Corporate Social Responsibility and Shareholder Effects: The Greek Paradigm

Theodore Syriopoulos
Department of Shipping, Trade & Transport
School of Business, University of the Aegean

Abstract

The study investigates the risk and return profile of a stock portfolio constructed of companies that consistently promote corporate social responsibility (CSR). The stock market behaviour of these companies is analyzed and attention is paid on modeling dynamic volatility and assessing implications for shareholder value. It would be anticipated that corporate social responsible companies may exhibit a stable stock market behavior. However, the volatily model employed provides a statistical explanation of CSR stock risk and return. The impact of volatility is shown to be persistent though varying across the CSR sample. Shareholder value may fluctuate considerably and CSR stocks may not necessarily constitute a defensive asset class.

Keywords: corporate social responsibility; socially responsible investments; volatility dynamics; EGARCH models.

Introduction

In recent years, modern empirical finance is paying increasing attention to issues such as efficient corporate governance and corporate social responsibility. Corporate performance is found to be sensitive to the institutional framework upon a company is managed and run, in other words, its corporate governance system. On the other hand, market participants are gradually turning their interest towards companies that are keen to promote not only their financial but also their social performance by promoting socially responsible behavior. It is worth noting that a growing number of private and institutional investors, such as pension funds, customarily choose to allocate funds under their management toward socially responsible investments (Merikas, 2003).

The recent trends in corporate social responsibility (CSR) strategies and related socially responsible investments (SRI) are moving upwards and at a fast pace. Worldwide socially responsible investments represent approximately USD 3 trln. with 67% originating from the US, 25% from the UK, 5% from France and the rest from other developed countries, such as Canada and Australia (UK Social Investment Forum (SIF), 2002; Merikas, 2003). For the EU overall however, only USD 17.5 bln. was invested in 220 socially responsible funds by the end of 2000, a considerably lower portion of the investment market taken as a whole, but a considerable increase is anticipated in the future (Merikas, 2003). In the leading US market, one out of eight dollars invested was part of a socially responsible portfolio in 1999, and SRI growth rates were twice as high compared to conventional investments. This resulted to SRI increasing to USD 2.32 trln. in 2001 from USD 639 bln. in 1995 and USD 40 bln. in 1984 (Social Investment Forum, 2003).

A corporate social responsibility strategy can produce information signals to the investor in terms of shareholder value, since it affects production costs, revenue, cost of capital, cash flows and earnings and ultimately the company's stock price and market capitalization. It is no surprise therefore that the impact of corporate social responsibility strategies on shareholder value has been attracting increasing attention by the international investment community, because the assessment of the risk-return profile of a CSR investment contributes to the understanding and evaluation of the implications for shareholder value (Kim & Van Dam, 2003). Research evidence is overall inconclusive, with some studies suggesting that stock screening generally adversely affects the risk-return performance taken as a whole by narrowing the available investment universe, while others advocate that including CSR investments in a portfolio can reduce portfolio volatility and thus result in higher returns than a traditional investment approach (Institute of Business Ethics (IBE), 2003; Cowe, 2004). The advocates of the Capital Asset Pricing Model (CAPM) for example, maintain that assuming market efficiency, asset allocation to Socially Responsible Investment (SRI) stocks may lead to lower returns in the long-run due to diversification costs, since SRI stocks are only part of the market portfolio (*Markowitz Approach*). On the other hand, the proponents of the *Moskowitz Approach* advocate that SRI portfolios could attain higher returns relative to the overall market since they incorporate important informational signals which cannot be directly conjured and evaluated accordingly by the markets (Feldman *et al*., 1997; Hall and Rieck, 1998; Kurtz, 1999).

