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**Stock Valuation- Incorporating New Measures into the
Traditional Methods**

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MSc Risk Management

Abstract

This study investigate the specific factors which impact on corporate stock performance which is measured by stock return in the US companies from 2009 to 2012, aims to examine the relationship between firms` environmental performance and stock performance and discuss the way to incorporate environmental performance into stock valuation process. The results report the dividend yield and overall green score have negative impact on stock performance, and return on invested capital, environmental impact score, the green policies score and the reputation have positive impact on stock performance in the model of this study, and the P/E ratio, return on equity and cash flow/sales ratio have no relationship with stock performance. The result implies that environmental performance do impact on stock performance which is in line with the expectation. Finally this paper provide a analysis about how the environmental affect the stock performance which include short-term and long-term period and discuss the way to take corporate environmental performance into account while valuing a stock, provide a more comprehensive and reliable way for stock valuation process.

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Chapter 1 Introduction

Since 1930s last century stated a green movement which has changed the shopping and living habits of consumers in order to protect the environment, as a consequence, producers responded by producing more environment friendly product to mitigate the negative impact on environmental degradation. The issues relate to environmental performance, corporate sustainability, clean-tech and being green have become the hot topics in the current economic discussion, the reasons why this phenomenon occurs are diverse and the main reasons among them can be explained by the potential benefit of being green and the stricter environmental policies and laws made by government in order to protect the environment. Firms spend large amounts on environmental costs which investing in environmental equipment and developing environmentally friendly products for obtaining environmental certification such as ISO14001, lots of companies now regard this expenditure as an investment which relate to company profit and incorporate environmental policies into corporate strategy. For instance, according to the Environment-Friendly Company Survey by the Ministry of the Environment (2002, 2004), while 21.0 percent of listed corporations replied in 1999 that for them tackling environmental issues was ‘one of their most important business strategies and an integral part of their business activities’, increasing awareness among firms make the environmental efforts from one of factor affecting business performance to the position of a major strategic factor.

Evidence from previous studies can be found to support argument that environmental performance have impact on corporate financial performance, Nakano et al. (2007) point out this positive relationship in their study use the Japanese corporations data to make an empirical analysis. Russo and Fouts (1997) and Konar and Cohen (2001), obtained the results that a firm’s environmental performance does have a statistically significant positive relationship with its financial performance. Many other studies also have found the same results, deposit the extent of impact which may differ among different industries, firm size and other factors, and this is one of the main reasons that why companies spend a lot to be green.

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Meanwhile, how the market react to the environmental behaviors of company is necessary to study, the argument that weather market will react positive or negative is still under discussion, referring to previous studies, Weir (2010) finds a negative relationship between the stock performance and environmental performance which use the Newsweek Green Rankings to measure the environmental performance, the study finds that the stock market does not react to most of the individual firm rankings, but react negatively to the whole Newsweek Rankings, this means that the stock market resist the environmental news or the investors do not consider the company`s environmental choices. The data also suggests that investors place a negative value on environmental friendly companies. Kentucky (2011) finds a different results that the environmental performance scores have positive relationship with the stock price and equity return, The four scores of the Rankings increase return on equity as much as 0.06%, 0.38%, 0.40%, and 2.06% respectively, furthermore, one point improvement in the three environmental scores will increase a firm`s average value (market capitalization) of \$17,840,820, \$29,043,195, and \$99,576,670 respectively.

This paper intend to study the relationship between the environmental performance and stock performance which measured as stock return based on previous studies, to examine the relationship between corporate environmental decisions and stock market reaction, to find a way that incorporating the environmental performance into stock valuation as a new measure, unlike the traditional methods which use data and information from firms` financial statement to analyze the financial performance in order to value a stock, this study use the Newsweek Green Rankings and its environmental scores to measure the environmental performance, and this new measure is used to evaluate the potential impact of environmental performance on the stock performance, which is always unconsPICuous and difficult to predict to what extent the environmental performance could affect the stock value and how the market would react to it.

The study find evidence that environmental performance has impact on the stock performance, the three environmental scores of the Green Rankings shows a positive results with statistic significant, which means the higher score value could lead to a better stock performance. Furthermore, the fixed effect model reports the dividend yield has a negative impact on stock return with statistical significance, which is not in line wit expectation, referring to previous studies, Patel, Yao and Barefoot (2006) and Keppler (1991) all find a positive relation between the Dividend Yield and stock return. The return on invested capital

(ROIC) is positively relate to stock performance, too, which means investors care about how efficiency a company could generate returns through using its money.

The structure of the paper follows the outline of the Table of Contents, the second chapter is the literature review which reviews the previous studies on the traditional stock valuation methods, the impact of environmental performance on financial performance and market reaction to the environmental performance, summaries the main determinants and relevant findings. Chapter 3 provides details about the methodology adopted to achieve research objectives, including the approach adopted to examine the effect of main determinants on stock performance, the data type used and the data collection and source, the sample chose and the construction process of empirical model. Chapter 4 presents the empirical results which include the summaries statistics of variables, the strength of relationship between tested determinants and stock performance, and the limitation relate to the generated findings. The following chapter 5 provides a discussion on the impact of environmental factors on stock performance, which emphasis on how to incorporate environmental performance as a new measure into stock valuation. The final chapter 6 gives a conclusion

Chapter 2 Literature review

2.1 The traditional valuation methods

Stock valuation is used as the method of calculating theoretical values of companies and their stocks in financial markets, these methods are mainly used to predict future market prices or potential market prices of stocks and profit from price movement that buy the stocks which are judged undervalued and sell when the stocks are judged overvalued (with respect to their theoretical value).

The stock valuation methods can be divided into two categories:

Absolute valuation methods-attempt to find the intrinsic or true value of investment based only on fundamentals which means only focus on things such as dividends, cash flow and growth rate for a single company, for the last decades of years there are lots of empiric works study in this area to find out the appropriate methods to value stock of companies.

There are some models which use dividends as the measure to estimate the stock value, the first and simplest one is the dividend discount model- the value of a stock is the present value of expected dividends on it. In this model, calculates the "true" value of a firm based on the dividends the company pays its shareholders. The justification for using dividends to value a company is that dividends represent the actual cash flows going to the shareholder, thus valuing the present value of these cash flows should give you a value for how much the shares should be worth. Furthermore, it is not enough for a company to just pay dividend but also the dividend should be stable and predictable , and normally these types of companies pay stable and predictable dividends are in mature and well-developed industries, and they are often suited for this type of valuation method. Barker(1999) pointed out in his research that the value of share as a simple function of future dividends is given by the dividend discount model, but the actual determination of the share price is rarely based upon the direct estimation of these future dividends. He also shows that the ranking of the valuation models used by analysts and fund managers shows a preference for “unsophisticated” valuation using, such as the dividend yield rather than the dividend discount model, and The direct estimation of future dividends is only one of several means by which market participants can actually

determine current share price, this finding could depend on the practical difficulty of using currently-available information to forecast future cash flow, and this difficulty limits the quantitative basis of valuations to short forecast horizons while the subjective, quantitative estimation of terminal value assumes great importance, and normally both analysts and fund managers use their own assessment of management quality to underpin the estimation of terminal value on the basis that superior quality causes outperformance and management quality can be assessed now and future performance itself is unobservable. He concludes that linked with this and information asymmetry, valuation process is dynamic, company-specific which focused on personal communication with management and embodying ongoing signalling and implicit contracting that using both dividends and other variables to estimate the value of stock and company.

Rees (1997) studied the impact of dividends, debts and investment on valuation models. In his study it analyses a substantial sample of 8,287 firm/years drawn from UK industrial and commercial sectors during the years 1987-95 which a sample approximation of the earnings and book value model of value is estimated and the parameters are similar to those found by Strong et al. (1996) for an overlapping sample, and the explanatory power is barely affected after using model specifications to re-estimate the model, after the exploration and study of the valuation model, then using the model to measure the impact of dividends, debt and capital investment, the evidence suggests that earnings distributed such as dividends have bigger impact on value than those earnings retained within the firm, and according to the research the explanatory power of the model is improved from 54% to 60% as the inclusion of dividends in the valuation model.

