ECONOMIC SPREAD AND MARKET VALUE
THE CASE OF LISTED COMPANIES IN GREECE

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ABSTRACT

The present article aims to evaluate the relationship between economic spread and market value for all firms, except financials, listed in the Athens Stock Exchange over the period 2000 – 2004. Specifically, this relationship was examined both on a whole market and on an industry basis. The sample firms were classified into six industries, namely consumer cyclical, basic materials, consumer non-cyclical, industrial, technology, and communications.

In doing so a regression analysis was performed having economic spread as the independent variable and the ratio of market value over the invested capital as the dependent variable. Economic spread is defined as the difference between the return on invested capital and the weighted average cost of capital and indicates the net return a firm achieves for the capital it uses in its operations. Market value of a firm is defined as the sum of the market value of equity plus the market value of debt.

Economic theory suggests that firms earning a positive economic spread trade at a ratio of market value over invested capital in excess of one. Surveying the economic spread may be interesting; however, the more pressing issue is whether or not this spread is reflected in the stock price value. Furthermore, the Economic Value Added Model suggests firms that have a positive economic spread will have positive economic value added (economic spread times invested capital) and thus create wealth.

The results for the whole market showed that there is a statistically significant positive relationship between economic spread and market value in 66,67% of the cases. On the industry basis the results showed a positive relationship between the two variables in all sectors except the technology one.

Key words

Economic Value Added, Return on Invested Capital, Weighted Average Cost of Capital, Net Operating Profit after Taxes, Athens Stock Exchange, Regression Analysis

JEL Classification: G12; G30; G39

1. Introduction

It is widely accepted in finance theory that the primary objective of management is to maximize the value of the firm. This is achieved by investing in projects that have a return greater than the minimum acceptable hurdle rate (investment decision), choosing a financing scheme that minimizes the hurdle rate and matches the duration of the assets being financed (financing decision), and returning excess cash to stockholders when there are not enough investments that earn the hurdle rate (dividend decision), (Damodaran 2001).

In the financial literature internationally, through the years, a number of measures have been developed that are used to calculate the ability of a firm to create value. Such measures are: market value added (Stewart III 1994, Lehn and Makhija 1996, Cary et al 2004), total shareholder return (Stelter et al 2001), cash flow return on investment (Rappaport 1981 and 1997), cash value added (Ottosson 1996), wealth added index (Prasunas 2002 and Stern 2003), economic value added (Stewart 1994) and refined economic value added (Bacidore et al 1997).

From the above measures the one that has received great attention in the academic financial literature internationally is economic value added (EVA[1]). The EVA measure was developed by Stern Stewart & Company and is based on the comparison between the profit a firm creates and the capital charge it has incurred for creating this profit. In order for a firm to have positive EVA it must have a positive economic spread (the difference between the return on capital invested and the weighted average cost of capital).

Stern Stewart & Company have been advocating the use of EVA claiming that it has revitalized the financial performance of several U.S. companies such as Coca-Cola, CSX, SPX Corp, GE, and Chrysler (Tully 1993 and Walbert 1994). They argue that EVA drives stock prices higher, creates wealth and explains changes in shareholder wealth better than any other performance measure (Stewart, 1994).

A large number of companies have adopted EVA and are using it as an internal and/or external performance measure, as an analytical tool to make portfolio selection decisions, and as a management discipline (Teitelbaum 1997). A survey performed by the Institute of Management Accountants (IMA) in 1996 showed that 35% of the sample firms are currently using EVA and 45% expect to use EVA in the future. There are number of academic articles in the finance literature internationally showing the advantages of the EVA over other measures of value creation along with success stories of firms that have adopted EVA for measuring management's performance (Blair 1996; Byrne 1994; Carr 1996; Copeland and Meenan 1994; Gressle 1996; Tully 1993; Stern 1990; Rice 1996; Pallerito 1997; Martin 1996).