Socially responsible investments are therefore seen increasingly as an investment approach that can add value to other investment approaches such as value, growth, technology or emerging markets. However, the key issues regarding asset valuation and portfolio management remain. In other words, whether corporate social responsibility can potentially result in higher stock returns relative to the overall market portfolio boosting shareholder value and whether investors value corporate social responsible stocks as a low volatility "safe heaven" at nervous market times, investment decisions regarding asset allocation to SRI securities still depend on the risk profile of SRI stock investments. Since strong empirical evidence has indicated that a negative shock to stock returns can potentially generate more volatility than a positive shock of equal magnitude (Engle & Ng, 1993), it follows that when stock prices fall due to some bad news and the equity value of the firm decreases resulting to higher debt-to-equity-ratios, the weight attached to debt in the capital structure from an investor's point of view increases making the firm appear riskier. This increase in leverage will lead equity holders who bear the residual risk of the firm to anticipate higher expected future return volatility. Therefore, understanding the mechanism of volatility dynamics behind different corporate social responsibility stock reactions to market volatility can produce important implications for shareholder value, especially since the stock price behavior of companies embracing CSR strategies has not been uniform across all CSR companies and/or sectors (Ethical Investment Research Service (EIRIS), 1999; Sustainable Investment Research International Group (SIRI), 2003; Cowe, 2004).

The majority of past studies on CSR issues have focused mainly on developed markets, predominantly the US and the UK. In contrast, this study concentrates on the implications of the corporate social responsibility impact on stock behavior in a small recently upgraded

European stock market, namely Greece, with a carefully selected and sectorally well diversified sample of companies. The Greek market follows the major CSR trends seen in the rest of Europe where CSR investments remain at a particularly low level (Merikas, 2003). However, the establishment of the "*Hellenic (Greek) Network for Corporate Social Responsibility*" (HNCSR) underlines the increasing domestic corporate interest in the subject. This Greek CSR Network is based in Athens and was originally formed in June 2000 by thirteen companies and three business institutions as a non-profit organization. It is run by a board from seven member companies and is the Greek national partner of the European CSR Network, established in 1996. Its mission is to promote the "meaning of CSR" to both Greek businesses and Greek society with its ultimate goal a balance between corporate profitability and sustainable economic development. The Network collects data and records and publicizes the best practices in corporate social responsibility in order to raise public and company awareness of corporate social responsibility and provides a forum for networking and collaboration among companies and organizations at all levels for the exchange and spread of information (HNCSR, 2004). Recently, the Greek CSR Network has also been promoting the concept of social responsibility among small and medium-sized enterprises with conferences, presentations, and through CSR awards, and participated in two projects under the European Union initiative EQUAL that promotes equal employment opportunities especially for immigrants and people with disabilities. Today, the Greek CSR Network has grown into 56 companies and business institutions (Table 1).

Table 1: The Hellenic (Greek) Corporate Social Responsibility Network

BP Hellas S.A.	Hellenic Airspace Industry S.A.
Shell Hellas S.A.	Toyota Hellas S.A.
IBM Hellas S.A.	FAGE Dairy Industry S.A.
Nestle Hellas S.A.	Q-Plan S.A.
Philip Morris Hellas S.A.	Agricultural Industries A. Michailidis S.A.
Janssen-Cilag Pharmaceutical SACI	Leaf Tobacco A. Michailides S.A.
Procter & Gamble Hellas Ltd.	Ziridis Schools S.A.
Johnson & Johnson S.A.	Clotefi S.A.
C & C International S.A.	TUV Hellas S.A.
TVX Hellas S.A.	Dimiourgiki S.A.
Vodafone-Panafon S.A.*	Cocomat S.A.
Novartis Hellas S.A.	Amacon Management Consultants S.A.
Hellenic Telecom Organization S.A.*	Interbeton S.A.
EFG Eurobank Ergasias S.A.*	PriceWaterhouseCoopers S.A.
Titan Cement Co. S.A.*	Manpower Team S.A.
Coca-Cola Hellas S.A.*	Reputation Management S.A.
Coca-Cola HBC S.A.*	EQI Engineering & Quality Consultants International S.A.
Delta Holding S.A.*	Alpha-Mentor Consultants Ltd.
Silver & Barite Ores Mining Co. S.A.*	TradeLink Reputation Management S.A.
Intracom S.A.*	Bureau Veritas S.A.
Bank of Cyprus S.A.*	Epikinonia Business Communications Network
Heracles General Cement Co. S.A.*	Federation of Greek Industries
Chipita International S.A.*	Athens Chamber of Commerce and Industry
Motor Oil S.A.*	Hellenic Organization of Standardization S.A.
Klonatex Group S.A.*	Hellenic Association of Pharmaceutical Companies
Fanco S.A.*	Federation of Industries of Northern Greece
FHL H.Kyriakidis S.A.*	Institute of Social Innovation Ltd.
Atlantic S.A.*	Hellenic Organization of Small and Medium Enterprises & Handicraft

