THE INFORMATION CONTENT OF ECONOMIC VALUE ADDED, RESIDUAL INCOME, EARNINGS AND OPERATING CASH FLOW: EVIDENCE FROM SOUTH AFRICAN INDUSTRIAL SHARES

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Abstract

Proponents of the value based financial performance measure of Economic Value Added (EVA) argue that it is a major improvement over other traditional measures. This study investigates the relationship between EVA and market-adjusted share returns, and compares it to that of residual income, earnings and operating cash flow. Relative information content tests suggest that earnings have the strongest relationship with share returns. The results from the incremental information content tests indicate that although the EVA components provide statistically significant information content beyond that provided by residual income, the level of significance is low.

Key words: Economic value added; Value based financial performance measures; relative and incremental information content

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1 INTRODUCTION

While proponents of the measure economic value added (EVA) generally report high levels of correlation between the measure and shareholder value creation, other researchers have at times reported conflicting results. This raises the question whether the measure is able to outperform other financial performance measures.

The objective of this study is to investigate the ability of the measure EVA to explain market adjusted share returns for a sample of firms listed in the Industrial Sector of the Johannesburg Securities Exchange (JSE), and to compare it to that of other financial performance measures. In the first phase of the study the relative information content of EVA relative to residual income (RI), earnings before extraordinary items (EBEI) and operating cash flow (CFO) is evaluated. The second part of the study investigates the incremental information content of EVA components, and whether the inclusion of these components contributes significantly to the information content of the other measures. The empirical results indicate that the relative information content of EVA is not greater than that of earnings. From the incremental information content test it becomes clear that EVA components do not add significantly to the information content of earnings.

The remainder of this paper is in five parts. Section 2 provides the theoretical background to the study. Section 3 defines the components of EVA. Section 4 sets out the research method, highlighting the hypotheses, the statistical tests used in the study, the selection of the sample, and a description of the variables. Section 5 provides the main empirical results. Section 6 contains a number of sensitivity analyses. The final section presents the summary and conclusions, as well as possible limitations of the study.

2 BACKGROUND TO THE STUDY

The primary financial objective of a firm should be the maximisation of its shareholders' value (see, for instance, Brigham and Houston, 2001). All management decisions and strategies should contribute to this objective. Management, however, faces the problem of determining what the effect of its actions would be on the firm's shareholder value. Net Present Value (NPV) techniques are often employed to translate management decisions and actions into financial figures, and to evaluate their value creating potential. Projects with positive NPV values contribute to the shareholder value of a firm, while the adoption of negative NPV projects results in a destruction of shareholder wealth (Young and O'Byrne, 2001).

Value based financial performance measures are based on similar concepts as the NPV techniques (Peterson, 2000). Maximising the value based measures should therefore, result in the maximisation of NPV and as such should contribute to the creation

of shareholder value. These measures provide an estimate of a firm's economic profit by incorporating its total cost of capital in its calculation. In those cases where these measures yield positive values, economic profits are generated, and consequently shareholder value is expected to increase. Negative values indicate the destruction of shareholder value (Stewart, 1991; Grant, 2003).

Traditional performance measures exclude a firm's cost of capital, and no provision is therefore made for the opportunity cost on the capital invested by the shareholders (Young and O'Byrne, 2001). Excluding the cost of capital limits the ability of these measures to assess value creation since the cost of the capital investments required to generate earnings are ignored (Lehn and Makhija, 1996). The traditional measures are also based almost exclusively on information obtained from financial statements, which are compiled according to GAAP accounting guidelines. Consequently, these measures are exposed to accounting distortions (Stewart, 1991; Peterson and Peterson, 1996; Ehrbar, 1998). Despite these limitations analysts and investors still widely apply the traditional measures (Stewart, 1991; Ehrbar, 1998). While some studies reported statistically significant relationships with share returns (Peterson and Peterson, 1996), others obtained far weaker results (Black, Wright and Davies, 2001).

A number of different value based financial performance measures have been developed. These measures include a firm's cost of capital in its calculation (Fabozzi and Grant, 2000). Attempts are also made to overcome some of the accounting distortions by adjusting information obtained from the financial statements (Young and O'Byrne, 2001).

Perhaps one of the best known value based performance measures is Economic Value Added (EVA). This measure, which was registered and trademarked by the New York based consulting firm Stern Stewart and Co., has been adopted by a number of the world's largest firms. It enjoys wide media exposure in the popular press, and numerous examples of successful implementations by companies are available (Walbert, 1993; Teitelbaum, 1997).

EVA is an estimate of the economic profit generated by a firm (Stewart, 1994). The difference between an economic and an accounting profit is a capital charge levied on the capital provided to the firm. In accounting profit, only the cost of debt capital is included in the calculation. EVA, on the other hand, considers the costs of all its forms of capital (debt, as well as equity) (Grant, 2003), and compensates all its capital providers accordingly. EVA is based on the concept that shareholder wealth can only be created if a firm earns a return on its capital that exceeds its cost of capital. If this is achieved, the total shareholder value increases, while failure to do so results in shareholder wealth being destroyed. Maximising a firm's EVA should result in an increase in shareholder value created (Stewart, 1991).

