Performance measures: Traditional accounting measures versus modern value-based measures.

The case of earnings and EVA® in the Athens Stock Exchange (ASE)

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The case of earnings and EVA® in the Athens Stock Exchange (ASE)

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Abstract

EVA® is a representative measure of modern value-based performance measurement. It has been introduced in the corporate world accompanied by assertions such as: 'Forget EPS, ROE and ROI. EVA® is what drives stock prices' (Stewart 1991; 1999; Stern *et al.* 1995). However, results from the empirical research to date are not consistent to those assertions. They are in fact mixed and controversial. This study is stimulated by both the EVA® proponents' assertions and by the mixed empirical results for its value relevance reported until now. Pooled time-series, cross sectional data of listed companies in the Athens Stock Exchange (ASE) over the period 1992 – 2001 have been employed to examine whether EVA® or the traditional accounting-based measures are associated more strongly with stock returns. Relative information content tests reveal that stock returns are more closely associated with earnings per share than with EVA®. However, incremental information content tests suggest that EVA® adds considerable explanatory power to earnings per share.

Key words: Accounting and value-based performance measures and CAPM anomalies.

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1. Introduction

Traditional performance measures appeared in early 1900s and have been used since then, in various forms, to measure the financial performance of corporations. After the introduction of the discounted cash flow techniques, the free cash flow (FCF) valuation model, the more consistent determination of valuation (Miller and Modigliani, 1961), the incorporation of growth in valuation models (Gordon, 1962), the cost of capital and the capital asset pricing model (CAPM) (Sharpe, 1964; Lintner, 1965; Black, 1972), the divisional performance and the adaptation of residual income (Solomon, 1965), a new concept, the shareholder value (SHV) approach developed in early 1980s (Rappaport, 1986; Stewart, 1991). Value-based performance measures, based on shareholder value approach, such as Shareholder Value Added (SVA), Economic Value Added (EVA®), Economic Profit (EP), and cash flow return on investment (CFROI), gained popularity since the late 1980s. Thus, the value based management (VBM) approach became increasingly popular both as a decision making tool and as an incentive compensation system.

Several empirical studies have been conducted in the last two decades, first in the US and later in the rest of the international market community, to answer questions such as: *is it really better to use value-based measures than traditional accounting performance measures to measure the financial performance of corporations?,* or *which performance measure best explains corporations' change of market value?*. However, the reported results are quite mixed and controversial. This study is motivated by the controversial results of the previous research and aims to conduct a research for the ASE to assess (a) *which one of those measures best explains corporation's change of market value* (relative information content tests) and (b) *after a pairwise combination of one traditional and one value-based performance*

measure whether one measure adds information to that provided by the other (incremental information content tests).

Since the performance measures (traditional and modern) are many and appeared in different variations, this study is focused on the most popular mentioned in the literature. Those are, from the traditional measures, EPS, ROI, ROE and from the modern value-based measures, EVA® and SVA.

The structure of the paper is as follows: Section two presents a summary of the related literature review, section three describes the methodology followed, section four presents and analyses the results of the statistical analysis, and section five concludes the paper with the most important findings which are compared with those already existed from previous research.

2. Literature review

Since the early 1980s there has been a global momentum in the economy. Capital markets – indeed, almost all financial institutions – became more and more global in outlook. Moreover, investors started to be more sophisticated than ever and wanted to know all possible details about a company. What has the company been paying for dividends in the past was not enough for investors. Financial statements, such as the balance sheet and profit and loss account, prepared in traditional way were no longer enough. Cash flow had become a more important measure. Many consulting firms, academics and practitioners observed such global trends. They were moving forward from the traditional audit, on which they were focused for so many years, in order to keep pace with the new trends. Indeed the essential purpose for many firms became the maximisation of their value so as to keep satisfied their shareholders as well as their employees, customers, suppliers, and their communities (Black, Wright and Bachman, 1998).

