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EVA Reconsidered for the Greek Capital Market

By

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Abstract:

The present study examines the explanatory power of one value based performance measure (Economic Value Added) and three other traditional accounting measures (Earnings Per Share, Return On Investment, Return On Equity) in explaining stock market returns in the framework of Athens Stock Exchange for the period 1996-2005. Methodology is based on studies performed for the same capital market by Maditinos, Theriou and Šević (2005; 2006), Maditinos, Šević and Theriou G (2007), Maditinos, Šević, Chatzoglou and Theriou (2007) and Maditinos, Šević, Theriou and Demetriadis (2007). Results show EPS to provide the greatest value relevance in explaining stock market returns consistent with that of previous studies. Moreover, the explanatory power of the pair wise combinations of EVA with each traditional accounting performance measure is also examined. The pair wise combination of EVA with EPS grants for a significant increase of the explanatory power, compared to EPS explanatory power examined alone (from 2.9 to 7.6 per cent), in explaining stock market returns, consistent again with the previous findings.

Key Words: *EVA, EPS, ROI, ROE, Regression analysis, Greek Capital market*

Introduction

The study's main objective is to provide a comprehensive analysis of both accounting and value-based, financial performance measures as well as to clarify

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the role of EVA. Financial analysis of the Athens Stock Exchange listed companies for the 1996-2005 period is employed toward this objective.

Traditional accounting performance measures were first used in the late nineties. Since then, several measures such as Earnings Per Share (EPS), Return On Investment (ROI), Return On Equity (ROE) and Return On Assets (ROA) have been used as significant financial performance determinants (Epstein, 1925; Sloan, 1929). Many other performance measures were introduced since then each one specified on a different aspect of financial performance. Solomons (1965) conceived the Residual Income measure, Stern (1974) developed the Free Cash Flows (FCF) formula, Rappaport (1986) introduced the Shareholder Value (SHV) measure and Stewart (1991) introduced the Economic Value Added (EVA) performance measure.

The immense need of accuracy and concreteness in assessing overall financial performance, however, emerged the use of the modern value-based performance measures represented by Economic Value Added, Market Value Added and Shareholder Value Added (Rappaport, 1998). The basis of these measures is the invested capital and this, as O'Hanlon and Peasnell (1998) argue, is because of the domination of the aspect that capital is not free of charge. This fact is also proved by the SVA approach which states that earnings are not the only indicator of value (Knight, 1997).

From a large number of performance measures we focus on those with the most obvious utility which have engaged scholars' attention. EPS, ROI and ROE are selected among various traditional accounting performance measures and EVA is selected as the most representative modern measure. This study is mainly concerned about which measure best explains stock returns in the Greek stock market. Moreover, it explores whether a combination of two different measures rather than a single one can provide greater value relevance to stock returns. In the aggregate, based on a ten year period financial analysis (1996-2005), this study provides evidence for the explanatory power of traditional and modern value-based performance measures. The results could be the basis for further research on this issue.

On the contrary, while EVA was presented by Stewart (1991), as the most accepted financial concept, other studies claimed that the correlation between EVA and shareholders' return is not at all ambiguous (Peterson and Peterson, 1996; Chen and Dodd, 1997; 2001; Kramer and Pushner, 1997; Biddle, Bowen and Wallace, 1997; Clinton and Chen,1998; De Villiers and Auret,1998; Turvey et al., 2000; Keef and Roush, 2003, among others). This literature contradiction motivated us to examine the explanatory role of traditional and value-based performance measures in stock returns variation.

Literature review

1.1 Traditional Accounting Measures

Profitability, liquidity and solvency are the main three parts of the financial performance of the corporation (Chakravanty, 1986). The profitability of a

company strongly depends on the company's income and earnings. Accounting earnings have the most important role in security analysis; this is the motive for many scholars to assess earnings usefulness for investors. Ball and Brown (1968) were among the first to examine the correlation of stock returns and accounting earnings. Kramer and Pushner (1997) point out that "the market being fed almost with constant news on earnings" (pp.53). This triggers the need of the incorporation of earnings and income data in different models (Foster, 1986; Lev, 1989), some of which are outlined next in the analysis.

A relative common accounting measure is ROA (return on assets) which was criticised by Stern (1974) for having a negative effect on managers overwhelmed investment decisions based on a possibility of a low ROA score. ROA indicates the profitability of a company according to its total assets. ROA reveals an effective asset management for earnings generation. ROA's formula is the following:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \quad (1)$$

Similarly, RONA is a measure of financial performance calculated as:

$$\text{RONA} = \frac{\text{Net Income}}{\text{Fixed Assets} + \text{Net Working Capital}} \quad (2)$$

According to Foster (1986) and Lev (1989) the higher the RONA score is the greater the profit for the company.