According to Stern Stewart, EVA performs better than other financial performance measures in explaining the shareholder wealth that a firm creates (Stewart, 1991; Stewart, 1994). According to them, changes in EVA over a five year period accounts for almost 50% of the changes in market value added (MVA) (Stewart, 1994). A strong relationship was also highlighted by Walbert (1994). Studies carried out by Grant (1996; 2003) conducted regression analyses between EVA-to-capital and MVA-to-capital, and reported statistically significant relationships with R^2's of 0.316 and 0.27 respectively. Bacidore, Boquist, Milbourne and Thakor (1997) also reported significant positive correlations between EVA and abnormal share returns.

Lehn and Makhija (1996) compared EVA to traditional performance measures, and observed higher correlations between EVA and share returns than for any of the other measures investigated. O'Byrne (1996; 1997) concluded that changes in EVA have greater explanatory power than changes in earnings when attempting to explain the variation in share returns. He ascribed the failure of other studies to observe this variation to their ignorance of certain market valuation characteristics with regard to EVA (O'Byrne, 1996). He argued that market valuation multiples for firms with positive EVA values are higher than for firms with negative values, while higher multiples are also assigned to smaller firms. He also identified the shortcomings of other studies as their failure to focus on excess shareholder returns and expected EVA improvements (O'Byrne, 1997; 1999).

Some studies reported mixed results. Chen and Dodd (1997) reported that although significant relationships are found between EVA, EVA components and share returns, the correlations between the measures are low. Even though EVA provides significant information beyond the traditional measures included in their study, they argued that it should not completely replace them. The small differences observed between EVA and RI also gave rise to the question whether the EVA accounting adjustments are necessary (Chen and Dodd, 1997). Farsio, Degel and Degner (2000) observed weak positive relationships when investigating the relationship between share return and EVA calculated for the current financial year, while a negative correlation was observed between the current year's EVA value and the subsequent year's share return (Farsio *et al*., 2000).

Contradictory results, however, have also been reported. Clinton and Chen (1998) found that the majority of the correlations between EVA, share prices and share returns are either negative or insignificant. EVA is also the only one of the measures investigated in their study that did not consistently reveal significant associations with share prices or share returns (Clinton and Chen, 1998). De Villiers and Auret (1998) also concluded that EVA does not offer an advantage over the traditional

measure earnings per share (EPS) in terms of explaining share prices.

Biddle, Bowen and Wallace (1997) also investigated the relationship between EVA and share returns. The purpose of their study was to compare EVA to another value based measure, residual income (RI), as well as two traditional financial measures, earnings before extraordinary items (EBEI) and operating cash flow (CFO). Not only did they focus on the relative information content of EVA, but they also evaluated the incremental information content of the measure. By means of relative information content tests, the ability of EVA to outperform the other measures was evaluated. They also investigated whether components of EVA contribute additional information to that contained in the other measures. The results from the relative information content tests indicated that EVA does not outperform earnings when explaining market-adjusted share returns. Furthermore, the incremental information content tests indicated that the components of EVA only marginally add to the information contained in earnings. A number of sensitivity analyses were conducted, and supported the main results.

Studies following a similar approach to the one applied by Biddle *et al*. (1997) have subsequently been conducted. Conflicting results, however, are reported in these studies. Worthington and West (2004) report that EVA outperforms the other measures when attempting to explain the variation in share returns for Australian firms. Phaliam (2006), however, reports that EVA does not outperform earnings. Little or no relationship between shareholder returns and EVA is observed in his study. Similarly, Erasmus (2008a; 2008b; 2008c) include EVA as part of an analysis of different value based financial performance measures, and report that EVA does not outperform earnings.

South Africa is a developing economy with an established stock market on which shares are more thinly traded than on the US market where Biddle *et al*. (1997) conducted their studies. Information may, therefore, be less freely available in this more confined context. The purpose of the present study is to test to what extent their results may translate into the developing economy environment, and to determine the extent to which the information content of the various measures represents context specific, or more general phenomena.

3 THE COMPONENTS OF EVA

This paper studies the relative and incremental information content of EVA and the measures operating cash flow (CFO), earnings before extraordinary items (EBEI) and residual income (RI). To do so, EVA is partitioned into its contributing components using the approach applied by Biddle *et al*. (1997). To explore the relationships between the various measures, one should commence by defining EBEI, and then discuss all the additional components required to calculate EVA.

According to Biddle *et al*. (1997) a firm's EBEI could be defined as follows:

EBEI = CFO + Accrual,

where:
EBEI = The earnings before extraordinary items and tax.
CFO = The net cash from operating activities.
Accrual = The total operating accruals of the firm.