Furthermore, the relation between EVA and market values has attracted a great deal of attention in the finance literature internationally. Abate, Grant and Stewart III (2004) show that EVA can be a valuable investing tool to identify good companies with good stocks. Garvey and Milbourn (2000) used a relatively standard principal-agent model to ascertain the relative value of earnings and EVA based on two distinct uses of the stock price. They found that a

[1] EVA is a registered trademark of Stern Stewart & Co

simple correlation between EVA or earnings and stock returns existed and that EVA could be used as a reasonably reliable guide to the firm value.

Biddle, Bowen, and Wallace (1997) concluded that EVA might be an effective tool for internal decision-making, performance measurement and incentive compensation. Their evidence suggests that EVA is more highly associated with stock returns and firm values than accrual earnings generally. Furthermore, they suggest that EVA components only marginally add to information content beyond earnings.

Ferguson and Leistikow (1998) used event study methodology to investigate whether firms adopting an EVA system lead to better stock performance (i.e., greater profitability). The results showed that there is insufficient evidence to conclude whether adopting EVA improves stock performance. Also, firms that adopted EVA appeared to have above average profitability relative to their peers both before and after the adoption of EVA. Furthermore, there is some evidence that EVA adopters experienced increased profitability relative to their peers following adoption.

On the other hand, Paulo (2002) argues that EVA is just another piece of accounting information, and— like other accounting information—it has become less relevant to stock returns and stock price changes. Farsio, Degel, and Degner (2000) studied the relationship between EVA and stock returns using as a sample constituent companies of the S&P 500 index and the Dow Jones Industrial Average index. They concluded that EVA is not a good indicator of stock performance and represents just one of many available measures, explaining only a fraction of the variability in stock return fluctuation.

Finally, Chen and Todd (2001) examined the value relevance of three profitability measures: operating income, residual income, and EVA. Based on a formal valuation model of stock returns they found that all three profitability measures have information content in terms of value-relevance. However, contrary to the claim of EVA advocates, their evidence does not support the assertion that EVA is the best measure for valuation purpose. In contrast, the operating income regressions tend to show higher R-squares than the residual income regressions, which in turn have higher R-squares than the EVA regressions, although the differences are statistically insignificant.

The objective of the present article is to examine further the effect that EVA has on market values, or otherwise whether the ability of firms to create value, in the context of the EVA model, has a positive effect on their market price. Specifically, the relationship between economic spread and market value is examined, for all the firms, except financials, listed in the Athens Stock Exchange over the period 2000 – 2004, both on a whole market and on an industry basis.

2. Methodology

The EVA model is based on the comparison between the profit a firm creates and the capital charge it has incurred for creating this profit. If a profit is generated that exceeds the charges of debt and equity, as well as covering all other expenses, then value is created; if only the charges of capital is generated, then value is merely preserved; if less than the charges of capital is generated, then value is destroyed.

The profit a firm creates is measured, within the framework of the EVA model, by the net operating profit after tax (NOPAT). Thus, the EVA measure can be calculated as:

$$EVA = NOPAT - Capital\ Charges \quad (1)$$

The EVA is in essence an estimate of the residual income that a firm creates, since it takes into account not only the NOPAT the firm produces but also the capital charges, it has incurred in order to produce this profit. Since these charges are the product of the invested capital times the weighted average cost of capital (WACC), the EVA can also be defined as (Ehrbar and Stewart 1999):

$$EVA = NOPAT - (Invested\ Capital \times WACC) \quad (2)$$

The NOPAT is a function of earnings before interest payments and taxes (EBIT) and the tax rate of the firm, that is (Young and O' Byrne 2000):

$$NOPAT = EBIT \times (1 - Tax\ Rate) \quad (3)$$

Now, if we define the return on invested capital (ROIC) as the ratio of the NOPAT over the invested capital then the EVA can be redefined as follows:

$$EVA = Invested\ Capital \times (ROIC - WACC) \quad (4)$$

The invested capital refers to the sum of the net operating capital and the operating long-term assets and is calculated as follows (Brigham and Ehrhardt 2002):

$$\begin{aligned} Invested\ Capital = {} & Cash + Accounts\ Receivable + Inventories + \\ & Operating\ Long\ Term\ Assets) - (Accounts\ Payable \\ & - Accruals) \end{aligned} \quad (5)$$

