounting earnings and incremental explanatory power of book value to share price on the JSE capital market.

4.3 Change in value relevance of accounting earnings and book value over time

Table 5 summarizes the cross-sectional regression of the equations (1) to equation (3) (refer to pp 39). Accounting earnings in the equation (1) is significant in four years, while book value is significant only for two years at a significance level of 0.05. However, accounting earnings in the equation (2) and book value in the equation (3) are significant at significance level of 0.05 for five and three years respectively. Even though, the pooled regression of total years and five years, for the first three equations, indicates significant at a significance level of 0.001 for all independent variables. The first sub problem determined to investigate the change in the value relevance of accounting earnings and book value to share price on the JSE capital market. The result indicates that the R^2 of pooled the first five years (1993-97) cross-sectional time series regression of accounting earnings and book value jointly explain about 4.9%, while the latest pooled five years (1998-2002) 12.2% though the total pooled years explain only 8.2%. This indicates that the explanatory power common to both accounting earnings and book value has increased over a period of time which is consistent with the first sub-problem null hypothesis of this research ($t=4.62$). Thus on average, there is a 3% increase per year. The null hypothesis of the first sub-problem

is that the value relevance of accounting earnings and book value is increased across time which is consistent with the findings related to emerging capital markets (*Bao & Chow 1999*). The South Africa capital market is also categorized with the emerging capital market (*Bharath 2004*).

The R^2 of total pooled cross sectional time series regression indicates that accounting earnings (book value) explain 5 % (5%) of the firm value. While R^2 of accounting earnings (book value) from the first five years (1993-97) to latest five years (1998-2002) indicates increases from 3% (2.6%) to 9.9% (5.9%) respectively. Though *Collins, Maydew and Weiss (1997)* argue that the value relevance of accounting earnings decreases while the value relevance of book value increases over time; however the value relevance of earnings and the value relevance of book value increased on the JSE capital market. Thus, the average increase in the explanatory power of accounting earnings and the explanatory power of book value is 2% and 1% per year respectively which is significant for book value ($t=3.60$) and for accounting earnings ($t=2.84$) (refer to Appendix 6). This research finding is different from the *Collins, Maydew and Weiss (1997)* argument which could be influenced by the capital market categorization (developed or emerging capital market), change in the ownership structure, and change in the industrial composition, characteristics and performance of the firms. The last two variables, characteristics and performance of the firms, are examined at a later stage of this paper though the other variables are beyond the scope of this paper but are an area for further research.

Standard t-statistics for accounting earnings ranges from (1.05) of 1998 to (6.18) of 2001 and standard t-statistics for book value ranges from negative (-0.66) of 1999 to (4.50) of 2002. This indicates the variability of book value to share price which is supported by the result of the significant difference of the median from the mean in table 3 (pp. 48). A significant increase on the value relevance of accounting earnings and book value are shown in the observations of the years of 2000, 2001 and 2002. Table 5 reports the yearly cross-sectional regression of 10 years, pooled five years and total years.

Table 5

Yearly cross-sectional regression of price against accounting earnings and book value

Models: $P(it) = \alpha_0 + \alpha_1 x(it) + \alpha_2 bv(it) + \varepsilon(it)$

$P(it) = \beta_0 + \beta_1 x(it) + \varepsilon(it)$

$P(it) = \gamma_0 + \gamma_1 bv(it) + \varepsilon(it)$

Years	Obs.	α_0	α_1	α_2	R^2	β_0	β_1	R^2	γ_0	γ_1	R^2
1993	73	1.26 (12.39)	0.16 (1.21)	0.01 (0.54)	0.026	1.29 (15.17)	0.17 (1.27)	0.022	1.29 (13.24)	0.01 (0.64)	0.006
1994	84	1.69 (16.55)	0.16 (1.65)	0.03 (1.18)	0.069	1.76 (20.49)	0.19 (2.14)	0.053	1.70 (16.54)	0.04 (1.79)	0.038
1995	90	1.49 (15.00)	0.11 (1.60)	0.03 (0.89)	0.031	1.55 (19.48)	0.09 (1.34)	0.022	1.55 (15.11)	0.01 (0.40)	0.002
1996	91	1.29 (15.67)	0.78 (2.36)	-0.09 (-1.25)	0.078	1.25 (16.72)	0.43 (2.43)	0.062	1.26 (15.11)	0.06 (1.35)	0.020
1997	104	1.16 (15.72)	0.52 (1.31)	-0.07 (-0.91)	0.021	1.13 (17.40)	0.19 (1.14)	0.013	1.13 (16.04)	0.02 (0.64)	0.004
1998	115	0.83 (10.43)	0.02 (0.06)	0.06 (0.98)	0.018	0.87 (12.07)	0.26 (1.05)	0.010	0.83 (10.51)	0.06 (1.44)	0.018
1999	117	0.97 (16.04)	0.21 (1.51)	-0.22 (-0.44)	0.023	0.96 (17.43)	0.22 (1.59)	0.022	1.00 (16.96)	-0.32 (-0.66)	0.004
2000	116	0.83 (12.24)	0.96 (3.89)	0.09 (2.13)	0.224	0.92 (16.51)	1.18 (5.23)	0.193	0.86 (12.14)	0.16 (3.94)	0.120
2001	118	1.05 (16.39)	0.71 (5.60)	0.02 (0.81)	0.252	1.07 (18.86)	1.07 (6.18)	0.247	1.09 (15.31)	0.06 (2.40)	0.047
2002	118	1.05 (15.24)	0.29 (3.04)	0.14 (3.74)	0.212	1.21 (21.38)	0.39 (3.91)	0.116	1.08 (15.30)	0.17 (4.50)	0.149
1993-97	442	1.34 (32.92)	0.15 (3.20)	0.04 (2.90)	0.049	1.39 (39.55)	0.17 (3.71)	0.030	1.35 (33.25)	0.04 (3.45)	0.026
1998-02	584	0.96 (32.29)	0.44 (6.49)	0.06 (3.88)	0.122	1.01 (37.62)	0.52 (8.02)	0.099	0.99 (32.46)	0.09 (6.02)	0.059
pooled	1026	1.12 (45.14)	0.23 (6.04)	0.06 (5.98)	0.082	1.19 (53.49)	0.28 (7.39)	0.050	1.14 (45.58)	0.07 (7.31)	0.050

Notes: coefficient estimates are based on ordinary least-squares estimation. The table reports the coefficient estimates and t- statistics from the yearly, five and ten years cross sectional regression. T- statistics are in parentheses.

P is the deflated price of a share after three months after year end t. x is the deflated earnings per share of the firm i for year t. bv is the deflated book value per share of the firm i at year-end t.

Table 6

Yearly incremental explanation of accounting earnings, book value, and accounting earnings and book value

Models: $R_E^2 = R_I^2 - R_3^2$

$$R_B^2 = R_I^2 - R_2^2$$

$$R_C^2 = R_I^2 - (R_E^2 + R_B^2)$$

Years	R_I^2	R_2^2	R_3^2	R_E^2	R_B^2	R_C^2
1993	0.026	0.022	0.006	0.020	0.004	0.002
1994	0.069	0.053	0.038	0.031	0.016	0.022
1995	0.031	0.022	0.002	0.029	0.009	-0.007
1996	0.078	0.062	0.020	0.058	0.016	0.004
1997	0.021	0.013	0.004	0.017	0.008	-0.004
1998	0.018	0.010	0.018	0.000	0.008	0.010
1999	0.023	0.022	0.004	0.019	0.001	0.003
2000	0.224	0.193	0.120	0.104	0.031	0.089
2001	0.252	0.247	0.047	0.205	0.005	0.042
2002	0.212	0.116	0.149	0.063	0.096	0.053
1993-97	0.049	0.030	0.026	0.023	0.019	0.007
1998-02	0.122	0.099	0.059	0.063	0.023	0.036
Pooled	0.082	0.050	0.050	0.032	0.032	0.018

Notes: R_I^2 , R_2^2 and R_3^2 are a cross-sectional regression result on price of both accounting earnings and book value, accounting earnings, and book value respectively.