The most popular accounting measure is Price-Earnings (P/E) ratio. P/E is considered by managers and investors as the most representative indicator of a company's performance. Other measures broadly discussed in literature are Return On Investment (ROI) and Return On Equity (ROE) (White, Sondhi and Fried, 2003). The most common formulas for ROI are the following:

$$\text{ROI} = \frac{\text{Net Income}}{\text{Book Value of Assets}} \quad (3)$$

or

$$\text{ROI} = \frac{\text{Net Income} + \text{Interest} \times (1 - \text{Tax Rate})}{\text{Book Value of Assets}} \quad (4)$$

where the Book Value of Assets is the average book value of assets for a specific year.

ROE measures the profitability relative to shareholders (White, Sondhi and Fried, 2003). Hence total debt is excluded from the denominator and as a numerator is used either pretax income or net income. The proposed formulas are the following:

$$\text{ROE} = \frac{\text{Pretax Income}}{\text{Average Book Value of Shareholders' Equity}} \quad (5)$$

or

$$\text{ROE} = \frac{\text{Net Income}}{\text{Average Book Value of Shareholders' Equity}} \quad (6)$$

Finally, Rappaport (1998, p. 29) defined ROE as follow:

$$\text{ROE} = \frac{\text{Net income}}{\text{Book Value of Shareholders' Equity}} \quad (7)$$

where Book value of Shareholder' Equity is the average book value of shareholder equity for a specific year. ROE is useful for comparing different companies' profitability in one sector.

However, the above measures have been criticised for being highly influenced by accrual-based accounting rules and for not incorporating the cost of capital concept. This can result in the manipulation or misinterpretation of these measures.

1.2 Value Based Measures

There are several different approaches to estimate profitability, liquidity and solvency. More specifically, many scholars rely on Net Present Value and Free Cash Flow and produce a variety of value based performance measures (including the cost of capital). The most common referred variants of those measures are: Shareholder Value Added (SVA) Rappaport (1998), Economic Value Added (EVA) (Stewart, 1991) and Market Value Added (MVA) (Stewart 1991; 1999; Stern, 2001).

Solomons (1965) introduced residual income which is the amount of net income minus all debts. Specifically the proposed formula for calculating the residual income is the following:

Residual Income = Net Income-c*Investment (8)

where c is the cost of capital.

However, to go over from Residual Income figure to EVA figure, many accounting adjustments are required. These accounting adjustments (up to 164) have been designed to convert accounting income to economic income and accounting capital to economic capital (Stewart, 1991; Young, 1997; Anderson, Bey and Waver, 2004). EVA has gained considerable popularity since an impressive army of over 300 companies adopted it. Some of these companies were Siemens, Coca-Cola and Eli Lilly.

EVA includes both equity and debt capital cost and reflects cash-basis accounting (Peterson and Peterson, 1996). EVA is actually the economic book value of the capital committed to the business multiplied by the spread between the rate of return on capital, defined as *r*, and the cost of capital, defined as *c** (Stewart, 1991). Therefore, Stewart (1991) calculates EVA as follows:

EVA = (rate of return – cost of capital) X capital (9)

The rate of return (r) is company's Net Operating Profit After Tax divided by the total capital employed in operations:

$$r = \frac{\text{NOPAT}}{\text{Capital}} \quad (10)$$

Also, EVA is defined as operating profits less a capital charge. This is evident if we rearrange EVA's formula (9) as follows:

EVA =(r X capital)-(*cost of capital* X capital)

Rearranging equation (11), NOPAT becomes: NOPAT = r X capital

Thus, replacing (*r* × capital) in formula (9) with NOPAT, EVA becomes:

EVA = NOPAT – (*cost of capital** × capital) (11)

From all the above we conclude that EVA is an accounting based measure driven by accounting data such as net income, interest, debt and capital. EVA includes the cost of capital in its formula and this is why it differs from the other traditional accounting measures.

EVA has got a lot of critics. Several scholars disagree and discuss EVA's drawbacks. For example Saint (1995) writes "*as a single period measure of financial, I believe its contribution is minimal and not much different from return on equity (minus the company's cost of equity) or other traditional accounting measures*". One main disadvantage of EVA is that it is quite complex and easy to manipulate. Moreover, EVA is a performance measure that does not include measures of quality or time. Also, there is a strong possibility that a risky project can be accepted while a less risky one can be rejected purely based on the quantitative characteristics that EVA incorporates. EVA is a static performance measure and refers to one year financial results and so it does not offer solutions but purely indicates company's situation. Finally, as DeVilliers (1997) states, one of the chief disadvantages of EVA is that it incorporates accounting profits and so there is always an incline between accounting profit and 'true' profit. That can become even worse by the influence of inflation (DeVilliers, 1997).

Methodology

1.1 Introduction

In the following section some of the most important methodologies employed by other scholars about the measures that best explain stock returns are presented. These studies explore traditional accounting measures (e.g. ROI, ROE, EPS) as well as the most commonly used value based performance measures (e.g. RI, EVA, SVA). In specific we present the studies of Easton and Harris (1991), Biddle Bowen and Wallace (1997), Chen and Dodd (2001), Maditinos, Sevic and Theriou (2005, 2006, 2007) and of Anastassis and Kyriazis (2007). Finally, the methodological approach employed by the present study is presented.