The idea that the primary responsibility for management is to increase their company's value, gained prominence and became widely accepted in the US after the Rappaport's (1986) publication of *Creating Shareholder Value*. Moreover, accounting earnings were under attack. Rappaport (1981; 1986; 1998) argued that earnings fail to measure the real change in economic value. Arguments such as the alternative accounting methods that could be used, the investment requirements exclusion of the calculation of profits and the ignorance of the time value for money, brought earnings under hard critic.

To overcome problems associated with earnings-based measures, several scholars proposed alternative theories and new (modern) performance measures. As a consequence, the Shareholder Value approach was developed in the late 1980s and early 1990s. Shareholder Value approach estimates the economic value of an investment by discounting forecasted cash flows by the cost of capital (Rappaport, 1998, p. 32). Proponents of shareholder value approach, either academics or consulting firms, based their analysis on free cash flows (FCF) and the cost of capital and produced a variety of such measures. The most common referred variants of those measures are: (a) Shareholder Value Added (SVA) by Rappaport and LEK / Alcar Consulting group (Rappaport, 1986; 1998), (b) Cash flow return on investment (CFROI®)[2] by Boston Consulting Group (BCG) and HOLT Value Associates (Black, Wright and Bachman, 1998; Madden, 1999; Barker, 2001), (c) Cash Value Added (CVA) by Boston Consulting Group (BCG) and the Swedes Ottoson and Weissenrieder (Ottoson and Weissenrieder, 1996; Madden, 1999; Barker, 2001), and (d) Economic Value Added (EVA®) by Stern Stewart & Co. (Stewart 1991; 1999; Ehrbar, 1998; 1999; Stern, 2001).

[2] CFROI® is a registered trademark of Holt Value Associates, LLP

The empirical research for the value relevance of traditional accounting performance measures and modern value-based performance measures is broad but with controversial results. Several studies proved the superiority of EVA® as a performance measure (Stewart, 1991; O'Byrne, 1996; Uyemura, Kantor and Petit, 1996; Milunovich and Tseui, 1996; Bao and Bao, 1998; Forker and Powell, 2004; Worthington and West, 2004) while others (Biddle, Bowen and Wallace, 1997; Chen and Dodd, 1996; 1997; de Villiers and Auret 1998; Turvey *et al.* 2000; Chen and Dodd, 2001; Worthington and West, 2001; Copeland 2002; Sparling and Turvey, 2003) provided different and opposing results. Thus, the question of relevance still holds well and the empirical research continues.

3. Methodology

3.1. Sample and the data collection

The sample period spans 10 years, from 1992 to 2001. There are 163 companies in the sample with different number of participating years for each of them. These companies gave a total of 984 year-observations. After excluding the extreme observations (3 standard deviations), the final sample was reduced to that of 977 year-observations. Table 1 shows the variation of companies' participation and the number of observations from year to year.

Table 1: Companies' participation (year-observations) from year 1992 to 2001

Year	Companies' participation / observations	Companies' participation / observations (3 std excluded)
1992	37	37
1993	55	55
1994	71	71
1995	73	73
1996	80	80

1997	106	106
1998	120	118
1999	135	130
2000	144	144
2001	163	163
Total	984	977

The research started the sample selection using daily closing prices of the common stocks, which were trading in the ASE during the period from January 1990 to April 2002, even though the investigation period spans from 1992 to 2001. They are raw prices in the sense that they do not include dividends but they are adjusted for capital splits and stock dividends. It starts from January 1990 since it needs at least two years prior trading period for each stock to incorporate it in the sample. The main reason for this was the need of 36 monthly returns for each stock in order to calculate its risk (beta) for each year, although Fama and McBeth (1973) used 60 monthly returns for this calculation. Thus, the stocks, which consist the sample of 1992, have a trading presence in the ASE at least from the first month of 1990.

