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ECONOMIC VALUE ADDED (EVA®) AND SECTOR RETURNS

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ABSTRACT

Prior studies show that Economic Value Added (EVA®) contributes little information content beyond earnings in explaining individual stock returns. Such findings might be attributed to the idiosyncratic measurement error of EVA in an individual company. We revisit the benefits of EVA by comparing its information content in explaining 90 sector returns with the information content of three traditional accounting-based performance measures: cash flow from operations (CFO), earnings (EBIT), and residual income (RI). Our findings show that the association between traditional accounting performance measures and sector returns is higher than that with EVA. Further investigation on which components of EVA contribute most toward the association of EVA with sector returns shows that operating accruals and operating cash flows provide information content beyond that provided by components that are unique to EVA such as capital charge.

Keywords: EVA®, sector, earnings, returns

INTRODUCTION

Economic Value Added (EVA®) is a value-based performance measure developed by Stern Stewart & Co. The creator of EVA advocated that EVA can better explain stock returns than traditional performance measures (Stewart, 1994). Thus, EVA has the ability to replace traditional earnings-based performance metrics for a company's performance measurement (Stewart, 1991). A number of empirical studies support this argument and find that the association of EVA with stock returns is superior to traditional accounting-based performance measures such as earnings. For example, O'Byrne (1996) shows that EVA outperforms earnings in explaining variations in stock returns. On the other

hand, some studies report a poor relationship between EVA and stock returns. The most influential work in this field was conducted by Biddle, Bowen and Wallace (1997), who find that earnings dominate EVA in explaining stock returns.

Previous studies investigating the value relevance of EVA mainly focus on the association between EVA and individual stock returns (e.g., Dodd & Chen, 1996; Chen & Dodd, 1997; Milunovich & Tsuei, 1996; Clinton & Chen, 1998). Unlike the existing literature, the objective of this study is to examine the association between EVA and sector returns and to answer the question of whether EVA is superior to traditional accounting-based performance measures in association with sector returns. Our motivation is that an industry-level study on EVA may provide additional insights into the value relevance of EVA.

In order to conduct an industry-level study on EVA, the relationship between EVA and sector returns is investigated in this paper. In particular, we employ data on 90 sectors in the United States over the period 2003–2005 to re-examine the effectiveness of EVA. This paper first investigates the association of operating cash flows (CFO), earnings (EBIT), residual income (RI), and EVA with sector returns, respectively, and examines whether EVA provides a greater association than these traditional accounting performance measures with respect to sector returns. We then decompose EVA into four components: operating cash flows (CFO), operating accruals (Accrual), after-tax interest expense (ATInt), and capital charge (CapChg), and examine which components of EVA contribute most to the association of EVA with sector returns.

A relative information content test is conducted to examine the association between these performance measures and sector returns. The objective of the relative information content test is to examine whether EVA provides greater information content than these traditional accounting-based performance measures. An incremental information content test is then employed to examine whether information content provided by components that are unique to EVA is beyond those provided by other accounting-based measures such as CFO or Accrual.

The relative information content test shows that EBIT better explains sector returns than do RI, CFO and EVA. EBIT explains 10.83% of the variation in market-adjusted annual sector returns. Only 7% of the variation in sector returns can be explained by EVA. CFO and RI also dominate EVA in explaining sector returns. Therefore, EVA cannot be regarded as a replacement for traditional accounting performance metrics as the firm's performance measurement. The incremental information content test reveals that Accrual contributes most to explaining sector returns and that CFO provides information

content beyond those provided by ATInt or CapChg. Since both Accrual and CFO are also earnings components, the incremental information test reinforces the conclusion of the relative information content test that most variation in sector returns is explained by earnings and less by EVA.

The rest of the paper is organised as follows. Section 2 reviews related literature. Section 3 presents the hypotheses and the empirical methodology. Section 4 provides data description. Section 5 reports the empirical results of the relative information content test and the incremental information content test. Section 6 concludes.

LITERATURE REVIEW

Performance Measures, Stock Returns and Wealth Creation

It is widely believed that stock returns are positively related to corporate governance and performance measures. Gompers, Ishii and Metrick (2003) examine the relationship between corporate governance and long-term equity returns, firm value and accounting measures of performance. Their results reveal that well-governed firms have higher equity returns and command higher values and that their financial statements show a better operating performance compared to their poorly governed counterparts. Brown and Caylor (2005) find that better-governed firms are relatively more profitable and more highly priced, and that they pay out more cash to their shareholders.