The difference between EBEI and the net operating profit after tax (NOPAT) is that NOPAT does not take the after-tax interest expense into account, while EBEI does. Therefore:

NOPAT - ATInt = EBEI

where:
ATInt = Interest expense after provision for tax

While EBEI makes provision for the cost of debt by subtracting the interest expense, RI is calculated by deducting the cost of the total (i.e. debt and equity) capital.

RI = NOPAT – (k*Capital)

where:
k = The firm's estimated weighted average cost of capital (WACC)
Capital = The amount of capital invested in the firm at the beginning of the period

Firms that achieve positive RI values are able to generate profits in excess of their total cost of capital, and consequently shareholder value should be created. Negative RI values are an indication that insufficient profits are generated, and as a result, shareholder value could be destroyed.

EVA is calculated in a similar way as RI. The major difference between the two measures relates to a number of adjustments to NOPAT and Capital included in the calculation of EVA. These adjustments are included with a view to removing some of the accounting distortions identified by Stewart (1991).

$EVA = (NOPAT + AcctAdj_{op}) – [k*(Capital + AcctAdj_{c})]$

where:
$AcctAdj_{op}$ = Adjustments to remove the accounting distortions from operating profit
$AcctAdj_{c}$ = Adjustments to remove the accounting distortions from capital

Based on these definitions, EVA may be presented as follows (Biddle *et al*., 1997):

EVA = CFO + Accrual + ATInt – CapChg + AcctAdj

where:

CapChg = k*Capital

AcctAdj = $AcctAdj_{op} – (k*AcctAdj_c)$

The relationship between the EVA components is summarised in Figure 1 (Biddle *et al*., 1997):

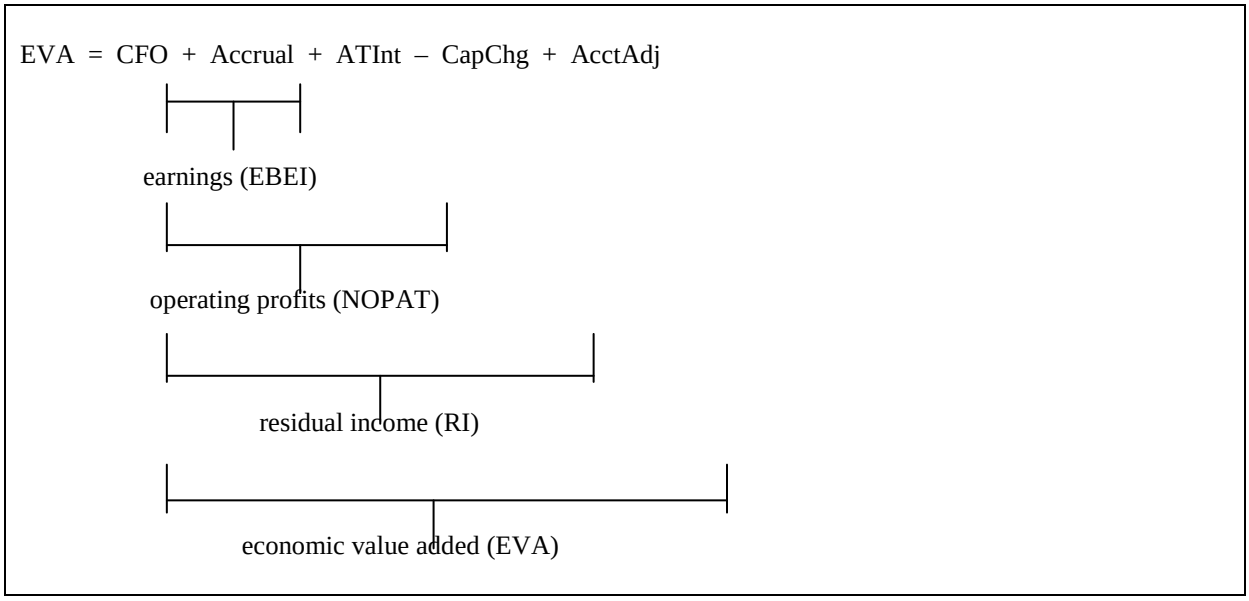

Figure 1. Components of economic value added (EVA)

4 RESEARCH METHOD

4.1 HYPOTHESES

The information content of a financial measure refers to the additional information that the market deduces from its publication and incorporates into the expected future financial performance of the firm. In order to evaluate the relative and incremental information content of the measures EVA, RI, EBEI and CFO, an approach developed by Biddle *et al*. (1997) is applied. According to this approach, relative information content comparisons should be used when different measures are compared in terms of their information content, or when a choice of only one of the measures is required. Incremental information content comparisons are used to determine whether one measure provides additional information over and above that provided by another.