In the study by Gregoriou (2009) about the corporation valuation and dividends which using the UK firm as evidence from panel unit root and cointegration tests, they establish the most typically used explanatory variables in the Ohlson (1989) company valuation model that are earnings, book value and dividends all following non stationary I (1) integrated processes, as this paper is more specifically it makes contributions to the existing literature, at first they use panel unit root tests to examine the stationarity properties of the data as the power of time series unit root tests will be low given the short time span available in annual company valuation data, and secondly, panel cointegration tests are conducted because the multivariate cointegration time series analysis of Johansen (1988) suffers from power loss due to finite samples. Finally, cointegrating vectors are estimated using the fully modified (FM) OLS

estimation technique for heterogeneous cointegrated panels developed by Pedroni (2000). The empirical results in the paper shows that book value earnings and dividends are all positive and significant at all conventional levels consistent with Rees (1997), Hand and Landsman (1999) and Akbar and Stark (2003). The panel results provide a clear evidence that there is a strong long run relationship between market value, book value, earnings and dividends in the LSE(London stock exchange), proving that the positive and significant relationship between dividends and market value is not spurious.

Stark and Akbar (2003) investigates the relationship between net shareholder cash flows, dividends, capital contributions and corporate valuation, as the reason that the prior empiricism in the UK or the USA is not unequivocal that some papers find positive relationship between market value and dividends whereas others find negative relationship, in this paper they investigate whether deflators play a part of role in establishing the estimated role of dividends in corporate valuation and their conclusion is that they do not play a part in this process, at least in the UK, and dividends have a positive estimated relationship with corporate value, whichever of four deflators found in the literature on empirical valuation models is used. Sometimes, dividends appear to usurp the role of earnings in market valuation and, in general, appear to capture some of the effects of book value and earnings, and these results will not be affected when proxies for other information are included in the model and it is inappropriate to amalgamate dividends with capital contributions into net shareholder cash flows as if the two components have identical effects in explaining market value. There is an other implicit message of the paper is that results from market-based accounting research in the USA do not automatically carry over into the UK, and this could arise as a result that different industries between the populations of listed firms in the UK and the USA, and dividend policies might be formulated differently in the UK relative to the USA which leading to different conclusions about the relationship between dividends and market value.

The second category is relative valuation models, these relative valuation models operate by comparing the company in question to other similar companies, generally involve calculating multiples or ratios, such as the price-to-earnings multiple and dividend yield, and comparing them with other comparable firms. For instance, if the firm's P/E multiple you are trying to value is lower than the P/E multiple of a comparable firm, then it could be said that the company may be relatively undervalued. Generally, this type of valuation methods is much

easier and quicker to do than the absolute valuation methods, and many investors and analysts choose to use this kind of methods to do their analysis.

Gottwald (2012) in his paper called “ The use of P/E ratio to stock valuation” points out that investors use different investment analysis which usually fundamental, technical and psychological analysis, and fundamental analysis is the most complex analysis and investor intrinsic value of a stock focus on the fundamental analysis, Gottwald (2011) define this value as justified price that is the real value of a stock. The intrinsic value estimation of a stock is the basic aims of fundamental analysis, investors usually buy undervalued stock as the stock price will usually rise in the future, and sell overvalued stock which price will fall in the future.

This paper also concluded that the models which is used to estimate the intrinsic value of a stock that include:

- The profit model
- The dividend discount model
- The combination of the profit model and the dividend discount model
- Historical model
- The free cash flow to equity model
- The balance model

In this paper it focus on the P/E ratio, Halsey (2000) analyzes the relationship between P/E ratio and the P/B ratio to describe various type of companies as below:

- High performance company- high P/B, high P/E, expected positive residual income, increasing income.
- Decline company- high P/B, low P/E, expected positive residual income, decreasing income.
- declining company - high P/B, low P/E, expected positive residual income, decreasing income,
- improving company - low P/B, high P/E, expected negative residual income, increasing income,
- poor performing company - low P/B, low P/E, expected negative residual income, decreasing income.

Chisholm (2009) focus on the P/E ratio more detailed, this ratio is used to value weather shares are “dear and cheap” to each other, comparing the P/E ratios of similar companies which are in the same line of business and the same kind of factors will affect their performance. And many investors are prepared to pay a premium for high growth expectations in a high P/E ratio, and P/E ratios are affected by the general level of market interest rates, and the interest rates changes will have an effects on company earnings. The P/E ratio is also used to measure relative value when comparing listed companies, higher ratio than a competitor in the same area of business usually means bad value for investors, and a high P/E ratio reflects that the market expects a significant future earnings growth.

The author concludes that P/E ratios are important indicators which is not only used to estimate the intrinsic value of a stock within the fundamental analysis, they are used by many investors and analysts to analyze the value of a stock.

The similar views are found in many previous studies, Sezgin (2010) studied the relationship between P/E ratios, dividend yield and stock return in Istanbul Stock Exchange, in this paper, he points out that the aims of relative valuation is to determining the value of a stock by looking at data from comparable firms with similar qualities. The most common method in relative valuation is based on P/E ratio, which used frequently in developed and developing markets and is an important indicator for analysts and investors to analyze what a firm's market value should be in relation to profit per stock, which means the P/E ratio indicates how many times greater the price per share is over the profit per share.

P/E ratio is commonly used by investors and market analysts at intermediary or banks institutions in comparing potential profitability of different companies or industries. It also includes advantages and disadvantages in practices. The advantages of the P/E ratio includes these: the calculation is simple, using actual data, and it can be applied to all profit-making companies. On the other hand, the disadvantages also exist, using P/E ratio in a valuation could carries error probability, and taking net profit as one of the basic indicators in calculating P/E ratio may lead to several problems, when the net profit does not reflect the actual profit because the effects of different accounting practices and inflation, this may exist a misleading of derived value. Moreover, the P/E ratio can not be applied to loss-making companies, and it is difficult fo find comparable companies with similar qualities for valuation are among the disadvantages of the P/E ratio (Damodaran, 2002)

Financial analysts and investors assume that stock with a low P/E ratio are low-valued stock, which means cheap stocks. Nicholson (1960) assert that a low P/E ratio stocks have a better investment performance than stocks with a high P/E ratio, Basu (1977), he identified that stocks with low P/E ratio can provide a higher financial return compared to stocks with high P/E ratio, and investors prefer to invest in low P/E ratio stock than high P/E ratios ones.

Basu (1975, 1977) finds that returns on portfolios of low P/E stocks are higher on average than returns on higher P/E stocks, even after adjusting the risk. Levy and Lerman (1985) incorporate transactions costs and find a low P/E effect which only if transactions costs are minimal. Additional studies show that the low P/E effect may be a proxy for the size effect (Banz and Breen (1986), Goodman and Peavy (1986) show that the P/E effect may occur in January (Jaffe, Keim and Westerfield, 1989). Elfakhani (1994) examines the size and low P/E effects using a sample of Canadian stocks and finds that small Canadian companies earn higher risk-adjusted excess returns than large firms, but he doesn't find support for the low P/E effect except in quarters ending in December.

Although many previous empirical studies have investigated the relationship between stock returns and fundamental ratios such as P/E ratio, dividend yield and book-to-market ratio, the results are ambiguous. Basu (1983) and Banz and Rolf (1981) find evidence that stock returns are positively affected by their fundamental values. On the other hand, Fama and French (1992, 1988), and Basu (1975) in their studies find a contradictory results that stock returns are negatively affected by their fundamental values.

At the end of this paper, the author conclude that the P/E ratio is widely used, especially for practitioners which used as a measure of relative stock valuation. It is also an indicator which indicates investors' current mood that how much they are willing to pay per unit of company earnings. P/E increase when investors are willing to pay more per unit of earning while the earning remain stable.