* Listed on the Athens Stock Exchange (ASE)
(Source: Hellenic Network for Corporate Social Responsibility (HNCSR), www.csrhellas.gr)

These companies are established members of the '*Hellenic (Greek) Network for Corporate Social Responsibility Network*' (2004) well reputed to consistently promote CSR strategies, and leaders in their business fields with their blue chip equities traded in the Athens Stock Exchange.

This study investigates the risk and return profile identified in the stock market behaviour of companies promoting CSR strategies. A number of Greek companies, members of the HNCS, are carefully selected as a case study. Emphasis is placed on modeling asymmetric volatility of CSR stock returns and, subsequently, on assessing the relevant impact on shareholder value. The empirical findings are expected to shed some light on the feedback effect of CSR volatility on shareholder value, because misconceived models of stock volatility may lead to incorrect and/or invalid conclusions about stock return dynamics. The empirical conclusions are of interest to asset allocation, portfolio management and risk hedging.

Modeling CSR Stock Return Volatility

In order to investigate the time-varying volatility implications of the Greek CSR Network stock returns and shed some light on the feedback effect of this volatility on shareholder value, alternative symmetric Generalized Autoregressive Conditional Heteroskedasticity (GARCH) and asymmetric Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) models were estimated and their validity was statistically tested in order to determine whether they can adequately describe the CSR stock variance dynamics (Nelson, 1991; Bollerslev *et al.*, 1992; Rabemananjara & Zakoian, 1993). A conventional conditional mean specification, as a stationary AR(1) process can be:

$$r_{it} = \alpha_0 + b\ r_{it-1} + \varepsilon_{it}, \qquad |b| < 1 \qquad (1)$$

where r_{it} = the continuously compounded rate of return on i CSR stock over a single period from time $t-1$ to t; ε_{it} = the unexpected return at time t (error term); and, ε_{it} is given by $\varepsilon_{it} = \eta_{it}\sqrt{h_{it}}$ and η_{it} is an independently and identically distributed process (i.i.d.). A typical GARCH conditional variance specification, h_{it}, is:

$$h_{it} = \omega + \sum_{i=1}^{p} \alpha_i\ \varepsilon^2_{it-i} + \sum_{j=1}^{q} \beta_j\ h_{it-j} \qquad (2)$$

where h_{it} = the conditional variance function; $\omega > 0$, $\alpha_1, \ldots, \alpha_p \geq 0$, $\beta_1, \ldots, \beta_q \geq 0$ = constant parameters; ε^2_{it-I} = the ARCH effect; and, h_{it-j} = the GARCH effect.

In a GARCH(p,q) model, the size of the parameters α and β (reaction and persistence coefficients respectively), determines the short run dynamics of the resulting i stock return volatility. The α reaction coefficient measures the extent to which volatility shocks today feed through into next period's volatility, and large α reaction coefficients mean that volatility reacts quite strongly to market movements. The β persistence coefficient expresses whether volatility is persistent and large β persistence coefficients indicate that volatility shocks take a long time to fade away. Finally, the ($\alpha_i + \beta_j$) term measures the rate at which this effect dies out over time. In case α (reaction coefficient) is relatively high and β (persistence coefficient) is relatively low then volatility tends to be more "spiky".