A large number of consulting firms therefore produce various accounting-based performance measures to help firms design and implement compensation schemes aimed at increasing shareholder wealth.[1] The correlation of these measures with stock returns has been the topic of many studies, as the avowed goal of these new performance measures is to increase shareholder wealth. However, an early study by Gjesdal (1981) does not find a strong statistical correlation between stock returns and performance measures. No measure of performance could ever have a higher statistical correlation with stock returns than the return itself. If this correlation were the only goal, firms should use their stock price to design compensation and ignore all other measures. Nevertheless, stock returns can be a noisy and misleading measure of managers' added value. Garvey and Milbourn (2000) use a standard principal-agent model

[1] Myers (1997) summarises that these measures include Stern Stewart's EVA (Economic Value Added), Holt's CFROI (Cash Flow Return on Investment), Boston Consulting Group's TBR (Total Business Return), McKinsey's Economic Profit, and LEK/ALcar's SVA (Shareholder Value Added).

in which contracts can be based on any two accounting-based performance measures plus the stock price to examine which performance measures best capture managerial contributions to value. They find that stock prices provide a noisy measure of managerial value-added and that the simple correlation between EVA or earnings and stock returns is a reasonably reliable and valuable tool for shaping managerial incentives. They also calibrate the theoretical improvement in incentive contracts from optimally using EVA in addition to accounting earnings and empirically estimate the value added from EVA by firm. These estimates are positive and significant in predicting which firms have actually adopted EVA as an internal performance measure. A recent study by El Mir and Seboui (2008) argues that corporate governance mechanisms approximated by the board of directors' characteristics, auditors' quality, ownership structure and compensation mix can help bridge the gap between EVA and shareholder value created.

Sector Returns Versus Stock Returns

The literature on strategic management identifies three variables in determining a particular firm's performance: industry, corporate and firm factors (Bowman & Helfat, 2001). Schmalensee (1985) examines which variables among these three have the most significant influence on both the firm's profitability and the industry's returns. He reports that around 75% variance of industry rates of return can be explained by industry factors. In contrast, only 20% of the variance in the firm's profitability can be explained by industry effects. Using a comprehensive dataset, McGahan and Porter (1997) investigate the influence of industry, firm-specific and corporate-parent factors on the profitability of both broad economic sectors and the economy of US public companies in SIC categories. Their results are consistent with Schmalensee's findings in that industry effects have greater impact on profitability. Wernerfelt and Montgomery (1988) use a different performance measure, Tobin's Q, to conduct the study and report similar results. Although the results on the influence between industry factors and firm-specific effects in determining the firm's performance are still mixed (e.g., Rumelt, 1991), most previous empirical studies provide evidence that industry factors have more powerful impact on profitability of broad economic sectors.

In addition to the relative importance of industry factors in strategic management fields, sector analysis also plays a key role in investment studies. In the stock market, stocks in a sector tend to have similar trends because companies in the same industry are exposed to similar business risk. Thus, industry sector analysis can capture the impact that is specific to particular companies within a sector. Cardenete and Sancho (2006) point out that the economic impact of a sector in a given economy can be identified and quantified by sector analysis. A large amount of literature highlights from different perspectives the impact of industry factors on stock returns. Moskowitz and Grinblatt (1999) compare the

effectiveness of individual stock momentum trading strategies with industry momentum trading strategies. The authors show that investment strategies based on "buying stocks from past winning industries and selling stocks from past losing industries" will outperform trading strategies of individual stock momentum. Industry momentum investment strategies perform more effectively in predicting stock returns. As a result, they conclude that industry stock explains more momentum effects than do individual stocks. Other researchers find that industry factors explain more variation in industry stock returns than do other factors such as country effects. For example, Baca, Garbe and Weiss (2000) illustrate that industry sector effects have surpassed country effects in explaining variations of stock market returns of seven developed countries in recent years. Based on this evidence provided by previous studies, it is believed that industry sector analysis on EVA tends to be more appropriate to assess whether EVA is a better value-relevant performance measure than the traditional measures.

EVA Versus Other Performance Measures

One of the drawbacks in using earnings-based numbers such as net income and cash flow from operations to measure the firm's performance is that they only illustrate the company's interest expense. The cost of equity capital is ignored. As a result, it is difficult to determine whether the firm has created wealth for its shareholders. Moreover, the correlation between earnings and stock returns is relatively low. Sloan (1993) demonstrates that earnings only reflect how business-specific factors affects changes in stock prices and are unable to reflect how stock prices change with respect to external environmental factors. In addition to earnings, stock market performance measures such as stock price performance (RET), return on equity (ROE), and earnings per share (EPS) have been considered to supplement earnings-based performance measures for evaluating shareholder value.

A number of studies have investigated whether EVA is more closely associated with stock returns than are conventional stock market performance measures such as RET, ROE, and EPS. Lehn and Makhija (1997) examine the value relevance of accounting profit performance measures (ROA and ROE), stock performance measures (RET), and value-based performance measures (EVA and MVA), respectively, based on a database of 452 large United States companies during the period of 1985–1994. They argue that there is a significantly positive correlation between value-based performance measures and stock returns and conclude that EVA is a more effective performance measure.

However, the empirical research on the claim that EVA is superior to traditional accounting performance measures in association with stock returns is still controversial. A number of influential studies show that traditional earnings-

based performance measures are dominant in the firm's performance measurement. Biddle et al. (1997) argue that earnings dominate EVA in explaining stock returns in the relative information content test. Not only do earnings outperform EVA, but conventional accounting profit rates such as ROA, ROE and EPS are also a better measure of firm performance than EVA. Dodd and Chen (1996) study the association of EVA, RI, EPS, ROE and ROA with stock returns respectively using a sample of 566 United States companies over the period of 1983–1992. They conclude that unadjusted accounting measures have greater association with stock returns than EVA. Copeland, Dolgoff and Moel (2004) add analyst expectations into the comparison and report similar results. A recent extension of performance measurement is the introduction of the EVA-to-market value (EVAM) ratio by Leong, Pagani and Zaima (2009). Leong et al. (2009) examine whether portfolios created by utilising the EVAM ratio will generate higher returns than portfolios formed with earnings-price (EP) ratio and book-to-market (BM) ratio and fail to find any statistical difference among them.