2.2 Environmental performance impact on financial performance

In recently years, the debates about weather a firm's environmental performance has a

positive impact on its financial performance have attracted more attention on the relationship between the environmental performance and financial performance, and there are some empirical study work on this topic, Nakano et al. (2007) point out this positive relationship in their study use the Japanese corporations data to make an empirical analysis to support this study, in this paper they find that this tendency for two-way positive interaction appears to be a relatively recent phenomenon, and this tendency for realizing the two-way interaction is not limited to the top-scoring firms in terms of both financial and environmental performance. Firms now spend large amount on environmental costs and developing environmentally friendly products, and they find the trend over the past few years there is a growing number of firms regard this expenditure not as a cost but as an investment linked to corporate profit and try to take environmental issues as corporate strategy. In this study there are two goals: 1) using multiple linear regression analysis to examine whether environmental performance has a significantly positive influence on financial performance. 2) to examine using a set of pooled time series and cross-section data, whether there is any statistical causality from economic performance to environmental performance. Through the empirical analysis they find that the hypotheses that a firm`s environmental performance has a positive impact on its financial performance and vice versa are supported by applying two-way interactions appears to be only a relatively recent phenomenon, using five years` financial data from approximately 300 listed firms as well as the results of the Nikkei environmental management surveys, statistical analyses were performance to test the hypothesis that firms` perceptions are changing so that they see attempts to tackle environmental issues not as a cost factor but as an important strategic factor, and these perceptions are indeed supported by the market.

Darnall (2005) has done a similar study that based on the study (Darnall and Ytterhus, 2005) evaluates the link between facilities` environmental and financial performance and controls for endogeneity associated with improved environmental performance, in order to find out the relationship they utilize the survey data from manufacturing facilities operating in Canada, France, Germany, Hungary, Japan, Norway and the United States, and they made three types of comparisons to explore whether industrial sectors differ in their ability to derive financial benefits from environmental actions. At first, they compared the financial performance of facilities operating within low polluting industries or “clean sectors” to facilities operating within high polluting industries or “dirty sectors”. In the second stage of the analysis, they assessed whether facilities operating within two “dirty” sectors differed in their

environmental performance and whether these differences were related to their financial performance (Hart and Ahuja, 1996). Finally, they consider whether companies operating in “high growth” industries differed from companies operating in “low growth” sectors in whether they derived positive financial benefits from their environmental actions. They rely on chi-square tests to assess the statistical relationship between facilities` financial and environmental performance among the sector comparisons

According to their analysis, facilities that operated in dirty and clean sectors, and in early mover and later mover sectors did not differ in whether or not they earned positive profits from their improved environmental performance. Low-growth sectors that accrued positive profits had more often reduced their use of natural resources and global pollutants than facilities in the same sector that did not accrue positive profits, however, these differences were modest, so their overall conclusion therefore is that based on the facilities in this sample: there is no empirical support to suggest that there are differences among industry sectors, these results are further corroborated by the lack of statistical significance found in our bivariate probit regression models when evaluating the links between firms` environmental and financial performance.

On the other hand, there still have some limitations to this research design, at first the data were obtained using self-reported information rather than secondary sources, many studies evaluating environmental performance have generally relied on the U.S. Toxic Release Inventory (TRI), these data are widely available, but international comparisons of facility-level environmental performance using these data are not possible because TRI data are not collected in all countries, and by focusing on a broader population of organizations they have sacrificed greater specificity in our analysis. The second limitation of this research is that the self-reported data may be biased in that environmental managers may have misrepresented their facility`s environmental impacts and business performance, their results suggest that facility managers were reluctant to identify the shortcomings of their environmental and financial performance, the potential bias would tend to reduce the variance in their sample, as a result, they would be less likely to find statistically significant relationships.

In the paper called “corporate environmental performance: determinants and financial impacts” by Chang, X., Fu, K.K, and Tam, H.K. (2012) , they do a more comprehensive study

about the relationship between firm`s environmental performance and financial performance, at the beginning of this paper, it reviews an argument about that to what extent a corporation should care about objectives other than firm-value maximization, and point out that Lougee and Wallace (2008) indicate that at one extreme, the value maximization theory argues that firm/shareholder value maximization should be the overwhelming objective of the corporation. At the other extreme, the stakeholder theory argues that corporate performance should be evaluated in terms of not only the firm`s ability to satisfy its shareholders, but also other stakeholders (e.g. customers, employees). In order to balance the interests of all the stakeholders, it suggests that corporation should take social responsibilities into account, economic profit performance is the base without which corporations cannot fulfill their responsibilities to society, and value maximization cannot be achieved without the support of all corporate stakeholders.

They also mention that environmental issues have been gaining even more people`s attention worldwide for their global impacts and economic significance. And in this study they use a new index of environmental performance first published in 2009 by Newsweek who work together with several environmental agencies: Trucost, KLD Research & Analytics, and CorporateRegister. Com. They assign scores to 500 top US companies from fifteen industry sectors according to the companies` environmental performance, policies score (KLD) and a reputation score (CorporateRegister. Com), then Newsweek and these three agencies compute a composite “green score” that reflects the three aspects of environmental performance. This study is the first one which relate Newsweek`s green score and its components to corporate financial policies and performance. Their analysis is divided into three parts, the first part they examine the determinants of corporate environmental performance and policies, the second part they examine the financial impacts of environmental performance and check their findings by running a first stage regression for environmental performance and using the residual variable to explain capital expenditures. Finally they examine if more environmentally responsible companies invest more smartly by comparing the effects of investments on financial performance between more responsible companies and less responsible companies. Through examining the green score published by Newsweek`s Green Rankings in 2009 and 2010 and performing regression analysis to relate corporate environmental performance and corporate financial performance, they have three findings, at first, long-term compensation, women participation in top management and foreign sales are all positively associated with environmental performance, secondly, more

environmentally responsible companies invest less in fixed assets and research and development after controlling for other firm characteristics that are found to explain corporate investments in finance literature. The third one is that although those firms invest less their investments contribute more to financial performance, and the last two findings consistent with the alternative hypothesis that good environmental policies can reduce agency problems in corporate investment decision.

In the study called “The relationship between corporate social performance and organization size, financial performance and environmental performance: an empirical examination “ by Stanwick (1998) they examine the relationship between corporate social performance of an organization and three variables as above: organization size, financial performance and environmental performance. The corporate social performance of organizations has received an increased focus of attention, and this study builds on this existing research base by examining relationship between CSP and the variables mentioned before, and a sample of firms that meet the following criteria for each year from 1987 through 1992:

1. The firm was listed in the top 500 companies of pollution emissions in the United States Environmental Protection Agency`s Toxic Release Inventory Report
2. The firm was listed in the Fortune Corporate Reputation Index
3. Information about the firm`s level of profitability and sales was available from the Fortune 500 listing

After the test for the relationship between CSP and the three variables, the results shows that for two of the six years of the study (1987, 1990), a firm`s size, financial performance, and environmental performance do impact the level of firm`s CSP, firms which are larger in size, have higher levels of profitability and lower levels of pollution emissions have higher levels of CSP. In addition, three of the four remaining years (1998, 1991, 1992) showed the positive relationship between CSP and sales and profitability, this results show that CSP is a multi-faceted construct which is impacted by various organizational variables. More importantly, the results also support the belief that a strong relationship exist between profitability and corporate social performance, and profitability of the firm allows or encourages managers to

implement programs that increase the level of corporate social responsibility, this study shows that larger firms more likely to recognize the need to be leaders in their commitment to corporate social performance, as the increased influence of additional stakeholders (i.e. environmental groups, government) force organizations to increase their CSP level, on the other hand, higher CSP level also increase the profitability of corporate

There are many other studies have proved that environmental performance has positive relationship with financial performance, Shameek and Cohen (2001) made a further step on it which transfer this relationship into monetary number to value certain actions and performance from organizations` operation which according to the reflection of market, at the beginning of this paper the author points out that U.S. firms spent more than \$120 billion in 1994 to comply with environmental laws, in addition to several billion more on research and development (Vogan, 1996), which is an amount that represents between 1.5% and 2% of gross domestic product (GDP), and the true cost of environmental protection, however, may be much higher. This truth explain the reason why environmental issues have impact on firm`s benefits, and should take account environmental issues into the firm-level strategy, and the empirical question “does the market value firms that have better environmental reputations than those that do not?” arise in recently years, in order to answer this question this paper examines the extent to which a company`s environmental reputation is valued in the marketplace. Comparing with the previous economic literature on firm valuation, this paper is not only focused on the components of firm value and the factors that affect these components, it extends the standard economic technique of decomposing a firm`s market value into its tangible and intangible assets, by separating out environmental performance from the intangible assets of the firm, and find that there is a significant positive relationship between environmental performance and the intangible asset value of publicly traded firms in the S&P 500, the better environmental performance the firm have can led to higher intangible asset value after controlling for other standard variables which could affect the market value of a firm. Though reviewing some previous studies they find that these prior studies suffer from some problems such as small samples, lack of objective environmental performance criteria, and the data the used is too old that nearly 30 years ago.