To investigate the relative information content of the measures, the following null hypothesis is formulated (Biddle *et al*., 1997):

H_{REL}: The information content of measure X_1 is equal to that of X_2

where X_1 and X_2 are pairwise combinations of the measures EVA, RI, EBEI and CFO. Rejection of the null hypothesis indicates a statistically significant difference in the information content of the measures.

In order to investigate the incremental information content of the measures, the following break-down of EVA is used:

EVA = CFO + Accrual + ATInt – CapChg + AcctAdj

The following null hypothesis is formulated (Biddle *et al*., 1997):

H_{INC}: Component X_1 does not provide information content beyond that provided by the remaining components X_2-X_5

where X_1-X_5 are the EVA components CFO, Accrual, ATInt, CapChg and AcctAdj. Pairwise comparisons of the components are conducted to evaluate the incremental information content. Rejection of the null hypothesis indicates that the inclusion of the component under investigation will contribute significant additional information content.

4.2 STATISTICAL TESTS

When assessing the information content of a measure, the statistical significance of the slope coefficient b_1 from the following ordinary-least squares regression is examined (Biddle *et al*., 1997):

$$D_t = b_0 + b_1 FE_{Xt} / MVE_{t-1} + e_t \quad (1)$$

where D_t (the dependent variable) is a measure of return for time period t; FE_{Xt} / MVE_{t-1} is the unexpected realisation (or forecast error) of the measure X (FE_{Xt}), divided by the

market value of the firm's equity at the beginning of the financial year (MVE_{t-1}); while e_t is a random disturbance term.

The unexpected realisation of the measure X for time period t is defined as the difference between the observed value of the measure (X_t) and the market's expected value of the measure ($E(X_t)$):

$$FE_{Xt} = X_t - E(X_t) \quad (2)$$

Assuming that the market's expected value is formed according to a discrete linear stochastic process in autoregressive form, $E(X_t)$ may be defined as:

$$E(X_t) = \delta + \phi_1 X_{t-1} + \phi_2 X_{t-2} + \phi_3 X_{t-3} + \ldots \quad (3)$$

where δ is a constant and the ϕ's are the autoregressive parameters. Substituting Equations (2) and (3) into Equation (1) yields:

$$D_t = b_0 + b_1 [X_t - (\delta + \phi_1 X_{t-1} + \phi_2 X_{t-2} + \phi_3 X_{t-3} + \ldots)] / MVE_{t-1} + e_t =$$

$$b_0' + b_1' X_t / MVE_{t-1} + b_2' X_{t-1} / MVE_{t-1} + b_3' X_{t-2} / MVE_{t-1} + b_4' X_{t-3} / MVE_{t-1} + \ldots + e_t \quad (4)$$

where $E(b_0') = b_0 - b_1 \delta$, $E(b_1') = b_1$, and $E(b_i') = -b_i \phi_{i-1}$ for $i > 1$. Equation (4) provides the relationship between abnormal returns (D_t), and the lagged measures of accounting performance (X) scaled by MVE. For the purpose of this study, Equation (4) is limited to one lag:

$$D_t = b_0' + b_1' X_t / MVE_{t-1} + b_2' X_{t-1} / MVE_{t-1} + e_t \quad (5)$$

4.2.1 TESTS FOR RELATIVE INFORMATION CONTENT

The relative information content of the four measures EVA, RI, EBEI and CFO is assessed by means of a statistical test developed by Biddle, Seow and Siegel (1995). The four independent variables are included in individual regressions against the dependent variable:

$$D_t = b_0 + b_1 X_t / MVE_{t-1} + b_2 X_{t-1} / MVE_{t-1} + e_t \quad (6)$$

where D_t is the market-adjusted return on a firm's shares for time period t, X is one of the measures EVA, RI, EBEI and CFO, and MVE is the market value of the firm's equity.

According to the test, six pairwise comparisons of the individual regressions' R^2 values are conducted. Statistically significant differences between two R^2 values result in the rejection of the null hypothesis H_{REL}. This indicates a statistically significant difference in the ability of the two measures under investigation to explain the variation in the dependent variable (Biddle *et al*., 1997).

4.2.2 TESTS FOR INCREMENTAL INFORMATION CONTENT

In order to evaluate the incremental information content of the EVA components, the following regression is conducted (Biddle *et al*., 1997):

$$D_t = b_0 + b_1 X_t / MVE_{t-1} + b_2 X_{t-1} / MVE_{t-1} + b_3 Y_t / MVE_{t-1} + b_4 Y_{t-1} / MVE_{t-1} + e_t \quad (7)$$

where X and Y are two different EVA components (CFO, Accrual, ATInt, CapChg, AcctAdj). The individual regression coefficients are assessed by means of t-tests to investigate the contribution of the component. F-tests are used to assess the following joint null hypotheses:

H_{0X}: $b_1 = b_2 = 0$
H_{0Y}: $b_3 = b_4 = 0$

Rejection of the null hypotheses indicates that the inclusion of a component provides significant incremental information.