1.2. Relevant methodologies

Easton and Harris (1991) developed a model correlating earning levels and earnings changes to raw stock returns and tested it at a sample of 19,996 companies for a nineteen year period. Easton and Harris (1991) developed three different valuation models to examine how strong the correlation between earnings and stock returns is. These three models were: the levels model, the changes model and the combination of the two previous valuation models. The empirical examination of these models provided evidence demonstrating that earnings (E_p/P_{p-1}) and change in earnings ($\Delta E/P_{p-1}$) are associated, each one separately, with stock returns. Incorporating both variables (E_p/P_{p-1}) and ($\Delta E/P_{p-}$

$_{1}$) in a regression model, an increase in explanatory power is achieved. The proposed models are the following.

The levels model: $Returns_{jp} = \alpha_{p0} + \alpha_{p1} E_{jp}/P_{jp-1} + \varepsilon^{1}_{jp}$ (12)

The changes model: $Returns_{jp} = b_{p0} + b_{p1} \Delta E_{jp}/P_{jp-1} + \varepsilon^{2}_{jp}$ (13)

The combination of models (12) and (13) is the following:

$$Returns_{jp} = \gamma_{p0} + \gamma_{p1} E_{jp} / P_{jp-1} + \gamma_{p2} \Delta E_{jp}/P_{jp-1} + \varepsilon^{3}_{jp} \quad (14)$$

where E_{jp} / P_{jp-} is the earning level of year p and $\Delta E_{jp}/P_{jp-1}$ is the change in the earnings level of year p for each consecutive year. Easton and Harris's model produced a strong explanatory power concerning stock returns.

Easton and Harris's (1991) model became the theoretical and empirical basis for other scholars to further examine the correlation between stock returns and various financial performance measures (Chen and Dodd, 2001). The methodology of the present study is based on their approach. Specifically, every examined measure in our research (EPS, ROI, ROE, EVA) substitutes the earnings and earnings' change variables in the corresponding developed model. Furthermore, we use a regression of EVA and EVA change with each one of the examined traditional accounting measures so as to realise if EVA contributes to the explanatory power of the research model.

Biddle, Bowen and Wallace (1997) explored whether EVA explains stock returns more precisely than accrual earnings. Also they explored which components of EVA add information in their research model's explanatory power. The following two questions were tested:

Q1:" Do EVA and/or Residual Income (RI) dominate earnings and operating cash flow (CFO) in explaining contemporaneous stock returns?"

Q2:" Do components unique to EVA or RI help explain contemporaneous stock returns beyond that explained by CFO and earnings?"

More specifically they examined whether EVA and/or Residual Income outperforms Earnings and Operating Cash Flows. Their sample was 6,174 companies for almost a ten year period (1984-1993). In their regression analysis they used stock returns as depended and EVA, RI, Earnings and CFO as independent variable. The basis for Biddle, Bowen and Wallace's (1997) models was Easton and Harris's (1991) 'levels and changes' specification (14) model.

Relative information content comparison is employed to compare many performance measures and decide which one of them explains stock returns more precisely. This technique is in particular applied to decide which performance measure adds more information to the corresponding regression model. Biddle, Bowen and Wallace's (1997) findings illustrated that the present accounting earnings provide a better explanation of annual stock returns than Residual Income and EVA. Moreover, they concluded that EVA Residual, Income and Earnings outperform Cash Flows from Operation (CFO).

In order to address question two (*Q2)* they decomposed EVA into cash from operations, (CFO), operating accruals (ACCR), capital charge (CapChrg), and net

accounting "adjustments" (AcctAdj). By this they evaluate each component's contribution in explaining stock returns. The decomposed EVA formula is the following:

$$EVA = CFO + ACCR + ATIntEx - CapChrg + AcctAdjst_{\text{in total}} \quad (15)$$

The incremental information content approach suggests that EVA components do not add considerable information compared to earnings. Cost of capital and accounting adjustments in particular do not seem to add much information concerning returns of the same period in contrast to operating cash flow and accruals which added considerable information.

Chen and Dodd (2001) examined the correlation of three profitability measures to stock returns: Operating Income, Residual Income, and EVA to stock returns. Two approaches were employed: the relative and the incremental information content approach. They developed four hypotheses, two for each approach. The hypotheses that attract interest of the present study are the following:

H1:" EVA does not provide more information than RI in explaining the variation of stock returns"

H2:" EVA does not provide incremental information in addition to that contained in OI and RI in explaining the variation of stock returns"