Table 6 summarizes the incremental value relevance of accounting earnings, the incremental explanatory power of book value, and the incremental explanatory power common to both accounting earnings and book value across time. Value relevance and the incremental explanatory power of accounting earnings and book value indicate an increase across time. The second sub-problem is to compare the incremental value relevance of accounting earnings and the incremental value relevance of book value to share price within the industrial sector over a period of time. The result indicates the incremental explanatory power of accounting earnings (book value) increases from 0.023(0.019) of the pooled first five years (1993-97) to 0.063(0.023) of the pooled latest five years (1998-2002). The incremental explanatory power of accounting earnings and the incremental explanatory power of book value increases on average 1% per year which is significant for book value ($t=4.45$) and weakly significant for

accounting earnings ($t=1.90$). Thus, the incremental explanatory power of book value has increased significantly across time which is consistent with the findings of Collins, Maydew and Weiss (1997) and Brown, Lo and Lys (1999). Besides, the null hypothesis of the second sub-problem hypothesises that the incremental value relevance of book value increases while decreasing the incremental value relevance of accounting earnings. The finding of this paper indicates that the incremental explanatory power of accounting earnings and the incremental explanatory power of book value increased over the study period of 1993 to 2002 and therefore, the null and first hypotheses of the second sub-problem is rejected. This indicates the systematic change between accounting earnings and book value over time. The change in incremental and the value relevance of accounting earnings and book value is also presented in Fig (1) below.

Fig.1 yearly change of the explanatory power of accounting earnings and book value

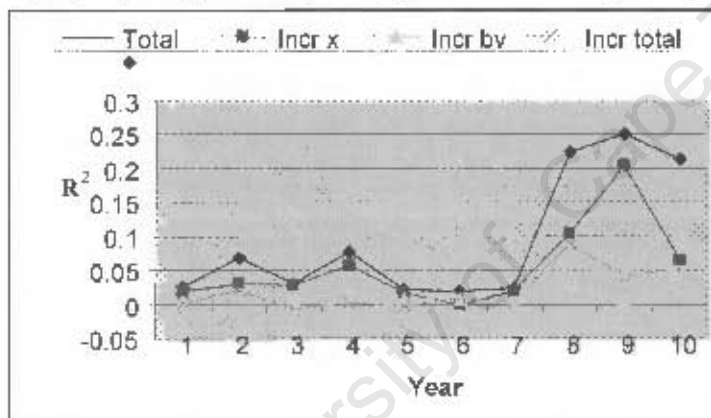


Fig.1 shows yearly cross-sectional regressions of common and incremental explanatory power of accounting earnings and book value. In each year three cross-sectional regressions are run. Price is regressed on both accounting earnings and book value; on accounting earnings; and on book value. The incremental explanatory power of accounting earnings (Incr. x) is the explanatory power R^2 from regression equation one less the R^2 from equation three (refer chapter three pp. 39). The incremental explanatory power of book value (Incr. by) is the R^2 from equation one less the R^2 from equation two (refer chapter three pp. 39). The incremental explanatory power common to both accounting earnings and book value (Incr. total) is the incremental explanatory power common to both accounting earnings and book value. Thus, the total represents the total explanatory power common to both accounting earnings and book value and 1 to 10 represents years from 1993 to 2002 respectively.

Fig.1 also shows the trend in the common and incremental explanatory power of accounting earnings and book value across time. In Fig.1, the total represents the total explanatory power common to both accounting earnings and book value; the Incr. x represents the incremental explanatory power of accounting earnings; the Incr. bv represents the incremental explanatory power of book value; Incr. total represents the incremental explanatory power common to both accounting earnings and book value. Inspection of Fig.1 it makes clear that the total explanatory power of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value have increased across time.

The results reflected in Table 5, Table 6 and Fig 1 indicate that the value relevance of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value have all increased across the study period of 1993-2002. To confirm this result, the yearly cross-sectional regression result is regressing R^2 on the time trend variable equation (7) (refer to chapter three pp. 40). This reveals that the increase in the total explanatory power of accounting earnings and book value, and the incremental explanatory power of book value, are significant. However, the incremental explanatory power of accounting earnings is weakly significant. For example, the incremental explanatory power of accounting earnings (book value) are weakly significant (significant) $t= 1.90$ and ($t=4.45$). This is despite the fact that the systematic change in the incremental value relevance of accounting earnings and the incremental value relevance of book value is hypothesized in the second sub-problem of this paper. Contrary to the finding of *Brief and Zarowin (2000)*; *Brown, Lo and Lys (1999)*; *Lin and Walker (2000)* and *Lo and Lys (2000)* combined explanatory power of accounting earnings and book value on the JSE has actually increased across time ($t=4.62$) and therefore the null hypothesis of the first sub-problem is accepted. The null hypothesis of the first sub problem is that the combined explanatory power of accounting earnings and book value is increased over period of time which is consistent with emerging capital markets findings.

4.4 Explaining the temporal change in the value relevance of accounting earnings and book value

4.4.1 The cross sectional affect of intangible intensive assets and transitory earnings

This section documents the manner in which the total explanatory power of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value vary in the firms with intangible intensive and transitory earnings. At this point, this study is not concerned with whether these factors are changing over time but simply seeks to document how each of these items relates to the value relevance of accounting earnings and book value.

Collins, Maydew and Weiss (1997) document that the explanatory power of accounting earnings and book value is slightly greater in firms with intangible intensive assets than non-intensive. In the contrast to *Collins, Maydew and Weiss's (1997)* findings, panel A of Table 7 (pp. 56) indicates that the value relevance of accounting earnings and book value is greater in the firms with non-intangible intensive assets than with intangible intensive (0.173 vs 0.041). This is consistent with the *Barth, Beaver and Landsman (1998)* and *Brief and Zarowin (1999)* claims that the value relevance of accounting information is lower in the firms with intangible intensive assets than non-intangible intensive firms. The relevance of the financial statement is decreased in the firms with intangible intensive assets. However, Table 8 (pp.57) shows that the incremental explanatory power common to both accounting earnings and book value is greater in the firm with intangible intensive assets than the firms with non-intangible intensive assets (0.032 vs -0.029). Thus, the incremental explanatory power common to both accounting earnings and book value is negative for the firms with non-intangible intensive assets which mean that the model does not have an incremental advantage in defining share price. This is consistent with *Amir and Lev (1996)* findings which are that accounting earnings and book value are irrelevant on a stand alone basis to determine value in the firms with intangible intensive assets.