In recent studies they pay a lot attention on the effect of environmental performance on the market value of publicly traded firms, and most of them have examined the contemporaneous effect of negative environmental events on stock price, Klassen and Mclaughlin (1996) found

significant negative abnormal return when firm had bad environmental news, for instance, oil spills, and positive returns when firms received good environmental performance award. The similar results were found by Karpoff, Lott, and Rankine (1999), Hamilton (1995) found significant negative abnormal returns (averaging \$4.1 million) on the day that the toxic release inventory (TRI) was first announced in 1989 in a sample which contains 436 publicly traded firms which had TRI emissions. Konar and Cohen (1997) had more finding on this result through showing that these abnormal returns were important enough to affect future firm environmental performance, and companies that had the largest stock-price reaction to the announcement of TRI subsequently reduced their TRI emissions more than others in their industry. These previous studies have shown the reflection of market towards the environmental performance of company, the market is sensitive to information that could be used to analyze the operation and performance of firm, which in order to predict the future profitability and strategic direction, as these studies found that market has negative reaction to the bad environmental news, especially shown on the stock price and return, it indicates that the market has changed recently which environmental performance has been valued while considering the value of a company. Shameek and Cohen (2001) in their study apply a different way that do not solely on the risk of bad outcomes such as oil spills or government enforcement actions, instead, they look for evidence that market values positive environmental performance. As mentioned above, the authors decomposing firm valuation into tangible and intangible assets, and mainly explore the relationship between the environmental performance and intangible assets, and find that firms have better environmental reputations could have high intangible assets, and this is why large publicly traded companies invest in environmental-reputation capital, and corporations voluntarily overcomply with environmental regulations and externally portray an image of being environmentally concerned, and their evidence suggests that these companies are rewarded in the marketplace for taking these positive environmental actions. These findings also have its limitations, they are not sure if this relationship is truly casual, does environmental concern really enhance their reputation? Will this possible that spend a lot on environmental quality, but do not create any value to the company? Even there are still lots of questions that they can not understand, their study makes great effort to understand the relationship between firm environmental performance and financial performance, and how the market value the environmental performance, generating important experience for the late studies on this field of research.

In the paper published in 2002 by Schaltegger and Synnestvedt, it discussed about the reasons for the different views about the relationship between environmental performance and economic performance of firms, they don't focus on exploring the existence of this kind of relationship or whether this is a positive or negative relationship, instead they argued that not merely the environmental performance's level, but mainly about the achievement of certain level and kind of environmental management which could influence the economic outcome. Research and business practice should focus more on causal relationships of eco-efficiency and less on general correlations. They pointed out that the reason why the previous empirical studies provide arguments for both sides: many studies support the hypothesis that good environmental performance is not punished, generally pays off and improve the firm's bottom line (e.g. Cohen et al., 1995; Porter and van de Linde, 1995). Others believed that environmental protection mainly causes costs to a company, one of the reason may be the different data sets used in the empirical studies, and the relationship between environmental effort and profit may differ depending on the regulatory regime in a country, the customer behavior, cultural setting, the time span, and the type of industries or size of companies analyzed and other many factors. Another important reason for this difference may be the lack of a clear theoretical framework that used to investigate the links between environmental and economic performance.

In order to solve these problems relate to empirical studies, in this paper the authors give a framework which could be used as a guide and give some recommendations for further research in this field. By using figure the authors try to explain the postulated relation between economic success and environmental protection, and provide several conclusions follow from this Figure, the first one indicates that the environmental performance can vary at a given level of economic success. Point B in this Figure reflects the same economic success as point ES0, this explain the difference that one level of economic success reflects environmental ignorance, the other level of represents a high degree of environmental responsibility. The second one shows that economic effect of firm environmental protection can vary at a given environmental performance level. Third, the correction between economic and environmental performance does not only depends on company external variables, but also substantially depends on internal variables which are influenced by management, managerial qualities moderate the relationship between environmental and economic relationship, and environmental performance's superiority can not necessarily improve the competition advantage (Christmann, 2000; Karagozolu and Lindell, 2000).

At last, the authors conclude that managerial qualities, materialized both by the choice of environmental profile and way how economically a certain profile can be achieved, determine the link between environmental and economic performance, and only after having designed and established the best environmental management concept, then management can choosing the economically best amount of corporate environmental protection activities. Empirical studies should focus more on the different environmental management concepts applied in different firms to explain the casual relations, and the correlations between environmental protection activities and environmental management, moreover, the economic performance as well.

2.3 Market reaction to environmental news

As the the information about companies spread much faster than before through the improvement of technology, investors can obtain the information of the company which they have invested in or going to invest much more easier than before, on the other hand, people now pay more attention on environment protection, environmental friendly behavior could improve the reputation of the company and consumers are more likely to choose companies with good reputation, thus how the stock market react to environmental news have become important as this reaction could be used as an measure when investors value a stock. Weir (2010) studied how the market react to environmental news, in his study, using a event study model that try to capture the effects of the Newsweek Green Rankings, examine he relationship between corporate environmental decisions and stock market reaction. In his paper the 2009 Newsweek Green Rankings are used to analyze the environmental effects on firm`s financial performance which is measured by stock market returns. The study finds that the stock market does not react to most of the individual firm rankings, but react negatively to the whole Newsweek Rankings, this means that the stock market resist the environmental news or the investors do not consider the company`s environmental choices. The data also suggests that investors place a negative value on environmental friendly companies.

Konar and Cohen (2010) point out that there are two paths are predicted by economic theory after a positive environmental decision is made by a firm. One theory suggests that positive benefits will be greater than the costs of environmentally friendly behavior, and the benefits

from things such as increased demand due to a better public image, less input waste in production, less negative attention from regulator, the stock market will also reflect positive to this. The other economic theory suggests that this behavior lead to high operation costs due to the high cost of pollution reducing technology and other things which are friendly to the environment, and if this theory is true, then the positive environmental choices will add negative value on the value of a company.

After the empirical study and analysis, the author indicates that the relationship between a firm`s greenness and its stock market performance is complicated and hard to completely understood, and suggests that there is no or a minimal effect on abnormal return by Green Scores and Rankings. The unexpected Green Rankings had significant effect on abnormal returns, and the stock market did react to the unanticipated component of the Newsweek Ranking. This paper also found that a company that was ranked worse than expected by the market experienced positive abnormal return, and the overall Newsweek Green study has a negative effect on the stock returns for the companies in the study, from this paper it could be found that stock markets do not believe environmentally friendly behavior adds any value to a firm, or even place negative value on firm value.

Kentucky (2011) finds a different result that the environmental performance scores have positive relationship with the stock price and equity return. The author mentioned at beginning of the paper that the green movement started in 1930s has recently picked up pace dramatically. The movement of environmentally conscientious consumers changes the way consumers shop. The last three Gallup polls, 2000, 2003, and 2008, showed roughly 80% of consumers have made either minor or major changes in their shopping and living habits to protect the environment over the last five years (Jones 2008), As a response to this change, producers try to produce more environmentally friendly products, this movement also has positive impact on the financial sector, particularly in consumers` decision to invest their wealth in stocks. The Social Investment Forum (Social 2006) reported that socially responsible investing in the United States has grown from \$162 billion in 1995 to \$1,685 billion in 2005.