Empirical research in equity market volatility has indicated significant asymmetric and leverage effects. The EGARCH model allows for asymmetric or leverage effects, whereas negative and positive shocks can have different impact on volatility. Conditional volatility is modeled as:

$$h_t = \exp\left[\omega + \alpha\ g_{1,t} + \beta\ \log\left(h_{t-1}\right) + \gamma\ g_{2,t}\right] \quad (3)$$

$$g_{1,t} = \left[\ \left|\frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}\right| - \sqrt{2/\pi}\ \right], \quad g_{2,t} = \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}}$$

The impact of negative shocks causing volatility to rise more than positive shocks of the same magnitude is depicted with γ coefficient; γ typically enters the EGARCH model with a negative sign and indicates that bad news ($\varepsilon_{it} < 0$) generate more volatility than good news.

Empirical Findings

The study of time-varying volatility effects on CSR stock returns is based on a sample of eight Greek companies founding members of the Greek CSR Network. As mentioned earlier, these companies have a strong reputation of actively promoting CSR strategies. The sample has been carefully selected, so that the companies represented encompass a diversity of corporate characteristics and activities, are market leaders in a range of important business sectors bearing value as well as growth features, have medium to large market capitalization value, represent both private and public sectors, and finally have their equities traded in the Athens Stock Exchange (ASE). This group of companies covers approximately 25% of the total ASE market capitalization, and since this sample represents such a significant stock market share the empirical findings may have implications for the ASE market as a whole. The companies included in the sample are: Hellenic Telecom Organization (OTE, telecoms); Titan Cement (TIT, cement); EFG Eurobank-Ergasias (EFG, bank); Commercial Bank of Greece (EMP, bank); Coca-Cola Hellas (COC, beverages); Delta Dairies (DEL, food & beverages); Intracom (INC, telecom equipment, technology); and, Silver and Barite Ores Mining (SLB, mining) (Table 3). The sample data covered a 5-year period from April 1999 to April 2004 and consists of weekly ASE closing values of the sample CSR company stock prices. The data were then transformed to continuously compounded returns, calculated as follows:

$$r_{it} = \log\left(P_{it} / P_{it-1}\right) \quad (4)$$

where: P_{it} = the value of i CSR stock price at time t; and, i = OTE, TIT, EFG, EMP, COC, DEL, INC and SLB, respectively.

The empirical findings regarding the CSR stock return volatility are summarized in Tables 2 - 5. The stock price path of the CSR stock sample indicates highly volatile periods at times with some sharp price swings not always justifiable by the underlying fundamentals. This means that the CSR stock market behavior may not have always been rational with significant implications for investors' expectations on asset risk and return valuation. A closer examination of the CSR stock price and return plots suggest that volatility displays the clustering phenomenon associated with GARCH processes. Preliminary statistical analysis of the descriptive CSR (log) stock prices and returns supports this conclusion. In most cases, positive skewness (long right tail) and kurtosis were observed, whereas significant values of the Jarque-Bera test support deviation from normality. Evidence of ARCH is shown by 12-order Ljung-Box statistics in some of the CSR stock return and squared return series. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for unit roots in levels and first differences indicated non-stationarity of the (log) stock price series, as the presence of a unit root was not rejected. The conditional mean i CSR stock return was modeled and tested as an autoregressive structure of the following form:

$$r_{it} = \mu + \sum_{i=1}^{j} b_j \; x_{jt} + \varepsilon_{it} \qquad (5)$$

where r_{it} = weekly i CSR stock return; μ = constant term; x_{jt} = lagged dependent variable(s), and, ε_{it} = the unexpected return of i CSR stock at time t, as a collective measure of news on the i CSR stock. An $AR(2)$ model specification was found to adequately explain the data generating process for the CRS conditional mean returns. Alternative $AR_{(1)}$ models for the conditional mean were preliminary estimated to test the best fit of the data, including functional forms such as: $r_{it} = b\ r_{it-1} + \varepsilon_{it}$; $r_{it} = b\ r_{it-1} + a\ \varepsilon_{it-1} + \varepsilon_{it}$; $r_{it} = a\ \varepsilon_{it-1} + \varepsilon_{it}$; $r_{it} = a_1\ \varepsilon_{it-1} + a_2\ \varepsilon_{it-2} + \varepsilon_{it}$. Tests were also conducted to check for the absence of a higher order autocorrelation up to 12 lags (Breusch-Godfrey test), as well of autoregressive conditional heteroskedasticity (ARCH-LM test) in the mean residuals (Table 2).