4.3 SAMPLE SELECTION

The research sample for this study consists of industrial shares on the JSE over the period 1991 to 2005. The information required to calculate the measures investigated in this study was obtained from the McGregor BFA Database (2005). In the case of companies that were still listed in 2005, annual EVA, WACC and standardised financial statement values were downloaded from the database. No EVA and WACC values were maintained in the database for those companies that delisted during the research period. Consequently, these values were calculated by the authors using the same method as that employed in the database.

The research covers 15 years, from 1991 to 2005. All firms listed in the Industrial Sector of the Johannesburg Securities Exchange (JSE) during this period were included in the sample. The research method requires complete data for at least two consecutive years, and only those firms that provided this information are included in the sample. After the exclusion of 22 firms that did not provide the complete required data, a total of 329 firms providing a total of 3039 complete observations were included.

Following Biddle *et al*. (1997), those observations in excess of eight standard deviations from the median are classified as extreme outliers, and consequently 48 observations were removed from the sample. Both the dependent and independent variables are also winsorised to ± four standard deviations from the median. The final sample consisted of 328 firms with 2991 observations.

4.4 DEPENDENT VARIABLE

The relative and incremental information content tests applied in this study focus on the relationship between the independent variables and the unexpected return generated on a firm's shares. In order to estimate the unexpected return, the market adjusted return is calculated (Biddle *et al*., 1997). This value indicates whether a firm over- or under performed relative to the overall market.

MktAdjRet The market adjusted return is calculated as the difference between the 12-month compounded return on a share and the 12-month compounded return on the ALSI index. These returns are calculated for a period ending three months after the end of a firm's financial year-end to ensure that the information contained in the financial statements is reflected in the share prices.

4.5 INDEPENDENT VARIABLES

The measures CFO, EBEI, RI and EVA included in the relative information content tests, as well as the five EVA components CFO, accruals, after-tax interest expense, capital charge and accounting adjustments required for the incremental information content tests, are calculated from the standardised financial statement data obtained from the BFA database (2005). In the case of listed firms EVA, cost of capital and invested capital values are also obtained from the database. Since these values are not available for firms that delisted during the period under review, they are calculated by the authors using the same method as that employed in the database.

To reduce heteroscedasticity in the data, all the independent variables are divided by the market value of equity as measured three months after the beginning of the financial year (MVE_{t-1}) (Biddle *et al*., 1997). This period is chosen to correspond with the period over which the dependent variable is calculated.

5 EMPIRICAL RESULTS

5.1 RELATIVE INFORMATION CONTENT TESTS

The descriptive statistics of the winsorised variables included in the relative information content tests pooled across time are provided in Table 1.

Table 1. Descriptive statistics on the dependent and independent variables in the relative information content tests

	Descriptive statistics				
	Dependent Variable	**Independent Variables**			
	MktAdjRet	**EBEI**	**EVA**	**RI**	**CFO**
Mean	0.122	0.187	-0.161	-0.101	0.282
Median	0.011	0.119	-0.021	0.001	0.144
Std. Dev.	0.758	0.538	0.605	0.518	0.651
	Correlations				
	Dependent Variable	**Independent Variables**			
	MktAdjRet	**EBEI**	**EVA**	**RI**	**CFO**
MktAdjRet	1.000				
EBEI	0.293***	1.000			
EVA	0.117***	0.324***	1.000		
RI	0.157***	0.440***	0.858***	1.000	
CFO	0.176***	0.474***	0.008	0.029	1.000

Notes:
All the variables are winsorised at ± four standard deviations from the median values. All the independent variables are size-adjusted by dividing them by the market value of the equity as measured three months after the beginning of the financial year.
*** Significant at the 1% level

CFO exhibits the largest mean and median values, followed by EBEI, RI and EVA. In the case of EVA and RI, the median values are close to zero. To investigate the behaviour of the measures over time, the median values of the four measures are plotted in Figure 2.