The WACC is the average of equity and debt cost of a firm weighted by the proportion of equity and debt in the total capital of the firm. The cost of equity was calculated by applying the Capital Asset Pricing Model where the yield of the ten-year Greek Government Bond was used as the risk free interest rate (r_f). Regression analysis was performed between the weekly returns of each stock and the according returns of the General Index of the Athens Stock Exchange (ASE) for the last two years in order to calculate the beta coefficient for each firm (b). As a proxy of the market portfolio the General Index of the ASE was used. Denoting market return as r_m, the cost of equity is equal to (Damodaran 2002):

$$Cost\ of\ Equity = r_f + b\ (r_m - r_f) \quad (6)$$

The before-tax cost of debt, K_{db}, is the average interest rate on borrowed funds that is annual interest expenses over principal. The after-tax cost of debt, K_d, is equal to the before-tax cost of debt times (1 – tax rate).

Economic spread is the difference between ROIC and the WACC. This difference, which is the heart of the EVA model, is actually the net return the firm achieves for the capital it uses in its operations. Companies that have a positive economic spread will have positive EVA and thus create wealth, while companies that have a WACC larger than the ROIC (negative economic spread) will eventually destroy wealth.

The advantage of the economic spread as a measure of wealth creation is that it elegantly incorporates balance sheet data into an adjusted income statement metric. Furthermore, economic spread is justified by financial theory and is consistent with valuation measures. Finally, economic spread summarizes in a single statistic the value created above and beyond all financial obligations, since it recognizes that capital is not free through the deduction of the capital charge from the profit a firm creates (Harper 2005).

The primary objective of management is to maximize the value of the firm. However, it is quite interesting to explore whether the ability of a firm to create value, within the context of economic spread, is reflected in its stock price. In order to examine whether economic spread is related with stock price valuation the following regression model is applied:

$$FV_{i,t} / IC_{i,t} = a + b \cdot ES_{i,t} + \varepsilon_{i,t} \quad (7)$$

where,

FV_i = Firm Value of i_{th} company in period t
IC_i = Invested Capital of i_{th} company in period t
ES_i = Economic Spread of i_{th} company in period t

The firm value of a company, that is the sum of market capitalization and debt, should be greater than its invested capital when it has positive economic spread, which means it is creating value. The higher the economic spread of a company the higher the ratio of firm value over invested capital.

The sample consists of all the companies that were listed in the Athens Stock Exchange, excluding financial firms, from 2000 to 2004 (Athens Stock Exchange 2000, 2001, 2002, 2003, 2004). Bloomberg was used to collect the market prices of the sample firms. Balance sheets and income statements were used to collect all the data needed to calculate the economic spread and the invested capital for each firm in every of the last five years.

The official industry classification of the Athens Stock Exchange consists of 17 industries, resulting in each industry having only a few firms. Thus, it was decided that the industry classification system provided by Bloomberg would be followed, which consists of nine sectors (Communications, Utilities, Technology, Industrial, Finance, Energy, Consumer Non-Cyclical, Basis Materials and Consumer Cyclical). The sample firms were classified into these six industries shown in Table 1.

3. Empirical Testing

The regression model was applied both for all years under consideration and for each year separately either on a whole market or an industry basis. Thus, for the whole market and for each sector five regressions were performed. Each regression equation was tested for the statistical significance of its variables and the Durbin-Watson test was used in order to examine if the data were serially correlated.