Though the association between EVA and individual stock returns has been extensively investigated, the relation of EVA and sector returns has not been emphasised. In order to contribute to the current debate on the value relevance between traditional performance measures and EVA, we will focus on the relationship between EVA and sector returns. An industry-level analysis can provide more convincing evidences on whether EVA is more effective performance measure than conventional accounting-based performance measures.

HYPOTHESES AND METHODOLOGY

We follow Biddle, Seow and Siegel's (1995) relative information content test to examine which performance measures better explain sector returns by comparing the information content of EVA, CFO, EBIT, and RI, respectively. The method used in the relative information content test is to compare the R^2 value from each separate regression. The first null hypothesis is presented as:

> H_1: The information content of EVA is equal to the information content of CFO, EBIT, and RI, respectively.

The information content of these performances is different if the null hypothesis is rejected. We shall be able to determine which performance measure has greatest explanatory power from six pairwise comparisons in the relative information content test. The relative information content test is expressed as:

$$Rt = \alpha + \beta_1 X_t/MVE_{t-1} + \beta_2 X_{t-1}/MVE_{t-1} + \varepsilon_t \quad (1)$$

Each of these variables (among CFO, NI, RI, and EVA) and its one-year period lag are respectively specified as the explanatory variable, X_t and X_{t-1}, in separate regressions with the dependent variables – market-adjusted annual sector returns, Rt. The independent variables are normalised by the one-year period lagged market value of equity, MVE_{t-1}. The purpose of this adjustment is to reduce heteroscedasticity (Worthington & West, 2004). Market-adjusted annual sector returns are used as the dependent variable in this study, which is estimated by using annual sector returns less the compounded annual stock market returns. According to the empirical evidence, a positive relationship between these performance measures and market-adjusted sector returns and a negative relationship between their lagged terms and market-adjusted sector returns are expected. The method of assessing relative information content is to compare the coefficients of determination (R^2) from each regression results.

The second question we need to answer regards which component of EVA contributes most toward the association of EVA with sector returns. An incremental information content test proposed by Biddle et al. (1995) is applied to examine the incremental contribution of each component of EVA. We assume that X and Y are any two components of EVA (among CFO, Accrual, ATInt, and CapChg), respectively. The difference between the information content of X and Y and that of the single component X is equal to the incremental information content of component Y. Similarly, the incremental information content of component X can be obtained by subtracting the information content of component Y from that of X and Y. We shall be able to determine whether the information content provided by component X is beyond that provided by component Y. The second hypothesis can be set as:

H_2: The incremental information content of one component of EVA is equal to another.

In order to examine whether one component of EVA provides more value relevance information beyond that provided by another, the second model used to test the incremental information content of component of EVA can be presented as:

$$RT = \alpha + \beta_1 X_t/MVE_{t-1} + \beta_2 X_{t-1}/MVE_{t-1} + \beta_3 Y_t/MVE_{t-1} + \beta_4 Y_{t-1}/MVE_{t-1} + \varepsilon_t \quad (2)$$

The dependent variable is market-adjusted annual sector return. The independent variables, X_t and Y_t, are specified as pairwise combinations of the components on EVA, among CFO Accrual, ATInt, and CapChg, respectively. In addition, the independent variables, X_{t-1} and Y_{t-1}, correspond to the one-year

period lag of these two components. Explanatory variables are also normalised by the lagged market value of equity (MVE_{t-1}) to reduce heteroscedasticity.

The incremental information content test focuses on the comparison of the adjusted R^2 value from the individual and pairwise regressions of the components on EVA, respectively (Worthington & West, 2004). Equation (3) is employed to examine the overall significance of EVA.

$$\begin{aligned} Rt = \alpha &+ \beta_1 CFO_t/MVE_{t-1} + \beta_2 CFO_{t-1}/MVE_{t-1} + \beta_3 Accruals_t/MVE_{t-1} \\ &+ \beta_4 Accruals_{t-1}/MVE_{t-1} + \beta_5 ATInt_t/MVE_{t-1} + \beta_6 ATInt_{t-1}/MVE_{t-1} \\ &+ \beta_7 CapChg_t/MVE_{t-1} + \beta_8 CapChg_{t-1}/MVE_{t-1} \\ &+ \beta_9 AcctAdj_t/MVE_{t-1} + \beta_{10} AcctAdj_{t-1}/MVE_{t-1} + \varepsilon_t \end{aligned} \quad (3)$$

All components of EVA and their one-year period lags are specified as explanatory variables. To reduce heteroscedasticity, all independent variables are divided by the lagged market value of equity. Similarly, the dependent variables are market-adjusted annual sector returns. The F-test is used to test the joint null hypothesis that together CFO, Accrual, ATInt, and CapChg have no effects on market-adjusted annual sector returns. CFO, Accrual, and AcctAdj are expected to positively associate with stock returns. However, ATInt and CapChg are expected to negatively associate with stock returns.