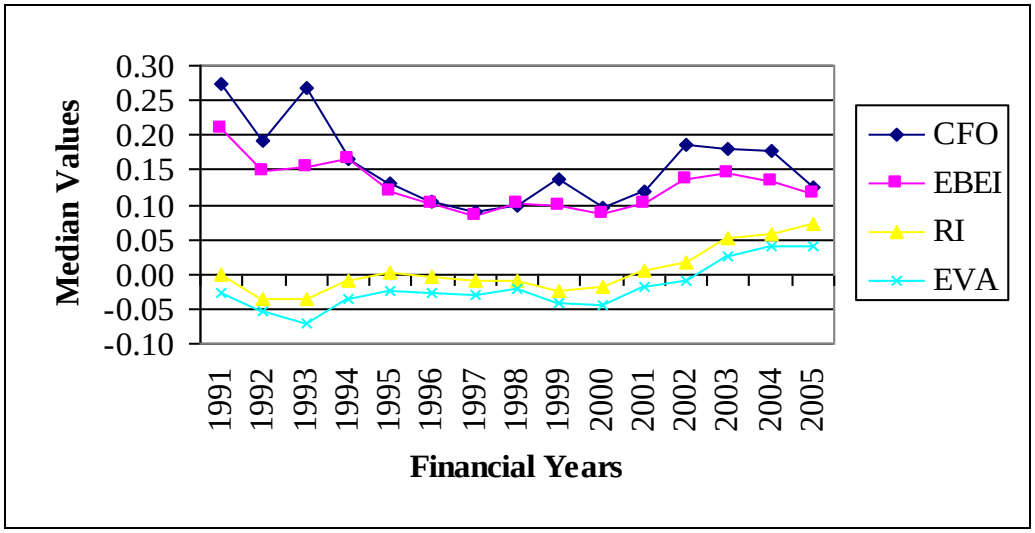

Figure 2. Median values of the size-adjusted measures CFO, EBEI, RI and EVA from 1991 to 2005

The median EVA values from 1991 to 2002 are all negative, while the last three years exhibit increasing positive values. The majority of the median RI values are negative during the period 1991 to 2002 (eight negative values versus four positive), and are also followed by increasing positive values over the last three years. In a competitive economy, most firms struggle to generate returns in excess of their costs of capital (Biddle *et al*., 1997). The period 1991 to 2002 exhibits this pattern.

In accordance with the patterns reported by Biddle *et al*. (1997), statistically significant positive correlations are found between most of the measures. The correlations between CFO, and EVA and RI, however, are not statistically significant. The highest correlation is between EBEI and *MktAdjRet*.

The relative information content of the four measures EBEI, CFO, RI and EVA are evaluated by conducting four separate regressions based on Equation (6), and comparing their R^2s. The results from the relative information content tests are provided in Table 2.

Table 2. Tests of the relative information content of EVA, residual income, earnings and operating cash flow

Relative information content								
Rank order of R^2	**Observations**	**(1)**		**(2)**		**(3)**		**(4)**
Panel A: Coefficient of positive and negative values of each performance measure constrained to be equal [a]								
All firms	**2543**	**EBEI**	**>**	**RI**	**>**	**CFO**	**>**	**EVA**
Adj. R^2		0.0758		0.0348		0.0257		0.0253
Panel B: Coefficient of positive and negative values of each performance measure allowed to differ [b]								
All firms	**2543**	**RI**	**>**	**EBEI**	**>**	**EVA**	**>**	**CFO**
Adj. R^2		0.0910		0.0851		0.06718		0.0372

Notes:

[a] In Panel A, the regression based on Equation (5.2) is conducted, where: $D_t = b_0 + b_1 X_t / \text{MVE}_{t-1} + b_2 X_{t-1} / \text{MVE}_{t-1} + e_t$. D_t is the market-adjusted return for period t, X is one of the four measures CFO, EBEI, RI and EVA, and MVE is the market value of the equity three months after the beginning of the financial year.

[b] In Panel B, the regression used in Panel A is adjusted to allow different coefficients for positive and negative values of the independent variable. The regression based on Equation (5.3) is conducted, where: $D_t = c_0 + c_1 X_{t;\text{pos}} / \text{MVE}_{t-1} + c_2 X_{t;\text{neg}} / \text{MVE}_{t-1} + c_3 X_{t-1;\text{pos}} / \text{MVE}_{t-1} + c_4 X_{t-1;\text{neg}} / \text{MVE}_{t-1} + e_t$. D_t is the market-adjusted return for period t, X is one of the four measures CFO, EBEI, RI and EVA, and MVE is the market value of the equity three months after the beginning of the financial year.

Panel A of Table 2 contains the adjusted R^2 values of the four separate regressions. The measures are arranged in decreasing sequence based on their R^2 values. EBEI has a significantly higher adjusted R^2

value (0.0758) than the other measures. It is followed by RI (0.0348), CFO (0.0257) and EVA (0.0253). In terms of information content, EBEI, therefore, outperforms the other measures.

According to Hayn (1995), Burgstahler and Dichev (1997) and Collins, Pincus and Xie (1997) profitable firms exhibit larger earnings responses than loss-making firms. O'Byrne (1997) also recommends a distinction between positive and negative EVA values. The tests for relative information content are repeated after allowing different coefficients for positive and negative values:

$$D_t = b_0 + b_1 X_{t;\text{pos}} / \text{MVE}_{t-1} + b_2 X_{t;\text{neg}} / \text{MVE}_{t-1} + b_3 X_{t-1;\text{pos}} / \text{MVE}_{t-1} + b_4 X_{t-1;\text{neg}} / \text{MVE}_{t-1} + e_t \quad (7)$$

The results from these regressions are provided in Panel B of Table 2. All the measures exhibit higher adjusted R^2 values. RI experienced the largest increase (0.0348 to 0.0910), and exhibits the highest value compared to the other measures. It is followed by EBEI (0.0851), EVA (0.0672) and CFO (0.0372).