Table 2: Diagnostic Testing

	OTE	**TIT**	**EFG**	**EMP**	**COC**	**DEL**	**INC**	**SLB**
Breusch-Godfrey$_{(12)}$*	9.867	25.298	20.462	22.091	18.789	22.018	15.638	23.963
p-values	(0.627)	(0.013)	(0.058)	(0.036)	(0.093)	(0.037)	(0.208)	(0.020)
ARCH$_{(12)}$*	10.891	27.977	19.468	15.161	15.852	33.133	14.543	21.026
p-values	(0.538)	(0.039)	(0.077)	(0.999)	(0.893)	(0.0009)	(0.933)	(0.050)
ADF$_{(0)}$**	-0.978	-1.730	-2.163	-0.917	-2.545	-0.841	-0.110	-0.776
ADF$_{(1)}$	-7.433	-7.427	-6.839	-6.499	-7.318	-5.940	-6.790	-7.564
PP$_{(0)}$**	-0.967	-2.165	-1.929	-0.749	-2.492	-0.808	-0.069	-0.733
PP$_{(1)}$	-15.874	-18.358	-17.256	-13.975	-17.068	-15.242	-14.106	-14.211

* Mean return residuals at 5% significance level
** (Log) stock prices at 4 lags: ADF: Augmented Dickey Fuller;
PP: Phillips-Perron tests;
ADF$_{(0)}$ / PP$_{(0)}$: level-tests;
ADF$_{(1)}$ / PP$_{(1)}$: first difference-tests;
(Critical values ADF / PP: -3.457 (1%); -2.873 (5%); -2.573 (10%))

The empirical findings support the application of generalized autoregressive conditional heteroskedasticity models to study the conditional variance of the CSR stock returns (Tables 3 and 4). The method of quasi-maximum likelihood (QML) covariances and robust standard errors was used in modeling the conditional variance. The estimated coefficients ω, α, β, and γ ($\gamma < 0$) were found statistically significant at the 5% level in most cases, and the critical value of $\chi^2_{(12)}$ was 21.026 at the 5% significance level. The broad interpretation of the conditional variance coefficients relates to an investor/shareholder that predicts this period's variance by developing a weighted average of the long term average represented by the constant term ω, the forecasted variance from last period represented by the GARCH term β, and the information about volatility observed in the previous period represented by the ARCH term α, while γ represents asymmetric reactions. If the asset return were to be unexpectedly large either upwards or downwards, then the investor/shareholder will increase the estimate of the variance for the next period. This is consistent with the volatility clustering of stock market returns where large changes in returns are likely to be followed by further additional large changes.

Table 3: The GARCH Model

	OTE	TIT	EFG	EMP	COC	DEL	INC	SLB
ω	0.0068	0.0003	0.0002	0.0004	0.0007	0.0009	0.0003	0.0008
z-statistics	(3.292)	(1.043)	(0.588)	(0.667)	(1.090)	(1.179)	(2.879)	(3.211)
α	0.0093	0.0691	0.0075	0.0289	0.0657	0.1218	0.0359	0.7496
z-statistics	(7.897)	(2.132)	(0.437)	(1.487)	(2.043)	(2.730)	(4.093)	(2.001)
β	0.7800	0.9012	0.9920	1.0144	0.8921	0.8458	0.9652	0.2015
z-statistics	(9.613)	(1.853)	(2.469)	(2.821)	(1.534)	(1.566)	(6.464)	(1.341)
L.L.	430.663	472.251	433.258	377.831	439.726	389.440	346.482	407.908
$Q_{(12)}$	6.049	9.982	15.364	18.010	10.481	14.280	11.261	14.981
p-values	(0.914)	(0.618)	(0.222)	(0.115)	(0.574)	(0.283)	(0.507)	(0.242)
$Q^2_{(12)}$	10.681	3.809	13.538	7.280	2.789	7.0695	7.288	4.134
p-values	(0.556)	(0.987)	(0.331)	(0.839)	(0.997)	(0.853)	(0.836)	(0.981)