DATA DESCRIPTION

Data used in this study are obtained from the Value Line database.[2] The raw data is then compiled by Professor Aswath Damodaran at New York University to annual observations for EVA, capital, and cost of capital across 100 industry sectors from 1999 to 2005. The sample period is between 2003 and 2005 (21,000 firm-year observations). Although data from 1999 to 2002 is available, it is not used in this paper due to the missing data. Data employed in this paper include: the firm's market capitalisation, return on capital, cost of capital, BV of capital, earnings, invested capital, and stock returns for 7,000+ listed US companies. Based on these financial data, variables such as CFO, EBIT, RI, EVA, and EVA components as defined in Table 1 can be computed for each particular firm.[3]

The value of EVA in this database is calculated by using its economic book value of capital at the beginning of the year multiplied by the difference between its return on capital and its cost of capital. Due to some companies missing data

[2] Value Line Database tracks more than 7,000 US firms and provides monthly their accounting and market data.

[3] The database provided by Damodaran has not yet made any adjustments in capital and operating income. As a result, data of accounting adjustments on EVA is not available for this study.

on ROC, the initial sample of 7,000 firms (21,000 firm-year observations) is reduced to approximately 4,700 firms (14,359 firm-year observations) across 90 sectors. This research is an industry-level study. However, the financial data in this database is estimated based on individual companies. Therefore, weighted average values estimated on a sector basis will be used for each sector. For example, return for a particular sector is not a simple average of stock return of individual firms in this sector. It is instead an average that takes into account the proportional relevance of each firm in a given sector. The weight of individual companies at a particular sector is obtained by dividing the company's market capitalisation by the cumulated market value of equity of all of the firms in that sector. Finally, data for US stock market returns during the period 2003 to 2005 are collected from Datastream. Market-adjusted annual sector returns are obtained by subtracting stock market returns from sector returns.

Table1
Variable definitions.

Variable	Description	Calculation
Panel A: Main variables		
CFO	Cash Flow from Operations	EBIT + Depreciation – Taxes
Accrual	Operating Accruals	EBIT – CFO
ATInt	After-Tax Interest Expense	IE × (1 – t)
NOPAT	Net Operating Profits After Tax	EBIT + ATInt
CapChg	Capital Charge	WACC × IC
RI	Residual Income	NOPAT – CapChg
EVA	Economic Value Added	(ROC – Cost of Capital) × Invested Capital
Panel B: Auxiliary variables		
IE	Interest Expense	Total debt × Cost of debt
WACC	Weighted Average Cost of Capital	Cost of equity × [E/(D + E)] + after-tax cost of debt × [D/(D + E)]
IC	Invested Capital	BV of equity + BV of debt – Cash
ROC	Return on Capital	EBIT (1 – t)/(BV of debt + BV of equity – Cash)

Table 2
Descriptive statistics for CFO, EBIT, RI, EVA and market-adjusted sector returns in the relative information content test.

Panel A: Mean, Median, Standard Deviation

	Ret (%)	CFO (%)	EBIT (%)	RI (%)	EVA (%)
Mean	–1.05	1.41	1.90	1.87	0.81
Median	–7.88	0.95	1.20	1.18	0.49
SD	26.90	2.01	4.48	3.33	1.45

Panel B: Correlation

	Ret	CFO	EBIT	RI
CFO	0.23 (2.22)**			
EBIT	0.30 (2.95)***	0.94 (25.85)***		
RI	0.25 (2.42)**	0.97 (37.43)***	0.98 (46.20)***	
EVA	0.13 (1.23)	0.76 (10.97)***	0.78 (11.69)***	0.80 (12.51)***

Notes: $t = r\sqrt{(n-2)/(1-r^2)}$ is used to compute the t-value to test the significance of correlation coefficient based on the t-distribution. In particular, ***r*** represents the correlation coefficient between any two variables. ***n*** is the number of observations.
** statistically significant at the 0.05 level.
*** statistically significant at the 0.01 level.

Table 2 summarises the characteristics of the data for the four performance measures (among CFO, EBIT, RI and EVA) and market-adjusted annual sector returns in the relative information content test.

We find that EBIT has the highest mean, median and standard deviation followed by RI and CFO. EVA has not only the lowest standard deviation but also the smallest mean and median values. Correlations between these variables are all positive. In particular, EBIT has the highest correlation with sector returns. In addition, in order to test the significance of correlation coefficients between these variables, the appropriate t-value has been computed for each correlation coefficient. Table 3 shows all coefficients except EVA are significant at a significance level of 5%.

Table 3 summarises the characteristics of the data for each component of EVA (among CFO, Accrual, ATInt, and CapChg) in the incremental information content test.

Table 3
Descriptive Statistics for EVA components (among CFO, Accrual, ATInt, and CapChg) and market adjusted sector returns in the incremental information content test.