Chen and Dodd (2001) used both the pooled cross-sectional and the individual year cross-sectional for a ten year period sample, by adopting and adjusting Easton and Harris's (1991) model. For the first hypothesis the models used are the following

$$RET_{jt} = beta_0 + beta_1 [\Delta OI_{jt} / P_{jt-1}] + beta_2 [OI_{jt} / P_{jt-1}] + e_{jt,} \quad (16)$$

$$RET_{jt} = beta_0 + beta_1 [\Delta RI_{jt} / P_{jt-1}] + beta_2 [RI_{jt} / P_{jt-1}] + e_{jt,} \quad (17)$$

$$RET_{jt} = beta_0 + beta_1 [\Delta EVA_{jt} / P_{jt-1}] + beta_2 [EVA_{jt} / P_{jt-1}] + e_{jt,} \quad (18)$$

where $RET_{jt,}$ is the annual stock return (the dependent variable), OI_{jt} is the operating income per share, ΔOI_{jt} is the change in operating income per share, RI_{jt} is the residual income per share, ΔRI_{jt} is the change in residual income per share, EVA_{jt} is the EVA per share, ΔEVA_{jt} is the change in EVA per share P_{jt-1}.The results as much from the annual regression analysis as from the ten year regression suggest that Operating Income has more explanatory power than Residual Income, concerning stock returns which also provide more information than EVA. The second hypothesis examines the valuable information added by EVA to OI and RI. Chen and Dodd (2001) applied the following model in order to capture the incremental information.

$$RET_{jt} = beta_0 + beta_1 [\Delta OI_{jt} / P_{jt-1}] + beta_2 [OI_{jt} / P_{jt-1}] + beta_3 [\Delta RIMOI_{jt} / P_{jt-1}] + beta_4 [RIMOI_{jt} / P_{jt-1}] + beta_5 [\Delta EVAMRI_{jt} / P_{jt-1}] + beta_6 [EVAMRI_{jt} / P_{jt-1}] + e_{jt} \quad (19)$$

where ΔEVAMRI is the difference between the changes in EVA minus RI.

Results prove that EVA adds valuable information in explaining stock returns compared to the information Operating Income and Residual Income add.

Maditinos Sevic and Theriou (2005, 2006, 2007) examined the value relevance of three traditional accounting measures (EPS, ROI, and ROE) and two

value based performance measures (EVA, SVA) explain to stock returns. This study has also relied on Easton and Harris's model as well as on the studies Chen and Dodd (1997; 2001), Biddle, Bowen and Wallace (1997), Worthington and West (2001) and Chen and Zhang (2003).The hypotheses then tested in their studies were the following:

H1: "EVA or SVA dominates traditional accounting performance measures, EPS, ROI, and ROE, in explaining annual stock returns"

H2: "EVA or SVA incorporates additional information content beyond that included in traditional accounting performance measures, EPS, ROI, and ROE"

In order to test the first hypothesis they developed five models were developed where annual stock returns serve as the dependent variable and EPS and its change for each consecutive year (ΔEPS), ROI and the corresponding change(ΔROI), ROE and the corresponding change (ΔROE) ,EVA and the corresponding change (ΔEVA) and SVA and the corresponding change (ΔSVA), served as independent variables:

Model (1): $Returns = a_0 + a_1 EPS/P_{p-1} + a_2 \Delta EPS/P_{p-1} + u_1$ (20)

Model (2): $Returns = b_0 + b_1 ROI + b_2 \Delta ROI + u_2$ (21)

Model (3): $Returns = c_0 + c_1 ROE + c_2 \Delta ROE + u_3$ (22)

Model (4): $Returns = d_0 + d_1 EVA/P_{p-1} + d_2 \Delta EVA/P_{p-1} + u_4$ (23)

where EVA is the economic value added of the sample's companies at time *p*, and ΔEVA is the difference that occurs in EVA from period *p-1* to *p*.

Model (5): $Returns = e_0 + e_1 SVA/P_{p-1} + u_5$ (24)

Where SVA is shareholder Value added and ΔSVA is the difference that occurs in SVA from period *p-1* to *p*.

Maditinos Sevic and Theriou (2005,2006,2007) based on Easton and Harris (1991) model replaced the earnings and earnings' change with the performance measures corresponding to each examined model. These models investigated which performance measure is more superior in value relevance with stock returns.

Incremental information content test were employed so as to examine the second hypothesis of this study. Using this approach the information that adds a measure when it is combined with another one (pairwise combination) is revealed. A combination of one accounting measure with one value based measure was incorporated in the model. The models they structured were as followed:

Model (11): $Returns = l_0 + a_1 EPS/P_{p-1} + a_2 \Delta EPS/P_{p-1} + d_1 EVA/P_{p-1} + d_2 \Delta EVA/P_{p-1} + u_{11}$ (25)

Model (12): $Returns = m_0 + a_1 EPS/P_{p-1} + a_2 \Delta EPS/P_{p-1} + e_1 SVA/P_{p-1} + u_{12}$ (26)

Model (13): $Returns = n_0 + b_1 ROI + b_2 \Delta ROI + d_1 EVA/P_{p-1} + d_2 \Delta EVA/P_{p-1} + u_{13}$ (27)