Table 7

Regression of price against accounting earnings and book value for various factors^a

Models: $P(it) = \alpha_0 + \alpha_1 x(it) + \alpha_2 bv(it) + \varepsilon(it)$								
$P(it) = \beta_0 + \beta_1 x(it) + \varepsilon(it)$								
$P(it) = \gamma_0 + \gamma_1 bv(it) + \varepsilon(it)$								
	N	α_1	α_2	R^2	β_1	R^2	γ_1	R^2
Panel A: intangible intensive ^x								
Non-intangible intensive	513	0.32 (7.01)	0.10 (8.71)	0.173	0.26 (5.21)	0.050	0.09 (7.27)	0.094
Intangible intensive	513	0.19 (1.93)	0.02 (0.96)	0.041	0.27 (4.58)	0.039	0.06 (4.25)	0.034
Panel B: performance ^y								
Permanent earnings	615	2.74 (5.72)	0.00 (0.08)	0.061	2.76 (6.34)	0.061	0.07 (2.59)	0.011
Transitory earnings	411	0.22 (4.97)	0.06 (4.91)	0.130	0.26 (5.86)	0.078	0.07 (5.91)	0.079
Panel C: intangible intensive and performance ^z								
Intangible & Permanent	340	2.68 (3.56)	0.43 (3.37)	0.125	3.96 (5.98)	0.096	0.66 (5.85)	0.092
Intangible & Transitory e	173	0.21 (1.79)	0.03 (0.93)	0.093	0.30 (4.07)	0.088	0.07 (3.74)	0.076

^a T-statistics are in the parentheses.^x Intangible intensive company is a year-end firm observation with a percentage ranking of 50% higher (lower) price to book ratio considered as intangible intensive (non- intangible intensive) firms.^y Transitory and permanent earnings are identified based on earnings to the beginning price ratio which is three inner quintiles considered as permanent earning and two outer quintiles considered as transitory earnings.^z Intangible & permanent and intangible & transitory are identified based on the percentage ranking of 50% higher price to book ratio for intangible intensive firms and permanent & transitory earnings based on earnings to begging price which is three inner quintiles considered as permanent earnings and two outer quintiles considered as transitory earnings.

P is the deflated price of a share after three months after year end t.

x is the deflated accounting earnings per share of the firm i for year t.

bv is the deflated book value per share of the firm i at year-end t.

Barth, Beaver and Landsman (1998) provide evidence that unrecognised intangible assets cause a decrease in the relevance of book value on defining share price. Panel A in Table 7 is similar to finding of *Barth, Beaver and Landsman (1998)* that firms with intangible intensive assets have a smaller explanatory power of book value than firms with non-intangible intensive assets (0.034 vs 0.094). Moreover, the explanatory power of earnings is slightly greater in the firms with non-intangible intensive assets than in firms with intangible intensive assets (0.050 vs 0.039). Table 8 also shows that for intangible intensive firms, the incremental explanatory power of book value is lower compared to firms with non-intangible intensive assets (0.002 vs 0.123) and have lower incremental explanatory power of accounting earnings (0.007 vs 0.079). The accounting earnings have a greater incremental explanatory power than the incremental explanatory power of book value in the firms with intangible intensive assets (0.007 vs 0.002). Moreover, the explanatory power of accounting earnings is greater than the explanatory power of book value in the firms with intangible intensive assets (0.039 vs 0.034). This indicates that accounting earnings are more dominant in explaining value relevance in the firms with intangible intensive assets than book value, this is consistent with the *Barth, Beaver and Landsman (1998)* and *Brief and Zarowin (1999)*.

Table 8

Incremental explanation of accounting earnings and book value on various situations

Models: $R_E^2 = R_I^2 - R_3^2$

$R_B^2 = R_I^2 - R_2^2$

$R_C^2 = R_I^2 - (R_E^2 + R_B^2)$

	R_I^2	R_2^2	R_3^2	R_E^2	R_B^2	R_C^2
Not intangible intensive	0.173	0.050	0.094	0.079	0.123	-0.029
Intangible intensive	0.041	0.039	0.034	0.007	0.002	0.032
Permanent earnings	0.061	0.061	0.011	0.050	0.000	0.011
Transitory earnings	0.130	0.078	0.079	0.051	0.052	0.027
Intensive & Permanent	0.125	0.096	0.092	0.033	0.029	0.063
Intensive & Transitory	0.093	0.088	0.076	0.017	0.005	0.071

Notes: R_I^2 , R_2^2 and R_3^2 are regression results on price based on their performance and characteristics of the firm-end observation of both earnings and book value, earnings, and book value respectively.

Barth, Beaver and Landsman (1998); Brief and Zarowin (2001); Hayn (1995) and Lin and Walker (2000) suggest that earnings (book value) have less (more) explanatory power for the firms with transitory earnings relative to those with permanent earnings. Panel B of Table 7, presents a result consistent with the expectation regarding book value, while the results are not consistent with the expectation for the accounting earnings. The value relevance of accounting earnings is lower in the firms with permanent earnings compared to firms with transitory earnings (0.061 vs 0.078). However, the incremental explanatory power of the accounting earnings (Table 8) indicates almost the same for the firms with transitory earnings as compared to the firms with permanent earnings (0.051 vs 0.050). *Barth, Beaver and Landsman (1998); Brief and Zarowin (2001); Collins, Maydew and Weiss (1997) and Hayn (1995)* argue, that for the firms with transitory earnings, book value should have a greater explanatory power compared to accounting earnings. However, panel B of Table 7 indicates that the explanatory power of book value almost equals that of the explanatory power of accounting earnings (0.079 vs 0.078). The incremental value relevance of accounting earnings and the incremental value relevance of book value is almost equal for the firms with transitory earnings (0.051 vs 0.052) while the incremental explanatory power of book value increased significantly for the firms with transitory earnings (0.000 vs 0.052). This indicates that the relevance of book value increases for the firms with financial difficulties which is defined as the abandonment option. *Brief and Zarowin's (2000)* findings, suggest that the value relevance common to both accounting earnings and book value remains constant for the firms with transitory earnings and for the firms with permanent earnings, book value compensates for the loss in the value relevance of accounting earnings and rescues the accounting earnings and book value model, while transitory earnings produce the biggest increase in the explanatory power of book value. However, the value relevance common to both accounting earnings and book value on the JSE is even stronger for the firms with transitory earnings than for firms with permanent earnings (0.130 vs 0.061). Thus, the value relevance of book value for the firms with permanent earnings is insignificant in determining share price on the JSE capital market. This result could be influenced by the investors' psychological perception that they react more actively for the unreliable than reliable information (*Frank 2004*).

Brief and Zarowin (2000) document that the value relevance of accounting earnings and book value is lower in the firms with intangible intensive assets/ transitory earnings than for those with intangible intensive assets/ permanent earnings. Panel C of Table 7 presents results consistent with *Brief and Zarowin's (2000)* findings that the value relevance accounting earnings and book value is lower for the firms with intangible intensive assets/ transitory earnings than for the firms with intangible intensive assets/ permanent earnings (0.093 vs 0.125). The value relevance of accounting earnings and the value relevance of book value is greater for the firms with intangible intensive assets/ permanent earnings than for the firms with intangible intensive assets/ transitory earnings (0.096 vs 0.088) and (0.092 vs 0.076) respectively. The incremental explanatory power of book value becomes insignificant for the firms with intangible intensive assets/ transitory earnings (0.005). However, incremental explanatory power common to both accounting earnings and book value is greater for the firms with intangible intensive assets/ transitory earnings than the firms with intangible intensive assets/ permanent earnings (0.071 vs 0.063). Even though the incremental explanatory power of accounting earnings and the incremental explanatory power of book value is greater for the firms with intangible intensive assets/ permanent earnings than for the firms with intangible intensive assets/ transitory earnings (0.033 vs 0.017) and (0.029 vs 0.005) respectively. Therefore, the value relevance of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value have decreased as the percentage of firms observation with intangible intensive assets/ transitory earnings increased while the incremental explanatory power common to both accounting earnings and book value has increased. The value relevance of accounting information decreases as the firms face financial difficulties and increase their investment in the intangible assets.