5.2 INCREMENTAL INFORMATION CONTENT TESTS

The descriptive data of the winsorised EVA components included in the incremental information content tests pooled across time are provided in Table 3.

Table 3. Descriptive statistics on the dependent and independent variables in the incremental information content tests

	Descriptive statistics					
	Dependent Variable	**Independent Variables**				
	MktAdjRet	**CFO**	**Accruals**	**ATInt**	**CapChg**	**AccAdj**
Mean	0.122	0.282	-0.069	0.082	0.372	-0.061
Median	0.011	0.144	-0.020	0.026	0.166	-0.016
Std. Dev.	0.758	0.651	0.597	0.170	0.645	0.303
	Correlations					
	Dependent Variable	**Independent Variables**				
	MktAdjRet	**CFO**	**Accruals**	**ATInt**	**CapChg**	**AccAdj**
MktAdjRet	1.000					
CFO	0.176***	1.000				
Accruals	0.058***	-0.492***	1.000			
ATInt	0.080***	0.237***	-0.085***	1.000		
CapChg	0.137***	0.444***	-0.033	0.616***	1.000	
AccAdj	-0.028	-0.027	-0.022	-0.198***	-0.152***	1.000

Notes:
All the variables are winsorised at ± four standard deviations from the median values. All the independent variables are deflated by the market value of the equity as measured three months after the beginning of the financial year.
*** Significant at the 1% level

The mean and median values of both Accruals and AccAdj are negative. This is consistent with the smoothing effect of these components on CFO (Biddle *et al*., 1997). The significant negative correlation between CFO and Accruals could be attributed to the same reason. The correlation between CFO and AccAdj is also negative, but not statistically significant. Statistically significant positive correlations are found between CFO, ATInt and CapChg. According to Biddle *et al*. (1997), firms with higher CFO also have higher debt and equity costs. The highest correlation is between CFO and *MktAdjRet*.

The incremental information contents of the EVA components are evaluated by conducting the following regression:

$$\textit{MktAdjRet}_t = b_0 + b_1 \text{CFO}_t / \text{MVE}_{t-1} + b_2 \text{CFO}_{t-1} / \text{MVE}_{t-1} + b_3 \text{Accrual}_t / \text{MVE}_{t-1} + b_4 \text{Accrual}_{t-1} / \text{MVE}_{t-1} + b_5 \text{ATInt}_t / \text{MVE}_{t-1} + b_6 \text{ATInt}_{t-1} / \text{MVE}_{t-1} + b_7 \text{CapChg}_t / \text{MVE}_{t-1} + b_8 \text{CapChg}_{t-1} / \text{MVE}_{t-1} + b_9 \text{AcctAdj}_t / \text{MVE}_{t-1} + b_{10} \text{AcctAdj}_{t-1} / \text{MVE}_{t-1} + e_t \quad (8)$$

The results of the incremental information content tests are provided in Table 4.

Table 4: Tests of incremental information content of EVA components: CFO, operating accruals, after-tax interest, capital charge, accounting adjustments

	Obs.	Constant	CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$	$AccAdj_t$	$AccAdj_{t-1}$
Adj. R^2	0.0597											
Predicted signs:			+	-	+	-	-	+	-	+	+	-
Regression coefficient[a]	2662	0.0461	0.29049	-0.03021	0.25265	-0.07615	-0.21327	0.57654	-0.00226	-0.01581	0.00161	-0.06236
t-stat		2.69	9.41***	-0.94	8.48***	-2.39**	-1.38	3.64***	-0.05	-0.33	0.03	-1.24
F-stat			48.08		36.01		8.28		0.16		0.78	
p-value [b]			(<0.0001)		(<0.0001)		(-0.0003)		(-0.8542)		(-0.4567)	

Notes:

[a] The regression based on Equation (5.4) is conducted: $MktAdjRet_t = d_0 + d_1\ CFO_t / MVE_{t-1} + d_2\ CFO_{t-1} / MVE_{t-1} + d_3\ Accrual_t / MVE_{t-1} + d_4\ Accrual_{t-1} / MVE_{t-1} + d_5\ ATInt_t / MVE_{t-1} + d_6\ ATInt_{t-1} / MVE_{t-1} + d_7\ CapChg_t / MVE_{t-1} + d_8\ CapChg_{t-1} / MVE_{t-1} + d_9\ AcctAdj_t / MVE_{t-1} + d_{10}\ AcctAdj_{t-1} / MVE_{t-1} + e_t$. D_t is the market-adjusted return for period *t*, while the independent variables are the EVA components (CFO, accruals, after-tax finance cost, capital charge and accounting adjustments). MVE is the market value of equity three months after the start of the financial year.