It also included the closing prices three months after the fiscal year end 2001 since the return period for each year spans nine months prior to three months after the fiscal year end (Easton and Harris, 1991; Biddle, Bowen and Wallace, 1997; Chen and Dodd, 2001). Except from the daily closing prices for each stock, it was also collected the daily General Index of the ASE and the three-month Government Treasury Bill rate, which is considered to be the short-term interest rate (risk free interest rate). All data was acquired directly from the ASE data bank.

From the daily closing prices of the common stocks the daily returns for each stock was calculated using the logarithmic approximation (Benninga, 2001):

$$R_{i,t} = \log\left(P_{i,t} \Big/ P_{i,t-1}\right) \qquad (2)$$

where $R_{i,t}$ is the return of stock *i* at time *t*, while $P_{i,t}$ and $P_{i,t-1}$ are the prices of stock *i* at time *t* and *t-1* respectively.

Daily returns were aggregated to compose the monthly returns, which are the primary inputs for our investigation. Using the same procedure, the monthly returns for the General Index (GI) were also calculated. Employing the first selection criterion, all financial companies and the Banks were excluded from the sample, while employing the second selection criterion the companies with penalties or with long periods without transactions (more than two months) or with missing values were also excluded. Using the monthly returns of each stock and the monthly returns of GI, the annual betas for each stock were estimated. Finally, annually returns were calculated as the aggregation of the monthly returns, extending nine months prior to three months after each fiscal year end.

The estimation of the adopted accounting and value-based performance measures was based on the annual balance sheet and income statement of each listed company included in the sample. This information was taken from the ASE data-base.

3.2. The Model

This research is based on Easton and Harris (1991) formal valuation model, which has been used by the majority of researchers who contacted similar studies (Biddle, Bowen and Wallace, 1997; Chen and Dodd, 1997 and 2001; and Worthington and West, 2001) and which is actually the only model supported theoretically by their proponents and, up to now, according to our knowledge, remains without any sound criticism by academia. The model links stock returns to earnings levels and earnings changes as below:

$$R_{jt} = \gamma_{t0} + \gamma_{t1} A_{jt} / P_{jt-1} + \gamma_{t2} \Delta A_{jt} / P_{jt-1} + \varepsilon^{3}_{jt} \qquad (1)$$

Where R_{jt} is the return on a share of firm *j* over the 12 months, extending from 9 months prior to fiscal year-end to 3 months after the fiscal year-end, A_{jt} is the accounting earnings per share of firm *j* for period *t*, ΔA_{jt} is the earnings change, and P_{jt-1} is the price per share of firm *j* at time *t-1*.

Both relative and incremental information content approaches were employed to answer the two research questions under examination. The relative information content approach is used to explore the first research question, while the incremental information content approach is employed to answer the second one.

To explore the first research question five equations (variations) were developed based on Easton and Harris (1991) adopted model. Analytically, the earnings and earnings' change variables were replaced with each of the performance measures under examination. Thus, the following equations were finally developed:

Equation (1): $Returns = a_0 + a_1 EPS/P_{t-1} + a_2 \Delta EPS/P_{t-1} + u_1$

Equation (2): $Returns = b_0 + b_1 ROI + b_2 \Delta ROI + u_2$

Equation (3): $Returns = c_0 + c_1 ROE + c_2 \Delta ROE + u_3$

Equation (4): $Returns = d_0 + d_1 EVA/P_{t-1} + d_2 \Delta EVA/P_{t-1} + u_4$

Equation (5): $Returns = e_0 + e_1 SVA/P_{t-1} + u_5$

Where, for all equations:

Returns are the annual compounded returns extending nine months prior to current fiscal year end to three months after the current fiscal year end

EPS is the earnings per share of firm at time *t*

ΔEPS is the change in earnings per share over period *t-1* to *t*

P_{t-1} is the market value per share at the first trading day of the ninth month prior to fiscal year end

ROI is the return on investment of firm at time *t*

ΔROI is the change in ROI over period *t-1* to *t*

ROE is the return on equity of firm at time *t*

ΔROE is the change in ROE over period *t-1* to *t*

EVA is the economic value added of firm at time *t*

ΔEVA is the change in EVA over period *t-1* to *t* and

SVA is the shareholder value added over time *t-1* to *t*.