The overall results of Table 7 and Table 8 show that the explanatory power of accounting earnings and book value are negatively affected by the firms with intangible intensive assets while being positively affected by the firms with transitory earnings. Intangible intensive firms are a more influential factor than the transitory earnings on the JSE capital market. This is because the combination of the two variables results in the increase in the value relevance of accounting earnings and book value on intangible/permanent earnings firms rather than on intangible/

transitory earnings. The transitory earnings findings have a positive impact on the increase in the value relevance of accounting earnings and book value. Moreover, the intangible intensive and transitory earnings are presented in deciles in order to provide additional evidence, on the trend of the value relevance of accounting earnings and book value on different deciles, for the findings in Table 7 and Table 8.

Fig (2) (pp. 61) presents further evidence of the affect of intangible intensive and transitory earnings on the value relevance of accounting earnings and book value. Fig 2 (a) and Fig 2 (b) form a deciles portfolio based on the percentage of market price to book value and accounting earnings to beginning share price ratio respectively, in order to examine how the total explanatory power of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value vary across the portfolio. To test whether the total explanatory power common to both accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value varies across portfolios. The R^2 regressed on deciles ranking and the t-statistics are examined significance for DECILES, that is values of DECILES one to ten for the most permanent (most non-intangible intensive) to most transitory (most intangible intensive) firms.

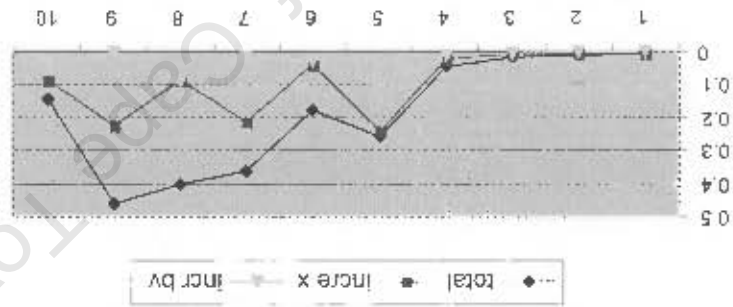
$$R_j^2 = \emptyset_0 + \emptyset_1 \text{DECILES}_j + b \varepsilon_j$$

In Fig 2 (a) a portfolio of firm year end observations are formed based on the percentage ranking of the market to book value ratio. Thus portfolio 1 is formed by a percentage range of 1- 10 as the most non-intangible intensive firms and portfolio 10 is formed by percentage range of 90-100 as the most intangible intensive firms observations (Refer to Appendix 2). Market price to book value ratio of greater than 50 percentages indicates intangible intensive firms, the last five deciles are entirely composed of those firms.

Fig 2 (a) represents pooled cross-sectional time series regressions of portfolios formed by deciles of market to book value ratio percentage ranking. Portfolios are formed by the percentage ranking of market price to book value ratio from the total sample of firm-year end observations. Ten portfolios are formed based on this criterion with portfolio 1 (1) as the most non-intangible intensive firms (most intangible intensive firms observations) which is on the range of 0-10% (90-100%) (Appendix 2). Then, pooled cross sectional time series observations are run to obtain total explanatory power of both accounting earnings and book value (total), the incremental explanatory power of accounting earnings (Incr x) and the incremental explanatory power of book value (Incr bv). (b) Pooled cross sectional time series regressions of portfolio formed by deciles of earnings to beginning share price ratio percentage ranking. Ten portfolio are formed, which are on the top and bottom 5% of earnings to beginning share price ratio as most transitory earnings and on the range of 45-55% as most permanent earnings and indicated by 10 (1) (Appendix 1). Pooled cross-sectional time series observations are run

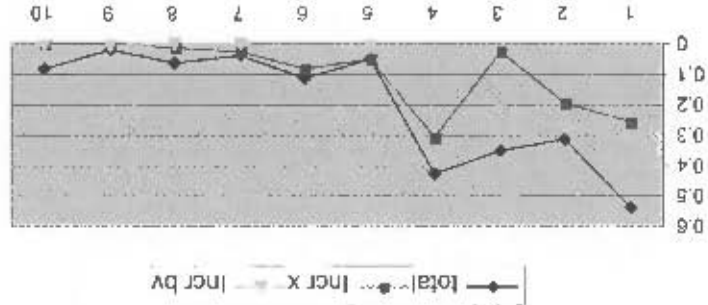
the same as in observation (a).

Deciles (1 is the most permanent, 10 is the most transitory)



(b)

Deciles (1 is the most non-intensive, 10 is the most intensive)



(a)

Fig. 2 deciles of the firms with transitory and permanent earnings and firms with intangible intensive and non intangible intensive assets

Fig 2(a) shows that the incremental explanatory power of accounting earnings and the incremental explanatory power of book value is low for the portfolio of firms with high intangible-intensive assets. As mentioned above value relevance of accounting information plays a smaller role in defining the share price of the firms with higher intangible intensive assets (*Amir and Lev 1996*). The incremental explanatory power of book value decreases with the increased percentage ranking of intangible observations ($t=-3.89$). In addition the incremental explanation power of accounting earnings decreases while there is an increase in the percentage ranking of intangible intensive firms ($t=-3.02$). This is consistent with the findings reflected in panel A of Table 7 and Table 8 (pp. 56 & 57) that the incremental explanatory power of accounting earnings and the incremental explanatory power of book value has decreased on average by 3 and 4 percent respectively per increase in deciles of intangible intensive assets. For the portfolio 7-10 the incremental explanatory power of book value is nearly zero while the incremental explanatory power of accounting earnings is zero at portfolio nine and ten. The total explanatory power common to both accounting earnings and book value decreased as the percentage ranking of intangible intensive firms increased ($t= -4.45$). The combined results of Panel A in Table 7 and Table 8 indicate that the common and individual explanatory power of accounting earnings and book value decreased as the percentage ranking of intangible intensive firms increased. Thus, the value relevance common to both accounting earnings and book value decreases as intangible intensive firms increase which is consistent with the *Amir and Lev (1996)* argument that the share price of intangible intensive firms is highly influenced by non financial information compared with non-intangible intensive firms.

Fig 2 (b) classifies the firms in deciles based on the percentage ranking of earnings over year beginning share price. Firms in tenth deciles have a top and bottom 5% of earnings to beginning price ratio, while the firms in the first deciles have a middle percentage rank which is in the range from 45 to 55 percentages of earnings to beginning price (Appendix 1). As two outer quartiles are considered as transitory earnings, the last four deciles are entirely composed of those firms.

Table 9

Regression of total and incremental explanatory power of earnings and book value across deciles^x

Model: $R_j^2 = \emptyset_0 + \emptyset_1 \text{DECILES}_j + b \epsilon_j$				
dependent variables ^y	N	\emptyset_0	\emptyset_1	R^2
Deciles of intangible intensive and non intangible intensive				
Total R^2	10	0.49 (6.65)	-0.05 (-4.45)	0.712
Incremental earnings R^2	10	0.25 (4.35)	-0.03 (-3.02)	0.533
Incremental book value R^2	10	0.35 (5.34)	-0.04 (-3.89)	0.654
Deciles of permanent and transitory earnings				
Total R^2	10	-0.05 (-0.62)	0.04 (3.28)	0.574
Incremental earnings R^2	10	-0.01 (-0.11)	0.02 (1.96)	0.325
Incremental book value R^2	10	0.01 (0.34)	0.00 (0.93)	0.097

^x T statistics are in the parentheses. DECILES represent numbers of deciles based on the percentage rank of market to book value for intangible intensive and non intangible intensive firms or earnings to begging share price for the transitory and permanent earnings (Appendix 1 and 2).

^y The dependent variables are Total R^2 from yearly regressions common to both accounting earnings and book value, the Incremental earnings R^2 and the Incremental book value R^2 .