Model (14): $Returns = o_0 + b_1 ROI + b_2 \Delta ROI + e_1 SVA/P_{p-1} + u_{14}$ (28)

Model (15): $Returns = p_0 + c_1 ROE + c_2 \Delta ROE + d_1 EVA/P_{p-1} + d_2 \Delta EVA/P_{p-1} + u_{15}$ (29)

Model (16): *Returns* $= q_0 + c_1$ ROE $+ c_2$ ΔROE $+ e_1$ SVA/$P_{p-1}+ u_{16}$ (30)

Kyriazis and Anastassis (2007) investigated the relative explanatory power of EVA with respect to stock returns and firms' market value, compared to established accounting variables in the Greek market. Their sample consisted by the financial statements and adjusted stock prices of 121 non-financial publicly traded Greek firms for a period of eight years; from 1996 to 2003.Their first hypothesis investigated whether the information content of EVA is higher than that of net income, operating income and residual income.

Hypothesis 1: "EVA explains the variability of stock returns better than net income, operating income and residual income".

In order to explore hypothesis one, the R^2 of the pooled regressions with independent variables, were compared with each one of the profitability measures under examination.

Hypothesis 2: "EVA provides information content, useful in explaining the variability of stock returns, which is not incorporated in net income, operating income and residual."

The second hypothesis is almost identical with question two of Biddle, Bowen and Wallace (1997) study. More specific, they tested the information added by EVA. Particularly, they test whether EVA has any incremental information content over net income, operating income and residual income. They have decomposed EVA into the net income(NI), the operating income adjustments(OIADJ), the capital charge(CAPCHG) and the Stern Stewart adjustments[STSTEWADJ(adjustments to profits– WACC $*t$ adjustments to invested capital$t-1$)] so as to test the incremental information content of EVA.The equation for EVA is the following: EVA = NI + OIADJ – CAPCHG + STSTEWADJ (31)

Present Study

The present study has been significantly affected by the studies presented earlier concerning both the hypotheses tests and the methodology. Two hypotheses were developed. The first one examines which measure (EPS, ROI, ROE or EVA) best explains stock market returns in the Greek market for the 1996-2005 period. The second hypothesis examines whether EVA adds information in explaining stock market returns when it is combined with another measure (EPS, ROI or ROE) in a regression model. The hypotheses are the following:

H1: EVA outperforms Earnings per Share/Return on Income/Return on Equity

H2: EVA adds information on Earnings per Share/Return on Income/Return On Equity

Relative information content approach has been employed to test the first hypothesis while incremental information content was used to test the second one.

Relative Information Content Tests

In order to explore whether EVA outperforms EPS, ROI, ROE the following equations are used:

Model (1): *Returns* = $a_0 + a_1 \, EPS/P_{p-1} + a_2 \, \Delta EPS/P_{p-1} + \hat{u}_1$ (32)

Model (2): *Returns* = $b_0 + b_1 \, ROI + b_2 \, \Delta ROI + \hat{u}_2$ (33)

Model (3): *Returns* = $c_0 + c_1 \, ROE + c_2 \, \Delta ROE + \hat{u}_3$ (34)

Model (4): *Returns* = $d_0 + d_1 EVA/P_{p-1} + d_2 \, \Delta EVA/P_{p-1} + \hat{u}_4$ (35)

where ΔEPS is the change in EPS calculated by the fraction EPS_p /EPS_{p-1} where p stands for the present period and p-1 for the previous period. Correspondingly ΔROI, ΔROE, ΔEVA are calculated

2. Incremental Information Content Tests

The second hypothesis of our research examines how significant is the information added by EVA when it is combined with ROE, ROI or EPS in explaining the stock returns. We apply incremental information content tests in order to examine the second hypothesis as Chen and Dodd, 2001; Maditinos, Sevic and Theriou, 2005;2006;2007 applied to their studies. More specifically, model number five examines whether EVA levels combined with EPS levels can explain stock returns better than EPS alone. Under the same perception, model six and seven were developed so as to realise whether EVA level combined to ROI level or to ROE level as pair can provide better information for stock returns.

Model (5) : Returns = $r_0 + a_1 \, EPS/P_{p-1} + a_2 \, \Delta EPS/P_{p-1} + d_1 \, EVA/P_{p-1} + d_2 \, \Delta EVA/P_{p-1}$ (36)

Model (6) : Returns = $s_0 + b_1 \, ROI + b_2 \, \Delta ROI + d_1 \, EVA/P_{p-1} + d_2 \, \Delta EVA/P_{p-1}$ (37)

Model (7) : Returns = $p_0 + c_1 \, ROE + c_2 \, \Delta ROE + d_1 \, EVA/P_{p-1} + d_2 \, \Delta EVA/P_{p-1}$ (38)

where, for all equations:

$Returns_p$ are every p year stock returns extended nine months before the present fiscal year end to three months after the fiscal year end of each share for each year EPS is the earnings per share of every company at time *p*. The extra three month period is needed so as to calculate the risk (beta). Beta is necessary for the calculation of WACC which is incorporated EVA calculating formula.ΔEPS is the difference that occurs in the earnings per share of the company change during period *p-1* to *p*, P_{p-1} is the shares' market value on their first trading day, EVA is the companies' economic value added and ΔEVA is the increase or decrease of EVA's level from period *p-1* to *p*.