Panel A: Mean, Median, Standard Deviation

	Ret (%)	CFO (%)	Accrual (%)	ATInt (%)	CapChg (%)
Mean	–1.05	1.41	0.93	0.22	0.70
Median	–7.88	0.95	0.56	0.08	0.36
SD	26.90	2.01	2.05	0.88	2.10

Panel B: Correlation

	Ret	CFO	Accrual	ATInt
CFO	0.23 (2.22)**			
Accrual	0.28 (2.74)***	0.93 (24.32)***		
ATInt	0.36 (3.62)***	0.88 (17.47)***	0.95 (28.54)***	
CapChg	0.33 (3.28)***	0.91 (20.99)***	0.96 (31.74)***	0.986 (55.47)***

$t = r\sqrt{(n-2)/(1-r^2)}$ is used to compute the t-value to test the significance of correlation coefficient based on t-distribution. In particular, ***r*** represents the correlation coefficient between any two variable. ***n*** is the number of observations.
** statistically significant at the 0.05 level.
*** statistically significant at the 0.01 level.

This table shows that CFO has the largest mean and median followed by Accrual, CapChg, and ATInt, and ATInt has the lowest standard deviation among the components of EVA and the highest correlation with market-adjusted sector returns. Again, correlations between these variables are positive and significant.

EMPIRICAL RESULTS

To test the relative information content of CFO, EBIT, RI and EVA, sector returns are respectively regressed against each performance measure based on Equation (1). Obviously, there are four separate univariate regressions for each year; one consists of each performance measure (among CFO_t, $EBIT_t$, RI_t and EVA_t) and its one-year period lag (among CFO_{t-1}, $EBIT_{t-1}$, RI_{t-1} and EVA_{t-1}) accordingly. A panel regression using samples from 2003 to 2005 is also conducted.

Table 4
The estimated coefficients and t-statistics of each variable (among CFO, EBIT, RI, and EVA) and its related one year period lag in each particular year over the period 2003–2005.

CFO_t	CFO_{t-1}	$EBIT_t$	$EBIT_{t-1}$	RI_t	RI_{t-1}	EVA_t	EVA_{t-1}
Panel A: 2003							
4.55	–0.03	1.96	–0.03	2.67	–0.02	6.65	–0.78
(3.90)***	(–0.85)	(9.46)***	(–0.90)	(5.53)***	(–0.90)	(2.60)**	(–0.98)
Panel B: 2004							
0.10	–0.004	0.077	–0.0033	0.077	–0.003	0.11	–0.005
(2.45)**	(–3.57)***	(2.81)***	(–1.75)	(2.85)***	(–2.87)***	(2.34)**	(–0.29)
Panel C: 2005							
0.36	–0.10	0.37	–0.27	0.27	–0.12	0.22	–0.05
(3.63)***	(–1.01)	(4.00)***	(–2.42)**	(4.07)***	(–1.41)	(2.29)**	(–0.53)
Panel D: Panel regression 2003–2005							
1.44	–0.02	0.97	–0.09	1.06	–0.05	2.43	–0.15
(3.44)***	(–0.94)	(4.05)***	(–2.42)**	(4.21)***	(–0.91)	(2.31)**	(–0.71)

Notes:
**statistically significant at the 0.05 level.
***statistically significant at the 0.01 level.

Table 4 reports estimated coefficients and t-statistics of each variable (CFO, EBIT, RI, and EVA) and its related one-year period lag in each particular year between 2003 and 2005.

Table 4 shows that there is a positive relationship between each performance measure and market-adjusted sector returns over the period 2003 to 2005. However, a negative relationship is found between their one-year period lag and market-adjusted sector returns. The panel regression results illustrate that the estimated slope coefficients for each performance measure are statistically significant at the 5% significance level, but the estimated slope coefficients of their lagged terms are insignificant except for EBIT during the sample period.

In order to examine which performance measure better explains sector returns and test the first hypothesis, we need to compare R^2 value from four separate regressions and panel regression. Table 5 shows the R^2 value for each performance measure from 2003 to 2005.

Table 5
R^2 value of four performance measures from 2003 to 2005.

Measures	EBIT (%)	RI (%)	CFO (%)	EVA (%)
2003	12.60	11.34	10.58	9.49
2004	6.24	5.96	5.09	4.66
2005	13.66	13.17	13.05	7.49
Average	10.83	10.15	9.57	7.21
Panel Regression	11.54	10.70	9.98	7.97

Obviously, the R^2 value is quite different among these performance measures during this period. Results show EBIT can better explain market-adjusted sector returns than RI, CFO and EVA. On average, 10.83% of the variation in sector returns is explained by EBIT. In addition, RI has a larger R^2 (= 10.15%) than CFO (= 9.57%) and EVA (= 7.21%). Panel regression reports similar results. These results suggest that EBIT is more highly associated with market-adjusted sector returns than RI, CFO and EVA. Our finding is consistent with the results of Biddle et al. (1997) who find that earnings outperform RI, EVA, and CFO in explaining market-adjusted stock returns. The difference is that they find CFO has the least association with stock returns among these performance measures. In contrast, our results show that CFO has greater association with market-adjusted sector returns than does EVA. On average, only 7.21% of variation in market-adjusted sector returns can be explained by EVA. Therefore, EBIT provides greater information content than does EVA. Based on these regression results, the first null hypothesis that the information content of EVA is equal to the information content of EBIT, CFO, and RI, respectively, should be rejected.