Through this approach (the relative information content approach), the study will investigate which one of the performance measures under examination is superior in terms of association with stock returns in the Greek capital market.

The equations will be estimated cross-sectionally by years as well as using pooled cross-sectional and intertemporal data (Easton and Harris, 1991; Chen and Dodd, 2001; Worthington and West, 2001). This design facilitates the use of testing procedures that are common in the information content literature and, therefore, will ease the comparison of the present study with those in the literature. In order to reveal the explanatory power of the variables under examination, the coefficients' significance, F-statistics, and R^2s will be examined.

To explore the second research question the incremental information content tests will be employed (Cheng, Cheung and Gopalakrishnan, 1993; Biddle, Bowen and Wallace, 1995; Chen and Dodd, 2001; Worthington and West, 2001; Francis, Schipper and Vincent, 2003). The purpose of these tests is to examine whether one measure adds information to that provided by another measure. The coefficient of determination, $R^2_{p/q}$, denotes the increase in R^2 due to variable *p*, conditional on variable *q*, and $R^2_{p.q}$ denotes the R^2 due to both variables *p* and *q* (Cheng, Cheung and Gopalakrishnan, 1993). Pooled time-series cross sectional data (all years) will be employed to reveal the information usefulness of each regression model. For this purpose the Easton and Harris (1991) model was extended incorporating the combination of one traditional and one value-based performance measure. The new

equations (variations) that have been developed to explore the incremental information content of the pairwise combination of these measures are six (equations 6-11):

Equation (6) : $Returns_t = l_0 + a_1 EPS/P_{t-1} + a_2 \Delta EPS/P_{t-1} + d_1 EVA/P_{t-1} + d_2 \Delta EVA/P_{t-1} + u_{6t}$

Equation (7) : $Returns_t = m_0 + a_1 EPS/P_{t-1} + a_2 \Delta EPS/P_{t-1} + e_1 SVA/P_{t-1} + u_{7t}$

Equation (8) : $Returns_t = n_0 + b_1 ROI + b_2 \Delta ROI + d_1 EVA/P_{t-1} + d_2 \Delta EVA/P_{t-1} + u_{8t}$

Equation (9) : $Returns_t = o_0 + b_1 ROI + b_2 \Delta ROI + e_1 SVA/P_{t-1} + u_{9t}$

Equation (10) : $Returns_t = p_0 + c_1 ROE + c_2 \Delta ROE + d_1 EVA/P_{t-1} + d_2 \Delta EVA/P_{t-1} + u_{10t}$

Equation (11) : $Returns_t = q_0 + c_1 ROE + c_2 \Delta ROE + e_1 SVA/P_{t-1} + u_{11t}$

4. Results

4.1. Relative information content approach

Relative information content is assessed by comparing R^2 s from five separate regressions (1 to 5), one for each performance measure, EPS, ROI, ROE, EVA and SVA. R^2s from these regressions are provided in Table 2. The higher R^2 is shown on the left and the lowest is shown on the right.

Following the Easton and Harris (1991) and Chen and Dodd (2001) methodology, the model was estimated using both the pooled cross-sectional and intertemporal (all years) sample and the individual year cross-sectional sample.

Table 2: Summary (all years) results from the five (1-5) regressions

	Regression (1)	**Regression (4)**	**Regression (2)**	**Regression (5)**	**Regression (3)**
All Years	**EPS**	**EVA**	**ROI**	**SVA**	**ROE**
R^2	**0.019**	**0.009**	**0.004**	**0.001**	**0.000**
F	(9.577)***	(4.546)***	(2.781)*	(0.910)	(0.005)
Significance	0.000	0.01	0.062	0.340	0.995

* significance at 10% level, ** significance at 5% level, *** significance at 1% level

Firstly, there is a significant difference between the five regressions in the relative information content tests. Regressions (1) and (4) are significant at 0.01 level, regression (2) is significant at 0.1 level, while regressions (3) and (5) are not

statistically significant. Secondly, comparing the reported R^2s of the five pooled regressions, it is noticed that all are largely consistent to those of Biddle, Bowen and Wallace (1997), Worthington and West (2001), and Chen and Dodd (2001).