Fig 2(b) shows that the total explanatory power common to both accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value increases while the percentage ranking of transitory earnings increases. The t-statistics for the regression incremental R^2 on deciles ranking is weakly significant for earnings and insignificant for book value ($t=1.96$ and $t=0.93$ respectively). *Brief and Zarowin (2000)* and *Collins, Maydew and Weiss (1997)* argue that the value relevance of accounting earnings decreases while the percentage of firms with transitory earnings increase. However, the findings of this thesis are contrary to this, which is that the value relevance of accounting

earnings increased with an increased percentage ranking of firms with transitory earnings. As mentioned on the above this result could be influenced by the investors' psychological perception that they react more actively for the unreliable than reliable information (Frank 2004). It is interesting to note that the incremental explanatory power of accounting earning reaches its peak on deciles five, even though the explanatory power of accounting earnings reaches a maximum on deciles nine ($R^2 = 0.461$ Appendix 1). However, the incremental explanatory power of book value is not significant to the performance of the firms. Moreover, t statistics for the explanatory power common to both accounting earnings and book value is significant ($t=3.28$). Thus, total explanatory power of accounting earnings and book value increased an average of 4% per deciles with an increase in the level of transitory earnings. Combining the results of panel B of Table 7 and Table 8 reveals that the value relevance common to both accounting earnings and book value increases with an increase in the transitory earnings. Overall, the results in Fig. 2 indicate that intangible intensive and transitory earnings are associated with a variation in the value relevance of accounting earnings and book value. If those factors vary systematically across time, then they may explain the change in the value relevance of accounting earnings and book value shown in Fig 1 (refer to p.53).

4.4.2 Temporal change in percentage of firms with intangible intensive assets and transitory earnings

This section investigates, whether the intangible intensive and transitory earnings have varied systematically over the period of time to assess whether the change in the value relevance of accounting earnings and book value can be explained by these factors. Thus, if the percentage of firms with intangible intensive assets and percentage of firms with transitory earnings are regressed using time variables, the result presented will determine whether the factors are changing over time. If their change is systematic with the change in the value relevance, this could explain the increase in the value relevance of accounting earnings and book value on the JSE market.

Fig 3 (a) presents a percentage of firms' observations with transitory earnings by the year and indicates that the largest percentage of firms with transitory earnings occur in

1993, after which the percentage of firms with transitory earnings declined until a low was reached in 1996 at less than two-thirds of the level in 1993. Since 1996, the percentage of firms with transitory earnings has increased moderately. While Fig 3 (a) reveals that the overall percentage of firms with transitory earnings appears to be decreasing ($t = -0.74$) (Appendix 6), this is as a result of the average decline from 1993 to 1996 out weighting the moderate increase after 1996. However, overall percentage decline is insignificant.

Fig 3 (b) presents a yearly percentage of firms with intangible intensive assets and reveals that the overall percentage of the firms with intangible intensive assets decreased from 1993-2002 ($t = -2.64$) (Appendix 6). The percentage of the firms with intangible intensive assets declined significantly which is consistent with the increase in the value relevance of accounting earnings and book value across time. Thus value relevance of accounting earning and book value has increased as the firms with intangible intensive assets decreased. The largest percentage of firms with intangible intensive assets is in 1996 and is lowest in 2001 which indicates a steady decline from 1996 -2001.

Overall the results in Fig. 3 indicate that the percentage of firms with intangible intensive assets over the study period of 1993-2002 increased in the same direction as the increase in the value relevance of accounting earnings and book value. The overall direction on the percentage of the firms with transitory earnings is decreased while increased in the value relevance of accounting earnings and book value to share price. Thus Fig 2 (b) (refer to pp.61) shows that the value relevance of accounting earnings and book value increases while the level of transitory earnings increases. Overall the percentage of firms with transitory earnings appears to be insignificantly decreased though; the percentage of firms with transitory earnings shows a steady increase in the last four years which is consistent with the increase in the value relevance of accounting earnings and book value. The next section formally tests whether the changes documented in Fig 3 can explain the change in the value relevance of accounting earnings and book value.

Fig.3 yearly percentage of firms with transitory earnings and yearly percentage of firms with intangible intensive assets

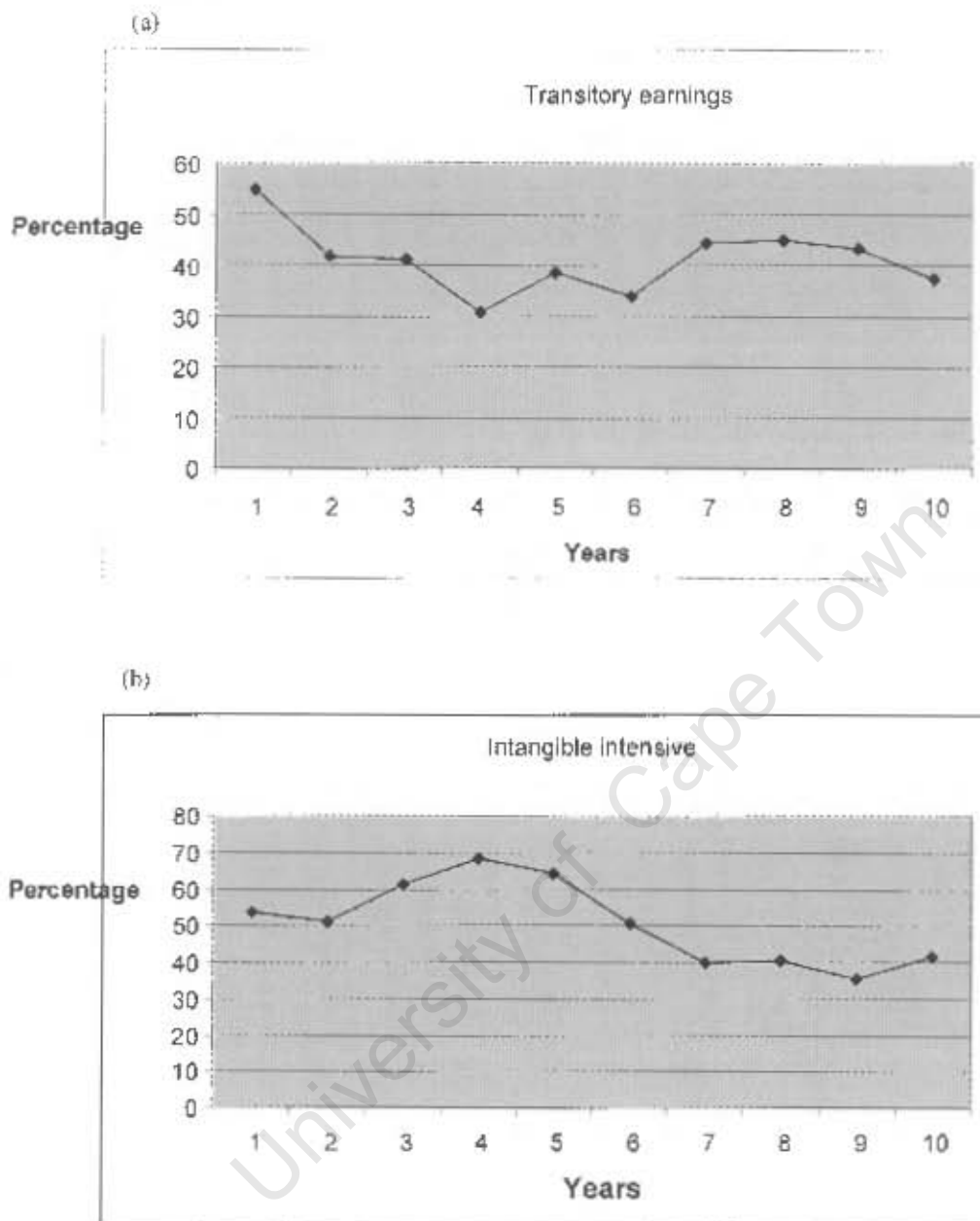


Fig 3 (a) presents a percentage of the firm observations in transitory earnings by the year. Transitory earnings are identified based on the percentage ranking of earnings to year beginning price which is two out quartiles is considered as transitory earnings. Then the percentage of firms with transitory earnings is identified by transitory earnings firms over total firms in the year (Appendix 3). (b) Presents a percentage of the firm observations in intangible intensive firms by the year. Intangible intensive is identified based on the percentage ranking of market price over book value which is above 50 percentages. Then the percentage calculation is similar to (a) (Appendix3).