Finally the study show s that risk factors, non-risk stock characteristics, and environmental scores variables are statistically significant in affecting stock price and equity return. The four scores increase return on equity as much as 0.06%, 0.38%,

0.40%, and 2.06% respectively, furthermore, one point improvement in the three environmental scores is associated with an increase in an average firm's value (market capitalization) of \$17,840,820, \$29,043,195, and \$99,576,670 respectively.

In conclusion, this chapter reviews the previous studies on the stock valuation methods which used by investors and analysts, the relationship between corporate environmental performance and financial performance, and the market reaction to these company environmental behaviors, according to these previous studies, finding evidence that support the argument which environmental performance have impact on financial performance, and the results of market reaction is mixed, Weir (2010) market react negatively to the environment news which means investors place a negative value on environmental behaviors, Kentucky (2011) reported that environmental performance has positive relationship with the stock price and equity return.

Chapter 3 Methodology and data

In this chapter it will provides details about the methodology which utilized in this study to achieve the research objectives. At first, it will describe the research method adopted to examine the effect of main determinants on stock performance, followed by the data type used, the data collection techniques and the data source. The sample mechanism including the method to select the sample, and the process of identification and measurement of components to construct the empirical model.

3.1 Research aims and objectives

The main aims and objectives of this research are listed below:

1. What are the main determinants of stock performance
2. To what extent these determinants impact the stock performance

3.2 Research method

The research methodology used in this research based on the objectives of this dissertation and the availability of relevant data. As the high volatility of stock market, stock price change frequently within periods of time, and it could be affected by lots of things which off the financial statement of firms, the left fo high level managers, the change of business partners and some events, for instance, the environmental pollution disclosure can also impact company stock price, to reduce the adverse impacts of short-term volatility of stock price, and the limitation from the data of Newsweek Green Ranking which are published once a year, in this paper, the stock return used as a proxy of stock market reaction to the impact of different factors which may have potential influence on a company`s stock value. Weir (2010) in his paper about the market reaction to company environmental news use stock abnormal stock returns as well and said that “the stock market has no reason to intentionally misprice any securities because this would result in an arbitrage possibility”, on the other

hand, the Green Ranking and the green scores should be also accurate, as this Ranking is a new index which published from 2009 that measure the environmental performance of companies, Newsweek will not intentionally produce Fraudulent rankings as it wants to improve the authority of the Ranking in this field and its credibility in the news industry, as a result the information from the Green Rankings is a reliable source

As it discussed in the literature review chapter, lots of previous empirical studies find that the environmental performance of a company would impact its financial performance, and commonly used stock valuation methods are based on the financial information of firm, the impact on company`s financial performance could also determine the market reaction, if the market believe that good environmental performance could add positive value to the company then the stock price is expected to increase, and the stock price would decrease if market believe there is costs associated with the environmentally friendly behaviors will have negative impact on the firm`s value, thus the relationship between the market and the company`s performance which both on financial and environmental should be linear relationship, and this paper will examine the possible linear relationship and find out how the environmental behaviors would impact the stock valuation.

In order to achieve the objectives of this research, this paper will primarily based on the quantitative research method, constructing an econometric model to identify and measure the determinants of stock value, the multiple regression analysis is applied here to measure to what extent each determinant could impact the stock value of a company, at the meantime, highlighting the significance of the impact of the independent variables on dependent variables. Multiple regressions are also utilized to examine the associative relationship between the variables in terms of the relative importance of the independent variables and the dependent variables` predicted values in the constructed model.

To find the components of the model, the available literatures are researched to identify these components, and through summarizing a lot of previous relative empirical studies, Price to earning ratio(P/E ratio), Dividend Yield, earning per share, return on equity, return on invested capital and cash flow to sales ratio are selected to be the explanatory variables to measure the financial performance, the green score, environmental impact score, green policies and performance score and reputation survey score are the explanatory variables measure the environmental performance of firm.

Due to the data availability, other factors which may impact the stock market will not be used in this model, here will focus on the internal determinants that impact the stock value, the external factors which are the macroeconomic issues will be included in the discussion section, integrating with the results and finds from the regression to generate more objective, accurate and reliable finds.

3.3 Empirical model

In this paper, the functional form to test is linear function, the following is a linear regression model which is developed for testing the empirical hypotheses regarding to the impact factors of stock performance.

$$Y_{it} = \alpha_{it} + \beta X_{it} + u_{it}$$

where i denotes the firm; t indicates the period = 2009,2010,2011,2012.

Y = stock performance

X = Independent variables which represent ROE, ROIC, Cash flow/Sale ratio, EPS, dividend yield, P/E ratio, environmental factors.

This model will help to find the relationship between stock performance and determinants to identify which factor is more significant importance relate to stock performance and these finds will be discussed with theoretic evidence.

the panel data is adopted in this paper, so the relative regression model is selected from fixed effect and random effect regression. Fixed effect model is the model that there are omitted variables and these variables are correlated with the variables in the model, and provide a means to control omitted variable bias. In a fixed effects model, the subjects serve as their own controls as whatever effects the omitted variables have on the dependent variable at one time, will also have the same effect at a later time, their effects will be constant, and the value of omitted variables does not change across time, but has the same effect across time. If there are no omitted variable, or there are reasons to believe that the omitted variables are uncorrelated with the explanatory variables in the model, the random effects model is more appropriate, it produces unbiased estimates of the coefficients with all the available data and

produce the smallest standard errors.

The way to choose model between fixed and random effects generally by running a Hausman test (Appendix 4), fixed effects are a good way to run with panel data as they give consistent results, but Random effects is more efficient to run as they give better P-values. According to Hausman test result, the model is estimated through fixed effect regression.

3.4 Data

In this paper the panel data which cross section and time period would be utilized, as the benefits of using panel data here, it could improve the efficiency of the estimates as Hsiao (2003) suggested that panel data set increases the degree of freedom and reduce the collinearity among explanatory variables. And due to the data availability and time constraint the study is based on secondary quantitative data from public database.

As the reason that the Green Rankings just published four years` score, the data collection is subject to the time scale of this ranking, and it is published yearly that make the data have to be annual data to keep the consistency and accuracy of the research, furthermore, as the rankings study and compare the largest United States companies from different industrial sectors, this paper only focus on these United States companies and choose appropriate samples among them, and other data is collected according to these chosen samples.

3.5 Data source

The primary secondary data source in this paper is from the Datastream, which is a comprehensive on-line historical database service provided by Thomson Financial that encompasses a broad range of financial entities and instruments with global geographical coverage, the database updated at the end of every trading day for over 100,000 equities in nearly 200 countries around the world, it also includes data on bonds, options and other derivatives, market indexes, mutual funds, exchange rates, corporate financial data and macroeconomic variables.

A selected set of Worldscope company fundamental data and financial ratios for more than 30,000 companies is available to support this financial market data . In addition, Datastream also provides exchange rates and interest rates as well as some 400,000 economic data

series sourced from central banks, national statistics offices, OECD, and IMF. Forecast data for many developed economies are also available. It has these features below:

- 1.The data can be easily downloaded to Excel, Word, or PowerPoint
2. Simple search through DataStream Navigator
- 3.Excel Add-in DataStream-AFO (Advance for Office) for running complex searches directly in Excel.

Another important data source is the Green Ranking published by Newsweek, which were created in 2009 with ASAP Media, a New York City media development firm founded by editors Peter W. Bernstein and Annalyn Swan. It specializes in creating magazine, book, and online content

It's a comparison of the environmental performance of America's largest public companies. The Newsweek Green Rankings cuts through the green chatter and compares the actual environmental footprints, management (policies, programs, initiatives, controversies), and reporting practices of big companies and teamed up with two leading research organizations to create the most comprehensive rankings available,

It mainly have four components, including the environment impact score, green policies and performance score, reputation survey score, then the green score which is calculated as the weighted sum of the three component. The green rankings provide a new criteria for measuring the environmental performance that is more comprehensive and reliable than other measurement tools before.