Empirical results on performance measures

1. Introduction

The main objective of the present study, as already cited in the previous chapters, is to examine which measure EPS, ROI, ROE or EVA explains best the stock market returns. In order to explore it, two hypothesis were formed (hypothesis 1 and 2) and seven equations (models) were developed [models (1) to (7)]. Moreover, two approaches were adopted so as to examine the two research questions. Relative information content approach is adopted to test models (1) to (4), while incremental information content approach is employed to test the second hypothesis, through models (5) to (7). The first hypothesis examines which measure best explains stock market returns. The second question examines which is the best pairwise combination of performance measures that provides greater explanatory power concerning stock market returns. In the following sections we analyse the sample and the data collection, the variable definitions and calculations, the empirical results of both approaches adopted, and finally, we conclude the chapter.

2. The Sample

After ten year (1996-2005) studying and monitoring 182 companies listed in Athens Stock Exchange, we come up with a 1,433 year observations. Table 4-1 shows the variation of companies' participation/observations from year to year.

Table 1**:** Companies' Participation/Observations through 1996 to 2005

Year	Companies' participation / observations
1996	80
1997	106
1998	120
1999	135
2000	144
2001	163
2002	164
2003	167
2004	172
2005	182
Total	1,433

The sample resulted after daily recording for ten years the closing prices of Athens Stock Exchange Market's stocks during the period 1994 to 2005.Starting point for the sample selection was January 1994 in order to incorporate into the

sample two years before the starting point of stock trading time. This means that a stocks that is incorporated in the sample of 1996 is definitely traded in the Athens Stock Exchange from January 1994.This extra period is needed so as to calculate the risk (beta) of each share for each year.

From year 1996 to 2005 were officially recorded the daily closing prices for each stock, the daily Greek General Index of stock prices and the risk free interest rate, the cost of equity, the equity capital, the debt and the cost of debt of each company. The data of our sample was derived from different sources of Athens Stock Exchange or direct contact with the concerned companies. Our sample is consisted by stocks/companies with sufficient public data. (balance sheet and income statement data).

3. Empirical Results / Relative Information Content Approach

Our results illustrate that EPS (R^2 = 0.029) explains better the stock returns than EVA (R^2 = 0.011). Furthermore, regressions models one (1) and four (4) are significant at one per cent level, while model two (2) significant at five per cent. Model three (3) is not statistically significant (Table 2). Thus, our results are consistent with relevant studies. Particularly, Biddle, Bowen and Wallace (1997) study revealed that Earnings Before Extraordinary Items (EBEI) (R^2 = 0.0904) provide more information than Residual Income (R^2 = 0.0624) and than EVA (R^2 = 0.0507). Worthington and West (2001) found similar results, Earnings Before Extraordinary Items (R^2 = 0.2367), Residual Income (R^2 = 0.1929) and EVA (R^2 = 0.1429).On the other hand, Chen and Dodd (2001) found that Operating Income (R^2 = 0.062) explains the stock returns better than Residual Income (R^2 = 0.050) and than EVA (R^2 = 0.023). Maditinos, Sevic and Theriou (2005,2006,2007) resulted that EPS (R^2 = 1.9) has greater explanatory power than EVA (R^2 = 0.9). Kyriazis and Anastassis presented the highest R^2 in the regression model of Operating Income (R^2= 16.85), followed by Net Income (R^2 =9.31), while Residual Income (R^2= 7.91) and EVA (R^2 = 6.89) appear to have the smallest explanatory power concerning abnormal stock returns.

Table 2: R^2 Outcome from the Five Regression Models (1) to (4)

All Years	Model (1) EPS	Model (4) EVA	Model (2) ROI	Model (3) ROE
R^2	**0.029**	**0.011**	**0.005**	**0.001**
F	(21.009)***	(7.653)***	(3.901)*	(0.867)
Significance	[0.000]	[0.000]	[0.020]	[0.420]

Table 3 presents the regression analysis of model one. Starting point is to check whether this model is suitable for examining the correlation between stock returns and the EPS. It is monitored that the significance of the model is at the level of one per cent (F=21.009 and sign.= 0.000).This result hints that model one is suitable for examining the correlation between stock returns and the EPS. The coefficients' significance level is at one per cent .Their significance level proves to exist a correlation between EPS and EPS changes with stock market returns.

Even though EPS proved to be correlated to stock returns with an R^2 equally to 0.029, it is realised that EPS does not fully explain stock market returns.