ω: constant; α: ARCH effect; β: GARCH effect; L.L: Log Likelihood; $Q_{(12)}$: Ljung-Box test, standardized residuals; $Q^2_{(12)}$: Ljung-Box test, squared standardized residuals; $\chi^2_{(12)}$: 21.026 (5% significance level).

Table 4: The EGARCH Model

	OTE	TIT	EFG	EMP	COC	DEL	INC	SLB
ω	0.2984	0.0366	0.4276	0.7416	0.3314	-0.3102	0.3784	0.2615
z-statistics	(1.877)	(0.926)	(1.767)	(1.234)	(1.314)	(1.992)	(1.741)	(2.700)
α	0.1541	0.0790	0.1921	0.0959	0.1183	0.2324	0.1360	0.8872
z-statistics	(1.407)	(2.523)	(1.714)	(0.581)	(2.174)	(3.018)	(1.334)	(3.047)
β	0.4982	0.9071	0.3290	0.2883	0.9623	0.9783	0.3334	0.6748
z-statistics	(1.921)	(3.311)	(0.812)	(0.270)	(2.635)	(4.113)	(0.852)	(4.555)
γ	-0.1397	-0.1004	-0.2493	-0.0073	-0.078	-0.0199	-0.2163	-0.1856
z-statistics	(-1.439)	(-3.300)	(-2.011)	(-0.074)	(-1.482)	(-0.340)	(-1.972)	(-1.090)
L.L.	430.771	486.773	428.936	369.724	444.399	388.818	345.532	412.698
Sk	0.337	-0.045	0.767	0.500	0.372	0.360	-0.151	0.316
Ku	3.583	3.590	7.748	5.990	4.994	3.746	5.378	5.773
$Q_{(12)}$	4.316	13.223	15.250	17.868	10.651	13.651	7.867	21.196
p-values	(0.977)	(0.353)	(0.228)	(0.120)	(0.559)	(0.324)	(0.795)	(0.048)
$Q^2_{(12)}$	8.737	27.670	14.844	2.706	3.165	6.690	6.454	4.807
p-values	(0.725)	(0.006)	(0.250)	(0.997)	(0.994)	(0.877)	(0.891)	(0.964)

ω: constant; α: ARCH effect; β: GARCH effect; γ: asymmetric / leverage effect; L.L.: Log Likelihood; Sk: standardized residuals skewness; Ku: standardized residuals kurtosis; $Q_{(12)}$: Ljung-Box test, standardized residuals; $Q^2_{(12)}$: Ljung-Box test, squared standardized residuals.

The magnitude of the estimated conditional variance in both GARCH and EGARCH models suggests a volatile CSR stock behavior over the sample period. The coefficients of the lagged conditional variance β denote a diversified impact between past CSR volatilities which carry on into the next period. For a number of the CSR stocks under study an (integrated) IGARCH formulation can be relevant, as (α_i + β_j) was found to be around unity. In some cases, the pace of convergence to the long-run volatility estimate of the EGARCH model was found to be particularly slow and in few cases variance non-stationarity may be apparent, as the combined effect of (α_i + β_j) exceeded unity. These findings seem to indicate varied but nevertheless persistent volatility shocks in most CSR cases.