3.6 Variables selection and measurement

In this study, two valuation model used as basic ratios of stock valuation, and three financial ratios are used to measure the financial performance. All the chosen variables are described as proxies in the table 1(Appendix 1), and the correlation between the independent variables

are shown in Table 2 (Appendix 2).

3.6.1 Environmental performance

In this study a new environmental performance index is utilized which first published in 2009 by Newsweek who work together with several environmental agencies which namely Trucost, KLD Research & Analytics, and CorporateRegister.com. They assign scores to 500 top US companies from fifteen industry sectors every year according to the companies` environmental performance, policies, and reputation, and summarized by an environmental impact score(Trucost), a green policies score(KLD), and a reputation score(CorporateTegister.com), then these three agencies and Newsweek compute a composite “green score” that reflects the three aspects of environmental performance. The three important components of this green rankings are worked out through huge number of data support and variables analysis, the following is a more detailed description about these three score and how the agencies get them.

The ENVIRONMENTAL IMPACT SCORE, is a comprehensive and standardized quantitative performance measurement which based on data compiled by Trucost that captures the total cost of all environmental impacts of a corporation's global operations. Over 700 variables are summarized in the EIS, containing four major elements which are green gas emissions ((including nine gases in total, with carbon dioxide the most important in many cases), water use (including direct, purchased and cooling), solid waste disposed, and acid rain emissions (sulfur dioxide, nitrogen oxide and ammonia) This figure is normalized against a company's annual revenues, so that companies of all sizes and industries can be compared.

The GREEN POLICIES SCORE, derived from data collected by KLD, reflects an analytical assessment of a company's environmental policies and performance. Its scoring model captures best-in-class policies, programs and initiatives, as well as regulatory infractions, lawsuits and community impacts, among other indicators. The main elements incorporated in the GPS score are: climate change policies and performance, pollution policies and performance, product impacts, environmental stewardship and environmental management.

The REPUTATION SCORE is based on an opinion survey of corporate social responsibility (CSR) professionals, academics and other environmental experts who subscribe to CorporateRegister.com. CEOs or high-ranking officials in all companies on the Newsweek 500 list were also invited to participate

The overall Newsweek Green Score was calculated as the weighted sum of the three component Z-scores: 45 percent for the Environmental Impact Score, 45 percent for the Green Policies Score, which takes into consideration sector differences, to make sure that various industries can be judged against each other and 10 percent for the Reputation Score, which also reflects sector analysis. This methodology and weightings were created in consultation with an independent advisory panel such as Daniel Esty, Hillhouse Professor of Environmental Law and Policy at Yale University and other famous professors to keep the accuracy and objectivity of the rankings.

According to the description above, it can be concluded that the Newsweek's green score has two main advantages. At first, it is formed by combining a continuous green policies score by KLD with the other two score by the rest two agencies, as a result the score should give us a more comprehensive picture of a company's overall environmental performance. Secondly, from a meta analysis of 52 previous studies, Orlitzky, Schmidt and Rynes (2003) show that reputation indices are more correlated with financial performance than are other indicators of corporate social performance. This supports the use of reputation score to supplement the green policies score and the environmental impact score. Second, Newsweek claims that the construction of green score takes into account for sector differences, which make the comparisons more conveniently between companies across different industries.

3.6.2 Financial performance

Financial performance are measured here as explanatory variables, they are all measured as the end of fiscal year and are defined as fellows:

ROE=Return on Equity=Annual Net Income/Average Stockholders' Equity: profitability of stockholders' investments, shows net income as percentage of shareholder equity

These indexes are used in present study to measure the financial performance, Y. Nakao et al

(2007) ROE as the explanatory variables to study the relationship between the environmental performance and financial performance, another reason which use these indexes because these indexes are also the important determinants when analyzing stock value, this would improve the accuracy of estimation in this paper.

Cash flow/sales ratio=Operating cash flows / Net sales

Cash flow to sales ratio shows the amount of operating cash flows per one dollar of sales. This ratio is important as it represents a firm's ability to turn its' sales into cash, to the company's investors, they are interested in how efficiently company's sales turn into cash, and the increasing trends of this ratio might indicate a better performance in debts' management. The reason using this ratio is to avoid the drawbacks and limitation of merely analyzing the impact of operating cash flows and net sales, to study the ability of a firm turns its sales into cash, as the previous studies have proven that cash flow and sales has impact on stock value, here this ration used as an explanatory variable to measure the financial performance of company.

Return on invested capital=Net Income –dividends/Total capital

The ROIC ratio used to assess the efficiency of firm to allocate the capital under its control to profitable investments, this measure could give some information to investors that how efficiency a company could generate returns through using its money

Earning per share= Net income- dividends on preferred stock/average outstanding shares

Earning per share indicate the portion of a company`s profit allocated to each outstanding share of common stock, serves as an indicator of a company`s profitability. it is considered to the most important variable in determining a share`s price, many empirical studies have proven the relationship between the stock price and EPS, Ohlson (1995) discusses the role of earning per share and its role in security valuation, Collins and Kothari (1989) concentrate on the stock price change associated with a given unexpected earnings change, Collins (1999) discusses the effect of negative earning on equity valuation, according these previous studies the EPS is considered as an important variable and in this paper it is used as an explanatory variable.

3.6.3 Stock Valuation Ratios

Price to earning ratio (P/E ratio)= Market value per share/Earning per share

This ratio used to value a company's current share price compared to its per-share earnings.

In general, a high P/E suggests that investors are expecting higher earnings growth in the future compared to companies with a lower P/E. However, the P/E ratio can't tell all the whole story, it's usually more useful to compare the P/E ratios of one company to other companies in the same industry, to the market in general or against the company's own historical P/E, and would not be useful for investors to use P/E ratio as a basis to compare companies from different industry as each industry has different growth prospects. Barker (2010) investigated the valuation models used by analysts and fund managers, and find that P/E ratio was considered as the most important valuation model compare with other models, it shows that both in theoretic study or real operation P/E ratio is significant important valuation model.

Dividend Yield= Annual dividend per share/Price per share

A financial ratio that shows how much a company pays out in dividends each year relative to its share price. If there is no capital gains, the dividend yield become the return on investment for a stock.

Dividend yield is used to measure how much cash flow you are getting for each dollar invested in an equity position.

Investors can secure a relatively stable cash flow through investing in companies with stable and high dividend yields, However, dividend yields can be high when a company is facing financial trouble, may cut the dividend in the near future. Dividend yield could also reflects the situation of a company, normally, a mature, well-established companies tend to have higher dividend yields, while young, growth-oriented companies tend to have lower ones, and most small growing companies don't have a dividend yield at all because they don't pay out dividends.

Dividend yield has long been considered as an important valuation model on equity valuation, Barker (2010) in his study which about importance of valuation model find that Dividend

yield ranks the second significant important valuation model after P/E ratio, Patel, Yao and Barefoot (2006) find a positive relation between the Dividend Yield and stock returns for the S&P 500, moreover, Keppler (1991) analyzes the relation between the average Dividend Yield of a stock index and its subsequent return for three months holding periods among the Indices of 18 different Countries and find that the relation between the Dividend Yield and the return of an index is positive.