The relative information content results show that traditional accounting-based performance measures are more powerful than EVA in explaining sector returns. In addition, we also find that RI is better than EVA in explaining the variation of sector returns. The superiority of RI has been supported by Stark and Thomas (1998), who report a stronger association between RI and market value by using a cross-sectional examination.

In the next step, we investigate the association between each component of EVA and market-adjusted sector returns using the incremental information test. Therefore, market-adjusted sector returns are regressed against each component of EVA (among CFO, Accrual, ATInt, and CapChg) and its related one-year period lag. The estimated coefficients, t-statistics, and the adjusted R^2 value are presented in Table 6. The panel regression results show that the estimated slope coefficients for each component of EVA are significant at the 5% significance level except for CapChg.

Table 6
The estimated slope coefficients, t-statistics and adjusted R² value from the individual regression of the component of EVA between 2003 and 2005.

CFO		Accrual		ATInt		CapChg	
CFO_t	CFO_{t-1}	$Accrual_t$	$Accural_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$
Panel A: 2003							
[8.52%]		[10.57%]		[10.55%]		[12.03%]	
4.55	–0.03	4.49	0.01	12.99	–0.01	10.17	0.03
(3.91)***	(–0.84)	(9.28)***	(0.44)	(5.60)***	(–0.09)	(10.46)***	(0.63)
Panel B: 2004							
[5.09%]		[5.08%]		[2.54%]		[2.87%]	
0.10	–0.004	0.12	–0.006	0.27	–0.02	0.11	–0.01
(2.45)**	(–3.57)***	(2.51)**	(–1.22)	(2.75)***	(–4.28)***	(2.31)**	(–4.02)***
Panel C: 2005							
[11.05%]		[9.74%]		[1.90%]		[2.51%]	
0.36	–0.56	0.69	–0.55	2.43	–2.34	1.08	–0.90
(3.63)***	(–1.01)	(5.04)***	(–3.16)***	(1.59)	(–1.35)	(1.22)	(–1.08)
Panel D: Panel regression 2003–2005							
[8.94%]		[8.77%]		[5.44%]		[6.01%]	
1.73	–0.21	1.56	–0.08	4.11	–0.78	3.89	–0.25
(3.55)***	(–1.22)	(6.98)***	(–1.97)**	(2.09)**	(–1.30)	(1.89)	(–1.78)

Notes: Numbers reported in square bracket, [ ], are adjusted-R^2; numbers shown in parentheses are t-statistics. Estimated slope coefficients are in the second line.
**statistically significant at the 0.05 level.
***statistically significant at the 0.01 level.

Table 7 reports the estimated coefficients and t-statistics value based on Equation (2). The explanatory variables are the pairwise combinations of EVA components. The six pairwise combinations are: CFO and Accrual; CFO and ATInt; CFO and CapChg; Accrual and ATInt; Accrual and CapChg; ATInt and CapChg. The number of estimated slope coefficients is 72 between 2003 and 2005 and only 16 are significant at the 5% level. Panel regression reports that 10 out of 24 estimated slop coefficients are significant at the 5% level.

In addition, the sign of the estimated slope coefficients in the panel regression are not consistent with our expectation. It might be due to the multicollinearity problem. We can solve the multicollinearity problem by dropping one of the collinear variables. However, incremental information content can be assessed by comparing the adjusted R² value from the regressions. Thus, we do not have to drop any variable to deal with the problem arising from multicollinearity in the incremental information content test.

Table 7

The estimated coefficients and t-statistics of the pairwise regression of the components on EVA over the period of 2003–2005.

CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$
Panel A: 2003							
0.70	–2.53	3.88	4.08				
(0.17)	(–1.63)	(1.14)	(1.63)				
1.97	–2.74			17.62	12.62		
(0.67)	(–0.87)			(0.88)	(0.86)		
–3.62	–7.36					16.69	16.52
(–0.54)	(–2.64)***					(1.28)	(2.65)***
		1.14	0.94	26.49	–2.65		
		(0.49)	(1.81)	(1.48)	(–1.79)		
		–3.32	1.52			17.34	–2.06
		(-0.76)	(0.69)			(1.83)	(–0.68)
				4.68	–4.60	8.98	2.24
				(0.23)	(–4.07)***	(1.54)	(4.11)***
Panel B: 2004							
0.033	–0.06	0.08	0.14				
(0.48)	(–0.90)	(1.23)	(0.84)				
0.096	0.057			–0.03	–0.29		
(1.07)	(0.71)			(–0.13)	(–0.77)		
0.145	0.03					–0.08	–0.07
(0.98)	(0.18)					(–0.42)	(–0.22)
		0.09	0.12	0.02	–0.28		
		(0.64)	(0.67)	(0.05)	(–0.72)		
		0.11	0.11			–0.012	–0.12
		(1.32)	(0.73)			(–0.10)	(–0.79)
				0.18	–0.38	0.04	0.15
				(0.37)	(–0.61)	(0.19)	(0.57)
Panel C: 2005							
0.24	0.26	0.45	–0.83				
(2.24)**	(2.17)**	(2.92)***	(–4.78)***				
0.31	0.09			2.18	–3.21		
(4.13)***	(0.64)			(2.08)**	(–2.11)**		
0.34	0.09					0.25	–0.62
(3.11)***	(0.54)					(0.32)	(–0.75)
		0.71	–0.69	–0.04	0.37		
		(2.97)***	(–1.50)	(–0.02)	(0.15)		
		0.72	–0.77			–0.08	0.39
		(3.41)***	(–2.02)**			(–0.09)	(0.48)
				2.49	–4.23	0.53	0.26
				(1.15)	(–1.46)	(0.51)	(0.25)
Panel D: Panel Regression 2003–2005							
0.29	0.26	0.72	0.35				
(2.01)**	(2.17)**	(2.04)**	(0.87)				
0.55	0.09			2.93	1.21		
(2.30)**	(0.64)			(2.11)**	(1.61)		
0.14	0.09					0.57	1.62
(1.99)**	(0.54)					(1.49)	(1.75)
		0.44	0.46	0.08	–0.43		
		(1.97)**	(1.01)	(0.13)	(–0.55)		
		0.72	0.57			0.04	–0.29
		(3.41)***	(1.32)			(0.90)	(–0.51)
				2.54	–3.95	1.32	0.33
				(1.51)	(–2.22)**	(1.90)	(2.01)**