4.5 Explaining the temporal variation change in the value relevance of accounting earnings and book value

This section investigated whether the observed change in the value relevance of accounting earnings and book value to share price can be explained by change in the percentage of the firms with transitory earnings and intangible intensive assets. A regression equation is formed which includes three independent variables in the earlier incremental and total regression R^2 on time trend variables. The results presented on Table 10 (refer to pp.68).

$$R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + \theta_2 \text{TRN} + \theta_3 \text{INT} + b \varepsilon(t)$$

Where TIME is 1-10, corresponding to the years 1993-2002, TRN is the percentage of firms with transitory earnings, and INT is the percentage of firms with intangible intensive assets. To examine what affect, if any, including TRN and INT, has on the significance of TIME.

In the first regression of total R^2 (Table 10), TIME is positive and significant ($t=4.62$) when it is the only explanatory variable. However, it become insignificant when the control variables are included ($t=1.39$). Except for the coefficient variable of the INT, which is negative, the other two variables have a positive coefficient variable on the total R^2 of accounting earnings and book value. As noted above, the coefficient of INT is negative and insignificant ($t=-0.59$) and the coefficient of TRN is positive and insignificant ($t=0.27$). Therefore, an increase in the value relevance of accounting earnings and book value on the JSE is not significantly influenced by the change in the firms with transitory earnings and intangible intensive assets. Thus, the explanatory power of accounting earnings and book value increased because of other factors which could be GAAP harmonization toward IAS (*Bao and Chow 1999*), change in the ownership structure, change in the company composition of the industry and /or the general economic condition of South Africa. This however requires further study. *Bao and Chow (1999)* document that the value relevance of accounting earnings and book value based on IAS is greater than the accounting information prepared based on domestic accounting standards. This implies that the harmonization

of the domestic accounting standard with the IAS could increase the explanatory power of accounting earnings and book value.

Table 10

Regression of the total and incremental explanatory power of earnings and book value on time trend variable and various yearly characteristics of the sample^x

Models: $R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + b \varepsilon(t)$

$$R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + \theta_2 \text{TRN} + \theta_3 \text{INT} + b \varepsilon(t)$$

Dependent variables ^y	N	θ_0	θ_1	θ_2	θ_3	R^2
Total R^2	10	-0.01 (-0.33)	0.03 (4.62)			0.727
	10	0.09 (0.18)	0.02 (1.39)	0.00 (0.27)	-0.00 (-0.59)	0.803
Incremental earnings R^2	10	-0.00 (-0.18)	0.01 (1.90)			0.311
	10	-0.04 (-0.11)	0.01 (0.81)	0.00 (0.37)	-0.00 (-0.15)	0.370
Incremental book value R^2	10	-0.03 (-1.43)	0.01 (4.45)			0.713
	10	0.14 (0.54)	0.00 (1.21)	-0.00 (-0.84)	-0.00 (-0.45)	0.746

^x T-statistics are in the parentheses. Variable definition: TIME is t is 1 for year 1993, and increases by one for each additional year. TRN is the percentage of the firms' observations in year t that are transitory earnings. INT is the percentage of the firms' observations in year t that are intangible intensive. All of the above regressions were corrected for the first autocorrelation in the residual using a generalized least squares approach developed by Prais and Winsten (1954) and described in Greene (1990) cited in *Collins, Maydew and Weiss (1997)* (Appendix 4).

^y The dependent variables are Total R^2 from yearly regressions of accounting earnings and book value, the Incremental earnings R^2 and the Incremental book value R^2 .

In the regression of the incremental R^2 of accounting earnings (Table 10), TIME is positive and weakly significant ($t=1.90$), however it becomes positive and insignificant when the other control variables are included ($t=0.81$). The coefficients on TRN and INT are insignificant which are $t=0.37$ and $t=-0.15$ respectively.

Therefore, the transitory earnings and intangible intensive firms have an insignificant influence on the incremental explanatory power of accounting earnings over a period of time on the JSE capital market.

The last set of regressions in Table 10 seeks to explain the variation in the incremental explanatory power provided by book value. When TIME is the sole explanatory variable, it is positive and significant ($t= 4.45$), consistent with the *Brown, Lo and Lys (1999)* and *Collins, Maydew and Weiss's (1997)* claim that the incremental value relevance of book value increase across time. After the control variables are included, however, the coefficient on TIME become insignificant ($t=1.21$). The coefficients on TRN and INT are negative and insignificant ($t=-0.84$ and $t=-0.45$ respectively). Therefore, the transitory earnings and intangible intensive firms have an insignificant influence on the increase in the incremental explanatory power of book value across time on the JSE capital market.

The overall results presented in Table 10 indicate that including the above variables renders TIME insignificant to explain temporal variation in total R^2 , the incremental R^2 provided by accounting earnings and the incremental R^2 provided by book value. Further, intangible intensive and transitory earnings are insignificant in explaining the variation in the explanatory power of accounting earnings and book value. Thus, an increase in the value relevance of accounting earnings and book value is not significantly influenced by the percentage change of the firms with transitory earnings and the percentage decrease of firms with intangible intensive assets on the JSE capital market.

Table 11

Regression of coefficients on time trend variable and various yearly characteristics of the firms ^x

Models: $R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + b \varepsilon(t)$

$$R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + \theta_2 \text{TRN} + \theta_3 \text{INT} + b \varepsilon(t)$$

Dependent variables ^y	N	θ_0	θ_1	θ_2	θ_3	R^2
Coefficient on earnings	10	0.39 (1.57)	0.04 (1.05)			0.121
	10	-0.69 (-0.21)	0.08 (0.87)	0.00 (0.12)	0.01 (0.46)	0.186
Coefficient on book value	10	-0.01 (-0.44)	0.01 (3.62)			0.723
	10	-0.21 (-0.51)	0.02 (1.73)	0.00 (0.11)	0.00 (0.65)	0.770

^x T-statistics are in the parentheses. Variable definition: TIME is t is 1 for year 1993, and increases by one for each additional year. TRN is the percentage of the firms' observations in year t that are transitory earnings. INT is the percentage of the firms' observations in year t that are intangible intensive. All of the above regressions were corrected for the first autocorrelation in the residual using a generalized least squares approach developed by Prais and Winsten (1954) and described in Greene (1990) cited in *Collins, Maydew and Weiss (1997)* (Appendix 5).

^y The dependent variables are coefficient on accounting earnings and coefficient on book value from the yearly regression of price on accounting earnings and book value.