Having described and taken the explanatory variables into consideration, the equation of empirical model should be formulated as follow:

$$SR_{it} = \alpha_0 + \alpha_1 ROE_{it} + \alpha_2 ROIC_{it} + \alpha_3 CF/S_{it} + \alpha_4 Dividend\ yield_{it} + \alpha_5 P/E\ ratio_{it} + \alpha_6 GREEN_{it} + \alpha_7 ENVIRON_{it} + \alpha_8 REPUT_{it} + \alpha_9 POLICIES_{it} + \varepsilon_{it}$$

3.7 Limitations

The limitations of this methodology mainly include three aspects, the limitations of data source, sample selection and small time scale. This study is mainly based on quantitative method which all the data are secondary data obtained from the Datastream database and the Newsweek Green Rankings, it may have some bias from data source, the environmental scores may be not correct as they are calculated according to the information which submit by companies themselves. Furthermore, as the samples only focus on the US companies, not including companies of other countries, thus the results from the empirical model may not occur if using samples of different countries. At last, as only studying four years, the time scale of the samples are small, which would impact the quality of the estimation, the results from the estimation may not be reliable enough to the find out the real relationship between stock performance and tested determinants in this study, to improve the quality of this estimation it is necessary to have longer time scale observed samples to improve te reliability of this estimation.

Chapter 4 Empirical results and findings

In this chapter it will provide detail description and analysis about the results from the chapter 3, which in reference to the research aims and objectives of this study that contain the summaries of individual variables, and the analysis of the strength of relationship between the selected determinants and stock performance.

4.1 Descriptive statistics of variables

The table 3 below is a descriptive statistics for all the variables involved in the regression model which include mean, min, max and standard deviation value, this statistics is used to provide an overall description about each variables in the model and served as a screening tool to identify the unreasonable figure.

Variable	Obs	Mean	Std.Dev	Min	Max
Log SR	530	3.309887	0.771195	0.96	6.61
P/E	489	19.51963	26.36775	1.3	528.5
DY	531	1.92162	1.788606	0	11.26
ROE	512	22.33953	64.55972	-118.92	1265.78
ROIC	521	12.11265	11.37817	-88.87	59.95
CFS	529	18.40242	12.17044	-44.07	70.38
GREEN	530	61.09923	17.55826	1	100
ENVIRON	530	52.68672	24.21548	0	100
POLICIES	530	50.16526	21.67491	1	100
REPUTAT	530	38.53423	27.58457	0	100

As the table shows, most of variables have 530 observations, but there are four of them which missed some observations, they are P/E ratio, return on equity, return on invested capital and cash flow/sales ratio, which missed 41, 18, 9 and 1 observations respectively, this is due to the missing figure in the observations and exclusion for outlier.

According to table, variables of return on equity present extreme large standard deviation compared with other variables which is 64.56, it means that the return on equity in companies have more significant variance than other variables, and the P/E ratio also shows a relative large standard deviation among the rest of variables which is the second large one. Furthermore, the environmental factors present relative high standard deviation, which implies that the environmental performance of these companies in USA during the period of 2009 to 2012 have a relative big volatility.

In order to detect the multicollinearity problem in regression model, a correlation matrix for independent variables is analyzed here, the results presents in the table 2 (Appendix 2), it indicates there is no multicollinearity problem exist in this model, which enhanced the reliability of regression analysis.

4.2 Regression results analysis

In the above section 4.1 has discussed and analyzed the summary statistic of variables and the correlation of independent variables in order to test the multicollinearity problem in regression model and find that there is no such problem in this regression model, this section will provide detail description and analysis of the estimation results, try to find the relationship between the stock performance and each independent variables, to explore how and to what extent each of them can impact the stock performance.

As stated in preceding section 3.3, the Hasuman test (Appendix 4) was applied to choose the the most appropriate effect regression between fixed and random effects model, and the test result indicates that fixed effect regression model should be used in this study, the table 4 below reported the empirical estimation of this model.

Independent variable	Dependent variable: Log SR
P/E	.000578 (0.765)

DY	-.0351513 (0.000)
ROE	.0001378 (0.496)
ROIC	.0035597 (0.002)
CFS	.000907 (0.365)
GREEN	-.0032375 (0.000)
ENVIRON	.0008294 (0.008)
POLICIES	.0016923 (0.000)
REPUTAT	.0006013 (0.014)
Cons	3.408962
R ²	0.3602
Prob>F	0.0000
210 firms, period 2009-2012, no.of observation=464 P-values in parentheses Significant at 5% level	

As the table presents, the model is statistical significant that the P-value is 0.0000 with the R² of %36, which means 36% variance in dependent variable Log SR can be explained by the model, however, this also means that left around 60% of variance unexplained which it could be said this outcome is not very satisfactory, lost of factors could lead to this unsatisfactory outcome, the limitations of data and samples, the reliability of the data source and many other factors. As there are very few existing empirical study on this topic, this model is a relative new and original one, the outcome may be not very satisfactory, but comparing with other empirical study, it is not so bad and can be said that it is a relative good one.

4.2.1 Stock valuation ratios

The fixed effect model shows that P/E ratio is positively related to the SR, and statistically insignificant, it means that P/E ratio has little relationship on stock performance. The results relates to P/E ratio are complicated referring to previous studies, Barker (2010) investigated the valuation models used by analysts and fund managers, and find that P/E ratio was considered as the most important valuation model compare with other model. Chisholm (2009) find P/E ratio is used to value weather shares are “dear and cheap” to each other, many investors are prepared to pay a premium for high growth expectations in a high P/E ratio, he concludes that P/E ratios are important indicators both to estimate the intrinsic value of a stock within the fundamental analysis, and to analyze the value of a stock by many investors and analysts.

Nicholson (1960) find a negative relationship that a low P/E ratio stocks have a better investment performance than stocks with a high P/E ratio, Basu (1977) pointed out that stocks with low P/E ratio can provide a higher financial return compared to stocks with high P/E ratio, and investors prefer to invest in low P/E ratio stock than high P/E ratios ones, he also finds that returns on portfolios of low P/E stocks are higher on average than returns on higher P/E stocks, even after adjusting the risk.

Basu (1983) and Banz and Rolf (1981) find evidence that stock returns are positively affected by their fundamental values . On the other hand, Fama and French (1992, 1988), and Basu (1975) in their studies find a contradictory results that stock returns are negatively affected by their fundamental values. Therefore, to summarize the impact of P/E ratio on stock performance is ambiguous even it has been used in practice by many investors and analysts to study the stock performance, and further research is required.

As to the dividend yield, the fixed effect model reports the dividend yield has a negative impact on SR with statistical significance, it implies that high dividend yield lead to low stock return. However, the low coefficient which is nearly to zero implies that dividend yield has little impact on stock performance in our model. Comparing with the previous studies, Patel, Yao and Barefoot (2006) find a positive relation between the Dividend Yield and stock

returns for the S&P 500, moreover, Keppler (1991) analyzes the relation between the average Dividend Yield of a stock index and its subsequent return for three months holding periods among the Indices of 18 different Countries and find that the relation between the Dividend Yield and the return of an index is positive.

4.2.2 Financial performance

Return on equity

Return on equity is an important measure of financial performance, normally the higher the ratio, the better profitability a company performs. The regression model shows a positive relationship on SR, which is statistically insignificant, which implies that ROE has little impact on stock performance in our model. ROE is always used to measure the profitability of a company, logically the higher profitability of a company, the better performance of its stock in market. However, the results concerning ROE are different while referring to previous studies, Kennedy and Johnson (2003) find a negative relationship on stock return, but statistically insignificant, Shehla (2013) finds that return on equity (ROE) has no statistically significant effect on the share price. Therefore, even ROE presents the profitability of a company, it cannot be said that it will impact the stock performance in the market.

Return on invested capital

ROIC is used to measure how efficiently a company could generate returns through using its money. Here the results of the model show a positive relationship with statistical significance, which implies that ROIC has an impact on the stock performance in this model. RS Investments (2010) finds that ROIC is the essential measure of intrinsic value, and executives who are good stewards of capital are best positioned to drive shareholder value, an improving ROIC can be a powerful predictor of stock performance. Furthermore, the degree of change in a company's ROIC is the key predictor of long-term stock price outperformance, firms with strong and consistent ROIC have already been recognized and are highly valued by the market. Therefore ROIC has a positive impact on stock performance, which is consistent with the results of the model and previous studies.

Cash flow to sales

This ratio is important as it represents how efficiently a company's sales turn into cash, and the

impact of CF/S is not significant in the model, referring to previous studies, Huang (2009) uses the Using the standard deviations of cashflow to sales as proxy for cashflow volatility and find there is negative relationship between the cashflow volatility and the stock return, which means the higher cashflow volatility, the lower stock return, this is in line with the logical relationship.