Testing for the possible impact of asymmetric implications and the presence of a "leverage effect" requires the corresponding term γ in the EGARCH model to be typically negative and statistically significant. The estimated γ coefficients for the CSR stocks suggest that negative shocks imply a higher "next period" conditional variance than positive shocks of the same sign. Asymmetric effects were detected for some of the CSR firms under study, such as, Titan Cement (TIT), Eurobank (EFG), and Intracom (INC). Financial research indicates that the EGARCH model appears to have considerable advantages, even in the case when leverage effects are not robust (Lumsdaine, 1995). Overall, the CSR stocks of the sample under study were found to exhibit a diversified asymmetric volatility behavior.

The EGARCH class of models was found to adequately describe the volatility behavior of the CSR stocks under study. Testing for the null hypothesis of absence of further autoregressive conditional heteroskedasticity effects (up to 12th-order) in the EGARCH standardized residual innovations ($z_{it} = \varepsilon_{it}/\sqrt{h_{it}}$) and the squared standardized residual innovations (z^2_{it}), the relevant Ljung-Box statistics point toward acceptance of the null hypothesis for all the CSR models (Table 4). The CSR stock returns are nearly normally distributed when normalized (divided) by their conditional variance, as depicted by standardized residuals skewness and kurtosis statistics. As an additional diagnostic check for the adequacy of the conditional variance model parameterization (Pagan and Sabau, 1992; Henry, 1998), a moment type specification test was estimated in the following form:

$$\varepsilon^{*2}_{it} = \varphi_0 + \varphi_1 \, h^*_{it} + n_{it} \qquad (6)$$

where ε^{*2}_{it} = the ARCH effect on the *i* CSR stock return or the squared unexpected return at time *t*, as a collective measure of news on the *i* CSR stock; h^*_{it} = the conditional variances from the reported models; φ_0 = constant term; φ_1 = the coefficient impact factor of *i* CSR stock's conditional variance h^*_{it}; and, n_{it} = the residual (error) term.

Table 5: Moment Specification Test

	OTE	TIT	EFG	EMP	COC	DEL	INC	SLB
φ_o	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001
hctr	(0.024)	(0.285)	(0.712)	(0.046)	(1.027)	(0.763)	(2.111)	(4.114)
φ_1	1.017	1.043	0.763	1.075	0.757	0.857	0.379	0.264
hctr	(1.988)	(2.380)	(2.815)	(1.675)	(3.288)	(2.801)	(1.221)	(8.059)

htcr: heteroscedasticity consistent *t*-ratios.

The null hypothesis that was tested with Equation (6) was that the EGARCH model is a correct specification for *i* CSR stock return volatility. Under the null hypothesis, the moment condition $E\,(\varepsilon^2_{it} \mid X_{t-1}) = h_{it}$ implies that $\varphi_0 = 0$ and $\varphi_1 = 1$. Thus, according to the estimation results of Equation (6), the null hypothesis is accepted for all CSR stocks under study (Table 5). Hence, the EGARCH model does indeed adequately explain the dependencies of the first and second moments that are present in the CSR stock returns.

Conclusions

This study has investigated the risk and return profile of a selective group of firms that consistently promote corporate social responsibility strategies and are members of the Hellenic CSR Network. Emphasis was placed on modeling dynamic volatility of CSR stock returns. For that, alternative dynamic volatility models were specified in order to identify the best fit that adequately describes the risk-return profile of CSR firms. The results have indicated that the EGARCH asymmetric volatility model is a statistically adequate specification to model CSR return fluctuations.

Since social responsible firms tend to have efficient management structures and pay attention not only to their financial but also to social output, we would anticipate stock market behaviour of relatively low volatility. Contrary to that, the CSR sample under study was found to exhibit persistent stock return volatility on shareholder value, though to varying levels. As a result, investor portfolio returns consisting of CSR stocks may fluctuate considerably. CSR stocks may not necessarily constitute a low risk –'safe shelter'- asset class. These empirical findings are of importance to asset valuation, portfolio allocation and hedging strategies and can affect shareholder value considerably. However, the impact of volatility on CSR stock returns has not been uniform across all CSR sample firms. This may indicate that sectoral and/or company-specific fundamental issues can also play an important role to shareholder asset allocation.