Results from applying the regression model for all sectors are disclosed in Table 2. The economic spread is positively related to the ratio of value over invested capital of a firm either for all years or for each year of the research separately, while the results are statistically significant in four out of six cases. However, the coefficient of determination appears to have a satisfactory explanatory power only in 2004.

In the consumer cyclical sector the regression results indicate that the there is a positive statistical significant relation between the economic spread and the ratio of value over invested capital of a firm either for all years or for each year of the research separately. Moreover, the overall fit of the estimated equations, as measured by the coefficient of determination is satisfactory in four out of six cases (Table 3).

In the case of the industrial sector, although the results indicate that the there is a positive relation between the independent and dependent variable, this relation is statistical significant in only one case. Moreover, the overall fit of the estimated equations, as measured by the coefficient of determination is poor in all six cases (Table 4).

In the consumer non-cyclical sector the economic spread is positively related to the ratio of value over invested capital of a firm for all years or for each year of the research separately, while the results are statistically significant in three out of six cases. However, the coefficient of determination is satisfactory only in 2003 and 2004 (Table 5).

In the basic materials sector the results indicate that the there is a positive relation between the economic spread and the ratio of value over invested capital of firm value either for all years or for each year of the research separately, while there are statistical significant in only two out of six cases. Moreover, the coefficient of determination is quite satisfactory in only two out of six cases (Table 6).

In the technology sector the results are statistically significant only in one case. Furthermore, the coefficient of determination is satisfactory in only one out of six cases (Table 7).

Finally, in the communication sector the results are statistically significant only in one case. Furthermore, the coefficient of determination is poor in all six cases (Table 8).

4. Conclusions

The objective of the present article was to examine the relationship between economic spread and the market value of the firm. In doing so, a regression model was applied were the dependent variable is the ratio of value over invested capital of a firm and the independent variable is the economic spread (the difference between ROIC and WACC). The research sample consisted of all firms that were listed in, the Athens Stock Exchange, excluding financial firms, over the period 2000 – 2004, both on a whole market and on an industry basis.

On a whole market basis the results showed that there is a positive relationship between economic spread and the market value of the firm in all

cases, which is also statistical significant in four out of six cases (Table 9). Thus, we may conclude that there is a strong indication that the ability of firms to have positive economic spread, that is to create wealth, is reflected on the market price of their stock.

Turning to the sector basis the results showed that the economic spread and the market value of the firm are positively correlated on all sectors except the technology sector, were the beta coefficient of the regression model was negative in 66,67% of the cases.

However, the above results are statistical significant in all cases in the consumer cyclical sector and in 50% of the cases in the consumer non-cyclical sector. Thus, it can be concluded that ability of consumer sector firms, either cyclical or non-cyclical, to have positive economic spread, that is to produce wealth on the EVA context, is reflected on the market price of their stock.

APPENDIX

Table 1
Industry Distribution of Sample Firms

Industry	Number of Firms				
	2000	2001	2002	2003	2004
Consumer Cyclical	67	68	68	68	68
Communication	15	16	16	16	16
Industrial	65	65	65	65	65
Consumer Non Cyclical	55	55	55	55	55
Basic Materials	26	26	26	26	26
Technology	19	20	20	20	20
TOTAL					

Table 2
Regression Model for All Sectors

	α	β	R^2
All years	8,952 *(4,488)*	69,684 *(4,558)*	1,79%
2000	30,546 *(3,115)*	114,86 *(2,046) ****	2,01%
2001	8,777 *(1,875)***	126,3 *(3,034)*	4,02%
2002	1,711 *(0,109)**	4,508 *(0,982)**	8,46%
2003	1,77 *(20,612)*	6,33 *(8,333)*	22,44%
2004	1,399 *(18,018)*	9,498 *(16,504)*	52,85%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 3
Regression Model for Consumer Cyclical Sector