The results of the present study show that EPS (R^2 = 19 per cent) provide more information in explaining stock returns than EVA (R^2 = 9 per cent). Biddle, Bowen and Wallace (1997) found that Earnings Before Extraordinary Items-EBEI with an R^2 = 9.0 per cent provides more information than Residual Income-RI (R^2 = 6.2 per cent), and EVA (R^2 = 5.0 per cent). Worthington and West (2001) also found similar results: EBEI (R^2 = 23.6 per cent), RI (R^2 = 19.2 per cent) and EVA (R^2 = 14.3 per cent), while Chen and Dodd (2001) reported that Operating Income-OI with an R^2 = 6.2 per cent explains the stock returns better than RI (R^2 = 5.0 per cent) and EVA (R^2 = 2.3 per cent). The results of this research suggest that for the Greek capital market, the new information provided by the EVA measure is less value relevant than EPS, at least from a stock return perspective. On the other hand, the low explanatory power of the five regressions is consistent to the results of Copeland (2002) who also found low R^2s for EPS and EVA (although EPS outperformed EVA), i.e., scaled EPS 4.5 per cent, change in EPS 5.1 per cent, scaled EVA 0.3 per cent, and change in EVA 3 per cent.

Examining separately each of the five regressions (1 to 5) and using the individual year cross-sectional sample, results are largely consistent with those reported for the pooled cross-sectional and intertemporal (all years) sample.

4.2. Incremental information content approach

To test the incremental information power, each traditional performance measure (EPS, ROI and ROE) is combined pairwise with each one of the value-based performance measures (EVA and SVA) forming six different equations (6 to 11). An assumption of a linear relationship between these variables was made.

All regression models were tested for multicollinearity using the variance inflation factor (VIF). According to Neter, Wasserman and Kunter (1985) a VIF in excess of 10 is often taken as an indicator of severe multicollinearity, while mild multicollinearity exists when the VIF is between 5 and 10. A VIF lower than 5 indicates that multicollinearity does not exist. The reported VIF from our regressions are mostly less than 5. Examination of residual plot and normality plot reveal no serious violations of the regressions' assumptions. There was an attempt to correct these minor violations, but the outcome was either produced regressions with insignificant coefficients or regressions with similar explanatory power to the initial ones.

Table 3 shows the detailed results from the pairwise combinations of one traditional performance measure and one value-based performance measure. It is noticed that regressions (6), (7), (8), (9), and (10) are significant at 0.05 level or better, whereas regression (11) is statistically insignificant.

The highest R^2 (7.2 per cent) is reported in regression (6), which combines EPS, ΔEPS and EVA, ΔEVA. The contribution of the EPS in the explanatory power of this regression is higher than that of EVA, since the R^2 of EPS alone is 1.9 per cent (regression 1, table 2) while that of EVA alone is 0.9 per cent (regression 4, table 2).

This suggests that the combination of EPS and EVA represents the most satisfactory explanation for stock returns in the Greek stock market. Chen and Dodd (1997; 2001) and Worthington and West (2001) revealed almost similar results for the US and Australian capital markets respectively. They found that EVA is a useful measure for measuring the financial corporate performance, especially when it is combined with EPS. All other examined models have reported low R^2s (lower than 2.1 per cent).