Beside incremental R^2 s one could use coefficient accounting earnings and book value to determine the change in the value relevance of accounting earnings and book value. Table 11 examines the inter-temporal change in the coefficient on accounting earnings and book value from the yearly regression price on accounting earnings and book value and investigates whether a similar pattern of change can be observed as the incremental R^2 s and to check whether the same variable, able to explain the change in the explanatory power of accounting earnings and book value can explain the change in coefficient. Therefore, Table 11 presents the results of re-estimating the equations in Table 10 with coefficient on earnings and book value as dependent variables. These results are generally consistent with Table 10 results that used incremental R^2 as a measure of value relevance. The value relevance of accounting earnings and value relevance of the book value have increased across time and are

insignificantly affected by the change of firms with intangible intensive assets and firms with transitory earnings. However, on the combined accounting earnings and book value model, the increase in the value relevance of accounting earnings is insignificant ($t=1.05$).

Overall Table 10 and Table 11 indicate that the increase in the value relevance of accounting earnings and book value, the increase in the incremental explanatory power of accounting earnings and the increase in the incremental explanatory power of book value over time have not significantly been affected by the change of firms with transitory earnings and firms with intangible intensive assets on the JSE market. Finally, there is no evidence of deterioration in the value relevance of accounting information on the JSE market which is consistent with the null hypothesis of the first sub-problem and with the value relevance of accounting information on emerging capital markets. However, the increases in the incremental explanatory power of accounting earnings is weakly significant while the incremental explanatory power of book value increased significantly. Therefore, the hypotheses of the second-sub problem is rejected which proposed the systematic relationship between accounting earnings and book value to share price.

Chapter five

Findings and conclusion

5.1 Findings

The paper has investigated the value relevance of accounting earnings and book value to share price based on the price model on the JSE capital market using the Ohlson (1995) model. The studies, relying on or motivated by the Ohlson (1995) model found different results on across developed and emerging markets. The value relevance of accounting earnings and book value of equity declined on developed capital markets (*Brief & Zarowin 2000; Brown, Lo & Lys 1999; Lin & Walker 2000 and Lo & Lys 2000*) while it is increasing on emerging capital markets (*Bao & Chow 1999*). Since the South African capital market is regarded as an emerging capital market (*Bharath 2004*), the same result is expected in terms of the null hypothesis of the first sub-problem of this research.

The results of this paper indicate that the correlation coefficient of accounting earnings and book value are positively correlated to share price and each other. The correlation coefficient of both accounting earnings and book value are significant at the significance level of 0.001 for pooled five and ten year's regression results. Thus, the value relevance of accounting earnings and book value has increased across a period of time which is consistent with the null hypothesis of the first sub-problem. The explanatory power of accounting earnings and the explanatory power of book value have actually increased across the study period of time. The incremental explanatory power of accounting earnings and the incremental explanatory power of book value have increased as well across the study period of time. It is not unusual to expect the increase of the incremental explanatory power of book value on the South African market compared with the insignificant increase in the Chinese market which experienced a high inflation rate at the time of the study (*Bao & Chow 1999*). However the increase in the incremental explanatory power of accounting earnings is weakly significant, though, the second sub-problem of this paper hypothesises that there is a systematic relationship between accounting earnings and book value to share price.

The explanatory power common to accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value varies across firms. Thus the value relevance of accounting earnings and book value is greater for firms with non-intangible intensive assets than for intangible intensive firms. Moreover, the value relevance of accounting earnings and the value relevance of book value is greater for the firms with non-intangible intensive assets than for intangible intensive firms. The incremental explanatory power of accounting earnings and the incremental explanatory power of book value is also greater for the firms with non-intangible intensive assets than for the firms with intangible intensive assets. Although, the value relevance of accounting earnings and the incremental explanatory power of accounting earnings is greater than the value relevance of book value and the incremental explanatory power of book value for the firms with intangible intensive assets respectively. Therefore, the overall results indicate that the value relevance of accounting earnings and book value has increased as the percentage of firms with intangible intensive assets decreased.

The explanatory power common to both accounting earnings and book value is greater for the firms with transitory earnings than for the firms with permanent earnings. Moreover, the value relevance of accounting earnings and the value relevance of book value is greater in the firms with transitory earnings than the firms with permanent earnings. The incremental explanatory power of accounting earnings is almost equal in the firms with transitory earnings and the firms with permanent earnings although the incremental explanatory power of book value significantly increased in the firms with transitory earnings. As a result, the explanatory power common to both accounting earnings and book value is greater in the firms with transitory earnings than in the firms with permanent earnings. However, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value is almost equal in the firms with transitory earnings. Therefore, the overall results indicate that the value relevance of accounting earnings and book value has increased with the increase in the percentage of firms with transitory earnings on the JSE capital market.

The combination of the intangible intensive assets/ permanent earnings results in higher explanatory power of accounting earnings and book value than for firms with

intangible intensive assets/ transitory earnings. Moreover, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value is greater in the firms with intangible intensive assets/ permanent earnings than in the firms with intangible intensive assets/ transitory earnings. However, the incremental explanatory power common to both accounting earnings and book value is greater in the firms with intangible intensive assets/ transitory earnings than in the firms with intangible intensive assets/ permanent earnings. The combination of intangible intensive/ transitory earnings has also contributed to the increase in the incremental explanatory power common to both accounting earnings and book value to share price on the JSE market. However, the value relevance of accounting earnings and book value decreased as the firms with a combination of intangible intensive assets/ transitory earnings increased.

The overall result indicates that intangible intensive and transitory earnings are insignificantly associated with variation in the value relevance of accounting earnings and book value. Thus, the value relevance of accounting earnings and book value increased as the percentage of firms with transitory earnings increased while decreasing the percentage of the firms with intangible intensive assets. However the firms with transitory earnings appear to decrease across the period of study even if they show systematic change with the change in the value relevance of accounting earnings and book value. The percentage of the firms with intangible intensive assets decreased as the value relevance of accounting earnings and book value increased over the study period of time. This could explain the increase in value relevance of accounting earnings and book value. However, intangible intensive and transitory earnings are insignificant in explaining the variation in the explanatory power of accounting earnings and book value. Although they may contribute some influence to the increase in the value relevance of accounting earnings and book value on the JSE capital market.

5.2 Conclusions

This paper has investigated the value relevance of accounting earnings and book value, over a period of time, on the JSE industrial sector. The analysis is motivated by the findings of the researchers that the value relevance of accounting earnings and book value is different on the emerging capital market to that of the developed capital market. This finding is consistent with the emerging capital market finding and the null hypothesis of the first sub-problem, which is that the value relevance of accounting earnings and book value has increased across the period 1993-2002. The incremental explanatory power of accounting earnings and the incremental explanatory power of book value have also increased across the study period of time. Despite the fact that the second sub-problem hypotheses which hypothesises a systematic relationship between the accounting earnings and book value to share price is rejected. Although the incremental explanatory power of accounting earnings is weakly significant. Finally, the increase in the value relevance of accounting earnings and book value, the incremental explanatory power of accounting earnings and the incremental explanatory power of book value cannot be explained by the percentage increase of firms with intangible intensive assets and a change in transitory earnings. However, they can influence insignificantly the increase in the value relevance of accounting earnings and book value. In summary, the increases on the explanatory power of accounting earnings and book value have been insignificantly influenced by the change firms with intangible intensive and transitory earnings on the JSE listed companies on Industrial Sector over the study period of 1993 to 2002.