[b] *p*-values in parentheses represent non-directional *F*-test of the null hypothesis of no incremental information content (Hypothesis H_{INC})

*** Significant at the 1% level

** Significant at the 5% level

Perusal of Table 4 indicates that the regression coefficients of the current year's CFO (CFO_t), both the current and previous years' accrual values ($Accrual_t$ and $Accrual_{t-1}$), and the after-tax interest expense for the previous year ($ATInt_{t-1}$), are all statistically significant at the 0.05 level or better. The coefficients of the other values, however, are not statistically significant. This indicates that the current year's EBEI (consisting of CFO_t and $Accrual_t$), combined with the change in accruals (as represented by $Accrual_{t-1}$), contain the majority of information when attempting to explain the market adjusted returns of a firm.

If the *F*-statistics are considered, it would be seen that CFO, combined with Accruals, provide the largest incremental information contributions. The *F*-statistic for the measure ATInt is also statistically significant at the 0.01 level. CapChg and AccAdj, however, are not statistically significant, and exhibit much lower *F*-statistics (0.16 and 0.78 respectively).

6 SENSITIVITY ANALYSES

6.1 DIVIDING THE SAMPLE INTO SUB-PERIODS

The information content tests are repeated for each individual year from 1992 to 2005. The results from the relative information content tests indicate that EBEI has the largest adjusted R^2 values for seven of the fourteen years, followed by RI for five years and CFO for the remaining two years. Based on the results it appears that EVA does not outperform the other measures in terms of information content.

6.2 FIVE YEAR RETURNS AS DEPENDENT VARIABLE

Stewart (1991; 1994) reports the strongest results over a five-year period. To investigate the effect of a five-year return period, the relative information contents of the measures are evaluated by means of the following regression (Biddle *et al*., 1997):

$$MktAdjRet_{5years} = b_0 + b_1 \sum X_t / MVE_{t-5} + b_2 \sum X_{t-5} / MVE_{t-5} + e_t \quad (9)$$

where $MktAdjRet_{5years}$ is the market adjusted return calculated over the most recent five-year period, $\sum X_t$ is the sum of performance measure *X* over the most recent five-year period, and $\sum X_{t-5}$ is the sum of performance measure *X* over the prior five-year period.

The results of the relative information content tests indicate that EBEI has the highest adjusted R^2 (0.277), followed by the measures RI (0.233), CFO (0.223) and EVA (0.157).

O'Byrne (1996; 1997) reports that changes in EVA have greater explanatory power than changes in earnings when attempting to explain the variation in share returns. To investigate this finding, the tests are also repeated for changes in the measures over the five-year period. Similar results are obtained, with EBEI having the highest adjusted R^2 value (0.273), followed by CFO (0.237), RI (0.218) and EVA (0.206).

6.3 TWO-YEAR RETURNS

To make provision for the possibility that the market takes time to absorb information and that the current EVA values may only be reflected in future share returns, the return interval was extended to a two-year period. The market adjusted return was compounded over the current and the subsequent year, and compared to the measures investigated in the study. The results from the relative information content tests indicate that EBEI has the highest adjusted R^2 value (0.0726) for two-year returns, followed by RI, CFO

and EVA (adjusted R^2 values between 0.0213 and 0.0364).

7 SUMMARY AND CONCLUSIONS

In this study, the information content of the measure EVA was compared to that of the measures RI, EBEI and CFO to determine whether EVA is able to outperform the other measures in explaining share returns. An approach similar to Biddle *et al*. (1997) was applied to a sample of South African industrial firms to evaluate the relative information content of the individual measures, as well as the incremental information content of the EVA components.

The results of the relative information content tests indicated that EVA does not outperform earnings in explaining the variation in the market-adjusted return of a firm's shares. In the majority of the tests, RI also outperformed EVA. This raises the question whether the accounting adjustments required to calculate EVA added significant information. The incremental information content tests indicated that EVA components do not add significant additional information content beyond that contained in earnings. More specifically, it appears that the capital charge and accounting adjustments did not add statistically significant incremental information content at all. Based on the results of the study, claims that EVA outperforms other financial performance measures could, therefore, not be supported.

The results from this study supported those obtained by Biddle *et al*. (1997) for US firms in the majority of cases. The major differences were observed for the results of the incremental information content tests, where only cash from operations, accruals and the after-tax interest payments contributed significant incremental information in the South African context. In the study conducted by Biddle *et al*. (1997), the incremental information contents of all EVA components were significant. Claims that EVA outperforms the other measures were, however, rejected in both studies. In general it would appear that the conclusions of the Biddle *et al*. (1997) study are also applicable in an environment where information flows less freely.

One of the limitations experienced in this study was that a distinction could not be made between those firms that adopted EVA for financial evaluation and remuneration structuring, and those that did not do so. Such information is not available for South African firms.

In future research the focus could be placed on identifying those components of earnings and EVA that contribute to information content. Unfortunately most of the data required to conduct these types of investigations are not available from publicly published sources.

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