Table 3: Incremental information content approach – Pairwise combinations

Incremental / One Traditional Measure + One Value-Based Measure

Regression	ALL YEARS	CONST	EPS	Δ EPS	ROI	Δ ROI	ROE	Δ ROE	EVA	Δ EVA	SVA	R^2	F	No of Obs
6	coef	-0.0249	0.2580	0.0056					-0.1570	0.0001		**0.072**		976
	t	(-1.073)	(7.772)***	(2.464)**					(-7.355)***	(0.405)			(18.761)***	
	sign	0.283	0.000	0.014					0.000	0.686			0.000	
	VIF		1.834	1.004					1.824	1.006				
7	coef	0.0406	0.0958	0.0057							-0.0020	**0.020**		976
	t	(1.848)*	(3.795)***	(2.451)**							(-0.966)		(6.773)***	
	sign	0.065	0.000	0.014							0.334		0.000	
	VIF		1.004	1.004							1.001			
8	coef	0.0281			0.0630	0.0032			-0.0680	0.0003		**0.021**		976
	t	(1.243)			(2.195)**	(2.173)**			(-3.730)***	(1.000)			(5.141)***	
	sign	0.214			0.028	0.030			0.000	0.317			0.000	
	VIF				1.293	1.025			1.267	1.000				
9	coef	0.0366			0.1480	0.0022					-0.0126	**0.015**		976
	t	(1.635)			(2.887)***	(1.465)					(-3.005)***		(4.904)***	
	sign	0.102			0.004	0.143					0.003		0.002	
	VIF				4.119	1.080					4.021			
10	coef	0.0420					0.0001	0.0009	-0.0528	0.0003		**0.011**		976
	t	(1.869)*					(0.027)	(1.027)	(-3.072)***	(0.977)			(2.599)**	
	sign	0.062					0.979	0.305	0.002	0.319			0.035	
	VIF						1.002	1.113	1.115	1.001				
11	coef	0.0556					-0.0003	0.0013			-0.0044	**0.002**		976
	t	(2.519)**					(-0.059)	(1.102)			(-1.458)		(0.711)	
	sign	0.012					0.953	0.271			0.145		0.546	
	VIF						1.000	2.126			2.126			

Significance at 10% level, ** significance at 5% level, *** significance at 1% level.

5. Summary / Conclusions

Relative information content approach revealed that in the Greek stock market earnings levels and earnings changes are associated with stock returns and outperform all other performance measures under examination (ROI, ROE, EVA and SVA) in explaining stock returns. These results are consistent to those reported for various international markets. Easton and Harris (1991), for example, found that earnings levels and earnings changes are associated with stock returns for the US market. Also, Biddle, Bowen and Wallace (1997) and Chen and Dodd (2001) found that earnings outperform EVA and residual income in the US stock market. Günther, Landrock and Muche (2000) and Worthington and West (2001) revealed similar results for the Germany and Australian stock markets respectively. On the other hand, the results of the present study do not support the claims of Stewart (1991) and the advocates of EVA financial system that EVA alone is the best performance measure.

On the other hand, incremental information content approach provided further interesting results. When EVA is incorporated in an EPS model its explanatory power increases from 1.9 to 7.2 per cent. This suggests that the new information provided by the EVA is of some value relevance in explaining stock returns. The relative low explanatory power of performance measures under examination is, in large, consistent with the reported results of several relevant studies conducted for the US market. Chen and Dodd (1997) found that EVA variables and accounting profit variables could not explain more than 47 per cent of the variation of stock returns. Moreover, a recent study of Chen and Dodd (2001) provided evidences that EPS and EVA could not explain more than 23.49 per cent of stock returns. These results support the claims of many scholars that more determinants should be employed to assess the value of the firm. This evidence suggests that the participants in the Greek Stock market

should pay additional attention to that relatively new value-based performance measure.

This study can be further extended in examining the incremental information content not only of the pairwise combinations but also from combinations incorporating more than one traditional or value-based performance measure. Another important suggestion for further research is to explore the value relevance of other factors beyond the above examined performance measures in explaining stock returns. Behavioural finance provides a good ground for this. Moreover, comparative studies within stock markets with similar market characteristics as these of Greece should add value to this kind of research.

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