Notes:

**statistically significant at the 0.05 level.

***statistically significant at the 0.01 level.

Table 8

Adjusted R^2 value of the pairwise regression of the components on EVA over the period 2003–2005.

Panel A: 2003						
	CFO&CapChg >	CFO&Accrual >	CFO&ATInt >	ATInt&CapChg >	Accrual&CapChg >	Accrual&ATInt
Adj R^2 =	32.79%	15.68%	13.17%	10.89%	10.43%	9.60%
Panel B: 2004						
	Accrual&ATInt >	Accrual&CapChg >	CFO&Accrual >	CFO&ATInt >	CFO&CapChg >	ATInt&CapChg
Adj R^2 =	6.3%	6.28%	6.2%	5.86%	5.78%	3.24%
Panel C: 2005						
	CFO&Accrual >	CFO&ATInt >	CFO&CapChg >	Accrual&CapChg >	Accrual&ATInt >	ATInt&CapChg
Adj R^2 =	15.28%	12.25%	10.34%	8.56%	8.00%	3.49%
Panel D: Average						
	CFO&CapChg >	CFO&Accrual >	ATInt&CapChg >	CFO&ATInt >	Accrual&CapChg >	Accrual&ATInt
Adj R^2 =	16.30%	12.39%	10.81%	10.43%	8.42%	7.92%
Panel E: Panel Regression 2003–2005						
	CFO&CapChg >	CFO&Accrual >	ATInt&CapChg >	CFO&ATInt >	Accrual&CapChg >	Accrual&ATInt
Adj R^2 =	18.11%	13.90%	11.33%	10.94%	8.78%	7.15%

Table 8 presents the adjusted R^2 value based on Equation (2) during the period of 2003 to 2005. The incremental information content for each component of EVA can be obtained by comparing the adjusted R^2 deriving from the individual and pairwise regressions of the components on EVA, respectively. The rankings of adjusted R^2 are reported for regressions on individual year and a panel regression. They have the same pattern.

Table 9 provides the incremental information content for each component of EVA when combining each other.

Table 9
Incremental information content of components of EVA.

Symbol	Pairwise adj R^2 – Individual adj R^2	Incremental information content of each component (%)				
		2003	2004	2005	Average	Panel
CFO/Accrual	CFO&Accrual – Accrual	5.11	–1.12	5.54	3.15	3.02
Accrual/CFO	CFO&Accrual – CFO	7.16	–1.21	4.23	3.39	3.11
CFO/ATInt	CFO&ATInt – ATInt	2.62	1.13	10.35	4.70	4.60
ATInt/CFO	CFO&ATInt – CFO	4.65	–1.57	1.20	1.43	1.39
CFO/CapChg	CFO&CapChg – CapChg	20.76	0.75	7.83	9.78	9.87
CapChg/CFO	CFO&CapChg – CFO	24.27	–1.65	–0.71	7.30	7.55
Accrual/ATInt	Accrual&ATInt –ATInt	–0.95	1.70	6.10	2.28	2.01
ATInt/Accural	Accrual&ATInt – Accrual	–0.97	–1.00	–1.74	–1.24	–1.15
Accrual/CapChg	Accrual&CapChg – CapChg	–1.60	1.27	6.05	1.91	1.44
CapChg/Accural	Accrual&CapChg – Accrual	–0.14	–1.13	–1.18	–0.82	–0.99
ATInt/CapChg	ATInt&CapChg – CapChg	–1.14	–1.90	0.97	–0.69	–0.58
CapChg/ATint	ATInt&CapChg – ATInt	0.34	–1.60	1.58	0.11	0.23

The incremental information content is calculated by subtracting the adjusted R^2 value of the individual regression from the adjusted R^2 of the pairwise regression. For example, CFO/Accrual is the incremental information content of CFO when combining with operating accruals (Accrual) which is calculated by using the adjusted R^2 value from CFO and Accrual less the adjusted R^2 value from Accural.