Table 3: Relative Information Content Approach
Regressions of Annual Stock Returns to Earnings Levels and Earnings Changes
Model (1) $Return_p = a_0 + a_1 EPS/P_{p-1} + a_2 \Delta EPS/P_{p-1} + u_{1p}$

All Years	a_0	a_1	a_2	R^2	**F**	**Observations**
Coefficients.	-0.117	0.170	0.011	**0.029**		1426
T statistics	(-6.689)**	(5.648)***	(3.086)**		(21.009)***	
Significance.	[0.000]	[0.000]	[0.002]		[0.000]	

Model (1) $Return_p = a_0 + a_1 EPS/P_{p-1} + a_2 \Delta EPS/P_{p-1} + u_{1p}$

Table (table 4) presents ROI levels and ROI changes after the regression analysis. It is observed in all years' sample, model's is significance level is at the 0.1 (F=3.901 and sign. = 0.020).This level reveals that model two is not the most suitable to test the relationship between ROI and stock returns .Moreover, the coefficient b_2 significance is 0.01 revealing that changes in ROI are also low correlated to stock market returns.

Table 4: Relative Information Content Approach

Regressions of Annual Stock Returns to ROI Levels and ROI Changes
Model (2) $Return_p = b_0 + b_1 ROI + b_2 \Delta ROI + u_{2p}$

All Years	b_0	b_1	b_2	R^2	**F**	**Observations**
Coeficients.	-0.106	0.013	0.004	**0.005**		1262
T statistics	(-5.995)***	(0.661)	(2.603)***		(3.901)*	
Significance.	[0.000]	[0.509]	[0.009]		[0.020]	

Model (2) $Return_p = b_0 + b_1 ROI + b_2 \Delta ROI + u_{2p}$

The outcome from year to year regression analysis which is presented in Appendix 1 is not so illuminative. Only four of them (years 1997, 1998, 2004, and 2005) are significant at the 0.01 level. At this point we cannot support that model three is the most suitable to test a possible correlation between ROI and stock returns for all the years of our sample. It is important to underline the relatively low R^2s in the annual regressions. The greatest reported R^2s are in years 2004 and 2005 and they are 0.106 and 0.094 respectively. Moreover the t-statistics of the coefficients are quite low in annual revealing that there is not a relation between ROI and stock returns.

Table 5 provides the results of the regression model three for ROE levels and ROE changes. Model three as well as model two does not proved to be suitable for monitoring a possible correlation between ROE and stock returns for Greek capital market. Moreover, the coefficients c_1 and c_2 are also statistically

insignificant revealing that no strong correlation exists between ROE and stock market returns, at least for our sample. Concerning the outcome from the yearly regression analysis (see Appendix I) we conclude that only four out of the ten (years 1994, 1995, 1996 and 1997) are considered significant (level 0.01). As well as for all year analysis the coefficients in the yearly regression are also statistically insignificant revealing once again that there is no noteworthy correlation between ROE and stock returns. Compared to ROI, the reported R^2s are higher but still lower than those of EPS. Significant high R^2s are those of the years 1994, 1995, 1996 and 1997, which are 0.140, 0.122, 0.119 and 0.091 respectively.

Table 5: Relative Information Content Approach

All Years	c_0	c_1	c_2	R^2	F	**Observations**
Coeficients.	-0.102	0.004	-0.001	**0.001**		1427
T statistics	(-5.758)***	(0.780)	(-1.068)		(0.867)	
Significance.	[0.000]	[0.436]	[0.286]		[0.420]	

Model (3) $Returns_p = c_0 + c_1 ROE + c_2 \Delta ROE + u_{3p}$

Table 6 presents EVA levels and EVA changes regression analysis results. Model four is proved to be a suitable (presents significance at the one per cent level) one in order to record a probable correlation between EVA and stock returns .Moreover, we realise that change in EVA is not associated with stock returns while EVA is .Since R^2 in most years is satisfactory high proves that EVA is correlated to stock returns. Particularly, R^2 for year 2005 reaches 4.4 per cent, while for year 2004 11.1 per cent. Generally the R^2 for model four fluctuates between 1.6 per cent to 11.1 per cent. Comparing the reported R^2s of EVA is higher than ROI's and ROE's but still lower than those of EPS.

Table 6 Regressions of Annual Stock Returns to EVA Levels and EVA Changes

All Years	d_0	d_1	d_2	R^2	F	**Observations**
Coefficients.	-0.106	-0.069	0.000	**0.011**		1426
T statistics	(-6.046)**	(-3.687)***	(1.340)		(7.653)***	
Significance.	[0.000]	[0.000]	[0.180]		[0.000]	

Model (4) $Returns_t = d_0 + d_1 EVA/P_{t-1} + d_2 \Delta EVA/P_{t-1} + u_{4t}$

After thorough examination of the four models we can conclude that EPS has the greater explanatory power of all measures tested in this study in explaining stock returns. However, according to the reported F statistics, the R^2s and the coefficients of EVA model, we can support that EVA is an acceptable measure for returns variation although it has less explanatory power compared to EPS. The outcome of the present study (that EPS outperforms EVA) in the context of the Greek stock market agrees with the reported outcome in terms of international markets. (see: Biddle, Bowen and Wallace, 1997, Worthington and West , 2001, Chen and Dodd ,2001).Moreover, it is consistent with the two

studies conducted in Greek stock market.(see: Maditinos, Sevic and Theriou, 2005; 2006; 2007, Kyriazis and Anastassis, 2007).