The analysis in this paper raises a number of questions for future research. First it is possible to extend this research paper by including more than ten years of study, by including all financial sectors and/or by using the comparison of two valuation models (price and return models). Secondly, it is not clear whether the increase in the value relevance of accounting earnings and book value are due to harmonized South Africa GAAP toward IAS or due to real economic changes. *Bao and Chow (1999)* document that the value relevance of accounting earnings and book value based on IAS is greater than the accounting information prepared based on domestic accounting standards. This implies that the harmonization of the domestic accounting standards with the IAS could increase the explanatory power of accounting earnings and book

value. Thirdly, the affects of variation on the value relevance of accounting earnings and book value across industry, change of ownership structure and change in industrial composition over time have not been explored. When firm ownership shifts from institutional ownership to individual ownership, they may react more actively than institutions do. Furthermore, the introduction of high tech companies in the latest years could have a high influence on the relevance of accounting numbers. Finally, the regression equation has a major conceptual limitation in that one can only ascertain relationships, but never be sure about the underlining causal relationship between accounting earnings and book value to share price.

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Appendix

Appendix 1

Deciles on percentage ranking of firms with transitory earnings

Percentage rank	Deciles No.	N	R_1^2	R_2^2	R_3^2	R_E^2	R_B^2
45- 55	1	103	0.008	0.006	0.001	0.007	0.002
40-45 & 55-60	2	102	0.009	0.008	0.002	0.007	0.001
35-40 & 60-65	3	102	0.020	0.012	0.012	0.008	0.008
30-35 & 65-70	4	104	0.044	0.032	0.023	0.021	0.012
25-30 & 70-75	5	102	0.256	0.152	0.014	0.242	0.104
20-25 & 75-80	6	102	0.179	0.150	0.138	0.041	0.029
15-20 & 80-85	7	104	0.364	0.348	0.150	0.214	0.016
10-15 & 85-90	8	102	0.404	0.310	0.032	0.084	0.094
5-10 & 90-95	9	102	0.461	0.461	0.238	0.223	0.000
0-5 & 95-100	10	103	0.143	0.109	0.055	0.088	0.034

Notes: R_1^2 , R_2^2 and R_3^2 are a regression result on price based on their performance of the firms' year end observation of both accounting earnings and book value, accounting earnings, and book value respectively. Moreover, R_E^2 and R_B^2 are the incremental explanatory power of accounting earnings and the incremental explanatory power of book value respectively.

Appendix 2

Deciles on percentage ranking of firms with intangible intensive assets

Percentage rank	Deciles No.	N	R_1^2	R_2^2	R_3^2	R_E^2	R_B^2
0-10	1	102	0.538	0.228	0.282	0.256	0.310
10-20	2	103	0.310	0.035	0.115	0.195	0.275
20-30	3	102	0.351	0.139	0.327	0.024	0.212
30-40	4	103	0.423	0.040	0.117	0.306	0.383
40-50	5	102	0.053	0.045	0.001	0.052	0.008
50-60	6	103	0.114	0.086	0.035	0.079	0.028
60-70	7	103	0.035	0.034	0.012	0.023	0.001
70-80	8	102	0.060	0.059	0.048	0.012	0.001
80-90	9	103	0.017	0.010	0.017	0.000	0.007
90-100	10	103	0.084	0.075	0.084	0.000	0.009

Notes: R_1^2 , R_2^2 and R_3^2 are a regression result on price based on their characteristics of the firms' year end observation of both accounting earnings and book value, accounting earnings, and book value respectively. Moreover, R_E^2 and R_B^2 are the incremental explanatory power of accounting earnings and the incremental explanatory power of book value respectively.

Appendix 3

Yearly percentage of firms with intangible intensive assets and firms with transitory earnings

Year	(A) N	(B) Transitory	C= (B)/(A) Percentage	(D) Intensive	E= (D)/(A) Percentage
1993	73	40	54.79	39	53.52
1994	84	35	41.67	43	51.19
1995	90	37	41.11	55	61.11
1996	91	28	30.77	62	68.13
1997	104	40	38.46	67	64.42
1998	115	39	33.91	58	50.43
1999	117	52	44.44	47	40.17
2000	116	45	44.82	47	40.52
2001	118	51	43.22	42	35.59
2002	118	44	37.28	49	41.53

Note: label C and E presents a percentage of the firms with transitory earnings and firms with intangible intensive assets respectively.

Appendix 4

Regression of the total and incremental explanatory power of accounting earnings and book on time trend variable and various yearly characteristics of the sample

year	R_I^2	R_E^2	R_B^2	TIME	TRN	INT
1993	0.026	0.020	0.004	1	54.79	53.52
1994	0.069	0.031	0.016	2	41.67	51.19
1995	0.031	0.029	0.009	3	41.11	61.11
1996	0.078	0.058	0.016	4	30.77	68.13
1997	0.021	0.017	0.008	5	38.46	64.42
1998	0.018	0.000	0.008	6	33.91	50.43
1999	0.023	0.019	0.001	7	44.44	40.17
2000	0.224	0.104	0.031	8	44.82	40.52
2001	0.252	0.205	0.005	9	43.22	35.59
2002	0.212	0.063	0.096	10	37.28	41.53

Notes: R_I^2 , R_E^2 and R_B^2 are a regression result of price on accounting earnings and book value, the incremental explanatory power of accounting earnings and incremental explanatory power of book value respectively. Moreover, TIME, TRN and INT are represented for year 1993 by 1 and increase yearly, percentage of transitory earnings and percentage of intangible intensive firms over period of time respectively.

Appendix 5

Regression of coefficient on time trend variable and various yearly characteristics of the firms

Years	Coeff. of X	Coeff. Of bv	TIME	TRN	INT	R_2^2	R_3^2
1993	0.16	0.01	1	54.79	53.52	0.022	0.006
1994	0.16	0.03	2	41.67	51.19	0.053	0.038
1995	0.11	0.03	3	41.11	61.11	0.022	0.002
1996	0.78	-0.09	4	30.77	68.13	0.062	0.020
1997	0.52	-0.07	5	38.46	64.42	0.013	0.004
1998	0.02	0.06	6	33.91	50.43	0.010	0.018
1999	0.21	-0.22	7	44.44	40.17	0.022	0.004
2000	0.96	0.009	8	44.82	40.52	0.193	0.120
2001	0.71	0.02	9	43.22	35.59	0.247	0.047
2002	0.29	0.14	10	37.28	41.53	0.116	0.149

Notes: Coeff. X and Coeff. Bv are a regression result of price on accounting earnings and book value which represents the coefficient of accounting earnings and the coefficient of book value respectively. Moreover, TIME, TRN and INT are represented for year 1993 by 1 and increase yearly, percentage of transitory earnings and percentage of intangible intensive firms over period of time respectively. R_2^2 and R_3^2 represents value relevance of accounting earnings and value relevance of book value across time respectively.

Appendix 6

Regression of value relevance and various factors on time trend^x

Models: $R_t^2 = \theta_0 + \theta_1 \text{TIME}_t + \epsilon(t)$

Dependent variables ^y	N	θ_0	θ_1	R ²
R ² of accounting earnings	10	-0.01 (-0.16)	0.02 (2.84)	0.502
R ² of book value	10	-0.01 (0.53)	0.01 (3.60)	0.619
Percentage of transitory earnings	10	44.10 (9.47)	-0.56 (-0.74)	0.064
Percentage of intangible intensive	10	64.59 (10.86)	-2.53 (-2.64)	0.466

^x T-statistics are in the parenthesis. Variable definition: TIME is t is 1 for year 1993, and increase by one for each additional year. All of the above regressions were corrected for the first autocorrelation in the residual using a generalized least squares approach developed by Prias and Winsten (1954) and described in Greene (1990) cited in *Collins, Maydew and Weiss (1997) (Appendix 5)*.

^y The dependent variables are the value relevance of accounting earnings, the value relevance of book value, the yearly percentage of firms with transitory earnings and the yearly percentage of firms with intangible intensive assets.