For example, in 2003, CFO/CapChg (= 20.76%) is equal to the adjusted R^2 value of CFO and CapChg (= 32.79%) minus the adjusted R^2 value of CapChg (= 12.03%). The average value is shown in the second-to-last column of Table 10. The panel regression result is reported in the last column. CFO/CapChg (= 9.87%) means that, on average, CFO adds 9.87% explanatory power when combined with CapChg. The average value of CapChg/CFO (= 7.55%) means that CapChg adds 7.55% explaining power when paired with CFO. We can conclude that the incremental information content of CFO is greater than that of CapChg by comparing both results. Six pairwise comparisons can be made based on panel regression results. They are:

1. The incremental information content of Accrual is greater than that of CFO, CapChg, and ATInt, respectively.
2. The incremental information content of CFO is higher than that of CapChg and ATInt, respectively.
3. The incremental information content of CapChg exceeds that of ATint.

Obviously, the incremental information content of each component is different. Therefore, the second hypothesis should be rejected. The information content provided by Accrual is beyond that provided by CFO, CapChg, and ATInt, respectively. Accrual contributes most toward the information content of EVA. In other words, Accrual contributes most toward explaining sector returns, followed by CFO, CapChg, and ATInt. The second major contributor is CFO, which provides information content beyond that provided by CapChg and ATInt. Components that are attributed to traditional accounting-based performance measures such as Accrual and CFO help explain sector returns beyond that explained by components that are unique to EVA such as CFO. We also notice that both Accrual and CFO are earnings components because earnings are equal to operating accruals plus cash flow from operations as defined in Table 1. The results of the incremental information content test enhance the findings derived from the relative information content test that earnings provide greater information content than EVA. Although components that are unique to EVA such as capital charge provide some incremental evidence, their contribution doesn't enable EVA to outperform earnings in explaining sector returns.

In addition, the regression results based on Equation (3) are shown in Table 10.

The panel regression results report that only CFO_t, $Accrual_t$, and $CapChg_{t-1}$ are significant at the 5% level. Therefore, CFO, Accrual, and CapChg have some joint effects on market-adjusted annual sector returns.

Table 10
The estimated slope coefficients and t-value of the overall regression on the components of EVA.

CFO_t	CFO_{t-1}	$Accrual_t$	$Accrual_{t-1}$	$ATInt_t$	$ATInt_{t-1}$	$CapChg_t$	$CapChg_{t-1}$
Panel A: 2003							
3.55	–9.98	2.84	1.91	–9.26	13.99	13.14	13.00
(–0.49)	(–2.85)***	(0.72)	(0.73)	(–0.44)	(1.74)	(0.75)	(2.99) ***
Panel B: 2004							
0.22	–0.21	0.18	0.06	0.16	–0.34	–0.49	0.52
(0.89)	(0.68)	(0.73)	(0.29)	(0.20)	(–0.36)	(–0.76)	(0.64)
Panel C: 2005							
0.39	0.15	0.16	–0.67	4.06	–4.54	–1.15	1.37
(2.45)**	(0.74)	(0.55)	(–2.08)**	(1.82)	(–1.54)	(–0.91)	(1.08)
Panel D: Panel Regression 2003–2005							
1.42	–1.09	1.66	1.24	0.06	1.04	2.46	3.47
(2.14)**	(–0.85)	(2.12)**	(1.73)	(0.32)	(1.14)	(0.56)	(3.01) ***

Notes: **statistically significant at the 0.05 level, ***statistically significant at the 0.01 level.

CONCLUSIONS

This paper investigates the association of EVA and traditional accounting performance measures with sector returns respectively based on data from 90 sectors in the US over the period 2003 to 2005. Emphasising the association between EVA and sector returns is more likely to evaluate whether EVA is a more value-relevant performance measure than traditional accounting-based performance measures.

The relative information content test is applied to compare the information content of the four performance measures among operating cash flows (CFO), earnings (EBIT), residual income (RI) and EVA, and examine whether EVA has closer relation with market-adjusted sector returns than CFO, EBIT and RI. The relative information content test shows EBIT are more highly associated with sector returns than RI, CFO and EVA. Therefore, earnings are superior to EVA in explaining sector returns. We also decompose EVA into four components: cash flows from operations (CFO), operating accruals (Accrual), after tax interest expense (ATInt), and capital charge (CapChg), and examine which component of EVA contributes most toward the association of EVA with sector returns. The incremental information content test is used to assess the contribution of each component of EVA. Results from the incremental information content test reveal that Accrual contributes most toward the information content of EVA, followed by CFO, CapChg and ATInt. Components attributed to traditional accounting-based performance measures such as Accrual

and CFO help explain sector returns beyond that explained by components unique to EVA such as CapChg. It strengthens the findings arising from the relative information content test that earnings dominate EVA in explaining sector returns.

Two possible explanations for not detecting stronger value-relevance for EVA are: First, current realisations rather than future flows of each performance measure are used in our study. Equity is normally valuated by discounting the future cash flows, or dividends, or RI or EVA. Even if EVA is a good proxy for economic profits, realised EVA® may not outperform the current realisations of other performance measures such as earnings in proxying for future cash flows. Second, earnings might be a better measure to explain the sector returns because it does not need to be adjusted while EVA is computed by adjusting net operating profits after tax (NOPAT) and capital substantially. For example, Stewart (1991) argues that research and development costs should be capitalised (if material) and amortised. This requires adjustments to both NOPAT and to capital.

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