A number of limitations could be improved by further research. A constraint of the study has been that CSR was introduced more as 'firm reputation' in the model rather than as a solid and explicit CSR metric. In contrast to conventional stock market indices though, CSR indices, constructed on the basis of specific CSR characteristics, are not widely available. The employment of CSR benchmarks could prove to be a valuable tool for CSR asset valuation and the assessment of shareholder value implications.

Acknowledgements

This research paper has been carried out under the auspices of the ARCHIMEDES project that is co-funded by the European Social Fund and National Resources-EPEAEK II.

Reference

Bollerslev, T., R.Y. Chou and K.F. Kroner, 1992, "Arch Modeling in Finance: A Review of the Theory and Empirical Evidence", *Journal of Econometrics,* 52, 5-59.

Cowe, R., 2004, "*Risk, Return and Responsibility*", Report, Association of British Insurers, www.abi.org.uk.

Ethical Investment Research Service, 1999, "*The Financial Performance of Ethical Investments*", www.eiris.org.

Engle, R. and V. Ng, 1993, "Measuring and Testing the Impact of News on Volatility", *Journal of Finance,* 48, 1749-1778.

Feldman, S., P. Soyka and P. Ameer, 1997, "Does Improving a Firm's Environmental Management System and Environmental Performance Result in a Higher Stock Price?", *Journal of Investing,* 6,53-62.

Hall, P.L. and R. Rieck, 1998, "The Effect of Positive Corporate Social Actions on Shareholder Wealth", *Journal of Financial and Strategic Decisions,* 11, 83-88.

Hellenic Network for Corporate Social Responsibility, 2004, *Organization, Mission, Activity, Members*, www.csrhellas.gr.

Henry, O., 1998, "Modelling the Asymmetry of Stock Market Volatility", Applied *Financial Economics,* 8, 145-153.

Institute of Business Ethics, 2003,"*Does Business Ethics Pay?* Webley and More", Report, www.ibe.org.uk.

Kim, R. and E. van Dam, 2003, "*The Added Value of Corporate Social Responsibility*", Working Paper, Triple Value Strategy Consulting.

Kurtz, L., 1999, "*A Review of Studies of Socially Responsible Investing: Markowitz vs. Moskovitz*", www.sristudies.org.

Lumsdaine, R.L., 1995, "Finite Sample Properties of the Maximum Likelihood Estimation in GARCH(1,1) and IGARCH(1,1) Models: A Monte Carlo Investigation", *Journal of Business Economics and Statistics,* 13, 1-10.

Merikas, A., 2003, "*A Study of the Opportunities to Establish Greek Mutual Funds Specialized in 'Corporate Social Responsibility'*", Special Report, Greek Capital Market Commission.

Nelson, D.B., 1991, "Conditional Heteroskedasticity in Asset Returns: A New Approach", *Econometrica,* 59, 347-370.

Pagan, A. and H. Sabau, 1992, "Consistency Tests for Heteroskedasticity and Risk Models", *Estudios Economico,* 7, 3-30.

Rabemananjara, R. and J. Zakoian, 1993, "Threshold ARCH Models and Asymmetries in Volatility", *Journal of Applied Econometrics,* 8, 31-49.

Social Investment Forum, 2003, "*Report on Responsible Investing Trends in the United States*", Report, www.socialinvest.org.

Sustainable Investment Research International Group, 2003, "*Latest Trends in European, Green, Social and Ethical Funds*", Report, www.sirigroup.org.

UK Social Investment Forum, 2002, "*International Evidence on Ethical Mutual Fund Performance and Investment Style*" (Bauer, R., K. Koedijk and R. Otten), Working Paper, Maastricht University, www.uksif.org.

Author's CV:
Theodore Syriopoulos

Dr. Theodore Syriopoulos is Assistant Professor of Finance in the Department of Shipping, Trade and Transport, University of the Aegean, Chios, Greece. Prior to his academic career, Prof. Syriopoulos has held various managerial positions for a number of international and domestic banking, investment and stock market institutions.