4. Empirical Results / Pairwise Test

In order to assess the information added by EVA, models 5,6 and 7 were formed. EVA is combined pairwise with each one of the traditional accounting measures (EPS, ROI and ROE).

From this regression, model five (5) produced the highest R^2 (0.076). The significance level of this model is one per cent. In other words combining EVA and EPS can explain the variation of stock returns in the Greek stock market effectively. Moreover, combining EVA with EPS provided us with an increase in the EPS explanatory power. This fact follows Chen and Dodd (1997, 2001) and Worthington and West's (2001) findings for international markets as well as Maditinos, Sevic and Theriou's (2005) for the Greek market.

As far as models five and six are concerned, they produced low R^2 scores (lower than 0.023). Table 7 contains a summary of these results, sorting the examined models according to the R^2 scores. The low R^2 scores indicated that the EVA with ROI and/or ROE combinations did not produce a satisfactory explanation of variation of stock returns. However, incorporating EVA in the ROI model produced an increase in its explanatory power from 0.5 per cent to 2.3 per cent.

Table 7: Summary Results of all models

All Years	**Model (5)**	**Model (6)**	**Model (7)**
R^2	**0.076**	**0.023**	**0.011**
F	(21.009)***	(8.558)***	(4.084)*
Significance	[0.000]	[0.000]	[0.003]

Concluding Remarks

The present study's main objective is to provide a comprehensive analysis about the explanatory power of the traditional accounting performance measures EPS, ROI and ROE as well as for one value-based measure, EVA in explaining stock market returns in the framework of Athens Stock Exchange (ASE). To reach this objective we developed several models, using stock returns as dependent variable and performance measures as independent variables.

Relative information content approach is employed to test the first hypothesis which examines if EPS, ROI, ROE and EVA are correlated to stock returns. This test revealed that EPS are highly associated with stock returns and outperforms the other measures (ROI, ROE and EVA) in explaining stock market returns. More specifically, the first regression model that compares the value relevance of EPS with stock market returns produces an R^2 (for all years) of 2.9 per cent. The regression between stock market returns with ROI produces an R^2 of 0.5 per cent, quite lower than the previous model. The regression between stock returns with ROE provided an R^2 of 0.1 per cent which is lower than both two

previous models. ROI explains only 0.5 per cent of stock market returns, while ROE's score is 0.1 per cent. On the other hand, the value based model explains the 1.1 per cent of stock market returns since the regression of EVA with stock returns produces an R^2 of 1.1 per cent. The results of the present study are consistent with the studies of Biddle, Bowen and Wallace (1997), Chen and Dodd (2001), Worthington and West (2001), Maditinos, Sevic and Theriou (2005; 2006; 2007) and Anastassis and Kyriazis (2007).

The second hypothesis was developed in order to decide the best pairwise combination of performance measures providing the greater explanatory power of stock market returns. Incremental information content approach revealed that the regression of EPS with EVA gives a substantially greater R^2 of 7.6 per cent that the 2.9 per cent of the regression without EVA. This significant difference of R^2 indicates the value relevance in explaining stock market returns of the new information contributed by EVA. Moreover, the regression of ROI with EVA produces a relatively increased R^2 of 2.3 per cent rather than the 0.5 of the regression without EVA. This difference also suggests that EVA adds information to the model which uses ROI for the explanation of stock market returns. Additionally, the regression of ROE with EVA shows an increase of the value relevance in explaining stock returns from 0.1 to 0.11 per cent.

The incapability of traditional measures and patterns to explain stock market returns stimulated the behavioral finance research. "Behavioral finance is the study of how psychology affects financial decision making and financial markets" (Shefrin, 2001). More specific expectation, beliefs, preferences are considered determinants that affect investors' behavior and choices. ". *Behavioral finance uses models in which some agents are not fully rational, either because of preferences or because of mistaken beliefs or expectations*" (Ritter, 2003). A number of various more determinants can be explored in this new field since investors are having variable investment behavior. Behavioural finance clarifies the way investors act and think. The stock market is not just figures for investors it is also "expectations", "hunch", "noise", "inside information" and much more.
Behavioral finance contributes in revealing the missing factors that could provide a more complete and sufficient analysis about the explanation of the stock market returns. Also accounting convergence eliminates accounting distortions, providing comparability and transparency to all investors. Therefore, there is a broad area of investigation about the role of both qualitative and quantitative characteristics in investment decisions. The combination of both qualitative and quantitative characteristics provides more clarity and completeness in understanding stock market returns.

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