	α	β	R^2
All years	2,212 *(24,994)*	7,943 *(15,243)*	42,07%
2000	2,765 *(12,010)*	8,624 *(3,422)*	16,56%
2001	2,201 *(12,953)*	1,962 *(2,004)*	6,08%
2002	2,013 *(12,935)*	3,027 *(6,262)*	38,37%
2003	2,104 *(14,089)*	8,321 *(9,385)*	57,92%
2004	1,792 *(9,332)*	11,76 *(13,642)*	74,41%

t-stats in parentheses

Table 4
Regression Model for Industrial Sector

	α	β	R^2
All years	1,589 *(18498)*	5,284 *(4,740)*	7,12%
2000	2,27 *(9,067)*	8,256 *(2,483)****	10,60%
2001	1,97 *(7,847)*	9,381 *(2,836)*	12,36%
2002	1,278 *(10,818)*	3,866 *(2,558)****	10,46%
2003	1,436 *(8,800)*	2,377 *(1,066)**	1,89%
2004	1,057 *(11,167)*	2,587 *(2,243)****	7,62%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 5
Regression Model for Consumer Non-Cyclical Sector

	A	β	R^2
All years	1,764 *(20,696)*	4,754 *(4,706)*	8,20%
2000	3,078 *(8,962)*	3,498 *(1,370)**	4,18%
2001	2,057 *(11,164)*	7,358 *(2,222)****	10,09%
2002	1,398 *(15,238)*	3,422 *(2,800)*	13,80%
2003	1,447 *(21,389)*	3,809 *(4,308)*	56,30%
2004	1,08 *(16,841)*	2,38 *(2,366)****	59,72%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 6
Regression Model for Basic Materials Sector

	α	β	R^2
All years	1,556 *(20,971)*	5,436 *(4,620)*	14,89%
2000	2,217 *(11,188)*	2,949 *(0,856)**	3,22%
2001	1,686 *(13,188)*	4,752 *(2,203)***	18,08%
2002	1,195 *(11,236)*	3,276 *(1,856)***	53,54%
2003	1,454 *(9,488)*	6,108 *(2,951)*	26,63%
2004	1,187 *(18,834)*	5,153 *(2,253)****	57,45%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 7
Regression Model for Technology Sector

	α	β	R^2
All years	5,966 *(4,300)*	59,95 *(5,429)*	27,43%
2000	6,257 *(0,611)*	87,38 *(2,269)****	36,39%
2001	12,12 *(2,642)***	-11,67 *(-0,201)**	0,34%
2002	3,83 *(3,191)*	-2,531 *(-0,179)**	0,23%
2003	2,269 *(3,726)*	-6,115 *(-0,601)**	2,08%
2004	1,291 *(3,749)*	-1,512 *(-0,456)**	1,14%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 8
Regression Model for Communications Sector

	α	β	R^2
All years	2,359 *(11,175)*	5,555 *(3,205)*	12,64%
2000	3,984 *(4,922)*	5,159 *(0,466)**	2,13%
2001	2,44 *(4,602)*	4,602 *(0,855)**	6,24%
2002	1,848 *(7,641)*	2,713 *(1,534)**	14,39%
2003	2,329 *(5,185)*	5,401 *(1,821)***	19,16%
2004	2,144 *(3,678)*	8,269 *(1,688)**	16,91%

t-stats in parentheses
**Not significant at the 90% or higher confidence level*
***Not significant at the 95% of higher confidence level*
****Not significant at the 99% confidence level*

Table 9
Summary of Regression Model Results

	Positive β Coefficient Cases in %	Statistical Significant Cases in %	Satisfactory Coefficient of Determination Cases in %
All sectors	100,00%	66,67%	16,67%
Consumer Cyclical	100,00%	100,00%	66,67%
Industrial	100,00%	33,33%	0,00%
Consumer Non-Cyclical	100,00%	50,00%	33,33%
Basic Materials	100,00%	33,33%	33,33%
Technology	16,67%	16,67%	16,67%
Communications	100,00%	16,67%	0,00%

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