4.2.3 Environmental factors

The impact of environmental variables on stock performance is the most important part of this model, there is few previous studies which focus on the environmental impact on stock performance, to study the relationship between environmental performance and stock performance could provide a better understanding the role of environmental factors in the stock valuation and how the market react to these factors.

According to the results of the regression model, both the green score and three components of it are statistically significant, which indicate that environmental factors have impact on stock performance in the model of this study.

This outcome is in line with our expectation, however, referring to previous studies, the results toward environmental factors are mixed, Weir (2010) in his study finds evidence that the stock market does not react to most of the individual firm rankings, but does react negatively to the whole Newsweek Rankings itself, this may implies that investors do not consider the relative environmental choices of firms or that the stock market does not like hearing about environmental news. The data also suggests that investors react negatively to news that a company is more environmentally friendly, this potentially means that investors place a negative value on environmentally conscious corporations.

In terms of green score, the model shows that the green score is negatively related to stock return, and is statistically significant, implies it has negative impact on the stock performance, as there are very few studies which apply Newsweek Green Rankings, the critical argument about this impact can not find enough empirical evidence to make a conclusion, one of the few studies by Weir (2010) find that there is no effects of green score on stock return, to

conclusion impact of green score on stock performance remains ambiguous and further research is required.

The environmental impact score measure how a firm's conduct in mitigating environmental degradation. Therefore the higher the score is the better their conduct in reducing their impact in degrading the environment, the regression model shows a positive relationship with statistical significance, implies that it has impact on the stock return, but the coefficient is nearly to zero, the impact is very small or has little impact at all. Referring to previous study, Shimshack and Lyon (2011) in their study find that overall green score, environmental impact score, or environmental policy score had no independent market impact, Muhammad (2011) indicates that environmental scores variables are statistically significant in affecting stock price and equity return, however, Kentucky (2011) finds that there is a significant negative sign of environmental impact score on stock price.

The green policies and performance also has positive and significant impact on stock performance in the model, This policy measures firms' investment on policies on climate change, pollution, product impacts, and environmental stewardships. Referring to previous studies, Feldman, et al. (1996) found significant indirect relationship between environmental policy and stock process that companies' investment on environmental management and policy will reduce their risk value, lower risk values associated with higher stock prices. However, as discussed above, Shimshack and Lyon (2011) find green policies and performance has no market impact. Different studies figure out different outcomes, the argument will continue and further research is required.

The last one is environmental survey score, it measures companies' reputation in environmental conduct including performance, communication, commitment, track record and ambassadors, and this score was given by CEOs, sector environmental specialist, and other participants. The fixed effects model show a positive relationship with statistical significance, implies REPUTAT has an impact on stock performance, comparing with previous studies, Feldman, et al. (1996) find that its effect is quadratic relationship that follow the inverse parabola function with a minimum value of 14, REPUTAT has a negative effect to the stock price when the value between 1 to 14, and the higher the score the higher the stock price after the value reaches higher than 14, this is reasonable as low value of this score indicates a poor reputation, as the this score was given by CEOs and other professional

participants, their attitude could more or less represent the market's reaction, a poor reputation will damage the image of the firm, market will react to this and impact the stock performance of the company.

The results in this model establish a correlation between dividend yield, return on invested capital, environmental factors and their impact on stock performance, this correlation normally indicate that firms that have low dividend yield and green score with strong environmental performance which except the green score, their stocks are expected to have better performance in the market. However, referring to previous studies, the results are not always in line with the expectation, the market may react negatively to environmentally friendly behaviors as investors may place negative value on these behaviors. Furthermore, the issues relate to the causality between stock performance and determinants needs further research to address, especially for the environmental factors, weather the companies with good environmental performance will lead to good performance in stock market remain ambiguous, there are lots of other factors which have impact on companies stock performance, and good performance in stock market do not mean companies perform well on environmental issues.

Chapter 5 Discussion

Based on previous studies and empirical findings from this study, this chapters will provides a detailed discussion on the implications of tested determinants of stock performance and emphasis on stock valuation practice in companies.

Referring to the literatures discussed in the chapter 2, the stock performance is determined by many factors, including the financial performance, the information of companies such as the change of management, the new projects or investment and new strategy, and the environmental performance have impact on the stock performance, and the financial performance can be impacted by environmental performance as the previous studies have found the positive relationship between the financial performance and environmental performance, and the way that environmental performance impact stock performance is mainly through impacting the expectation of future financial performance. The traditional methods of stock valuation mainly based on the financial information and data, here will discuss how to use the environmental performance as a new measure in the stock valuation process.

Before discussing how to use new measures into stock valuation, it is necessary to have a briefly review the key determinants of stock performance in firms.

5.1 Financial factors impact on stock performance

In the regression model of this study test several variables which have potential impact on stock performance, here focus on the two variables (DY and ROIC) which found have impact on stock performance with statistical significance.

Dividend yield shows how much a company pays out in dividends each year relative to its share price, as discussed above dividend yield has long been considered as an important valuation model on equity valuation, Barker (2010) in his study which about importance of valuation model find that Dividend yield ranks the second significant important valuation

model after P/E ratio, Patel, Yao and Barefoot (2006) find a positive relation between the Dividend Yield and stock returns for the S&P 500, according to its calculation: annual dividend per share/price per share, this model is determined by the dividend pay out from companies, and the amount of dividend based on the dividend policy of companies. Therefore, the dividend policy is an important subject to study when value the stock of a company. However, dividend yield also has limitation which used to value a stock, for instance, dividend yields can be high when a company is facing financial trouble, may cut the dividend in the near future. Moreover, when using dividend yield to analyze the stock value, the situation of companies also need to be taken into consideration, as normally, a mature, well-established companies tend to have higher dividend yields, while young, growth-oriented companies tend to have lower ones, and most small growing companies don't have a dividend yield at all because they don't pay out dividends, thus when analyzing a small growing companies this model is not appropriate.

As to the return on invested capital, ROIC is used to measure how efficiency a company could generate returns through using its money, that is how efficiency of a company's investment, this is an important index to measure the profitability of a firm, referring to previous studies, RS Investments (2010) finds that ROIC is the essential measure of intrinsic value, and executives who are good stewards of capital are best positioned to drive shareholder value, an improving ROIC can be a powerful predictor of stock performance. Furthermore, the degree of change in a company's ROIC that is the key predictor of long-term stock price outperformance, firms with strong and consistent ROIC have already been recognized and are highly valued by the market. Therefore, high ROIC value implies a good performance in stock market seems reasonable. On the other hand, company investment decision also has relationship with environmental performance, Kraus and Zechner (2001) and Barnea, Heinkel and Krause (2005) that greener companies can invest more because they enjoy a lower cost of capital, Chang, X., Fu, K.K, and Tam, H.K. (2012) finds the contrary view that more environmentally responsible companies invest less as capital investment is negatively associated with environmental performance, and good environmental policies can alleviate agency problems in corporate investment decisions by forcing managers to consider carefully about their investment decisions. Furthermore, Chang, X., Fu, K.K, and Tam, H.K. (2012) finds that more environmentally responsible companies also invest more smartly and their investments are more enhancing to their financial performance.

5.2 Environmental factors

Environmental performance of companies has become a hot topic in recently years, as the development of corporate social responsibility, companies pay more attention and resource to maintain or improve their reputation and image to attract potential customers and investors, and more and more governments start to make strict environmental policies to regular corporate`s behaviors, broken the rules may lead to huge amount of penalty and serious consequence. In this study the impact of environmental performance on stock performance has been tested use the fixed effects regression model, the results of the model show that environmental factors do have impact on stock performance, and referring to previous studies that evidence can be found to support this argument of this study just as discussed in the chapter 2, here will discuss how to apply environmental performance into the stock valuation as a new measure with referring to previous studies and the findings from the empirical study.

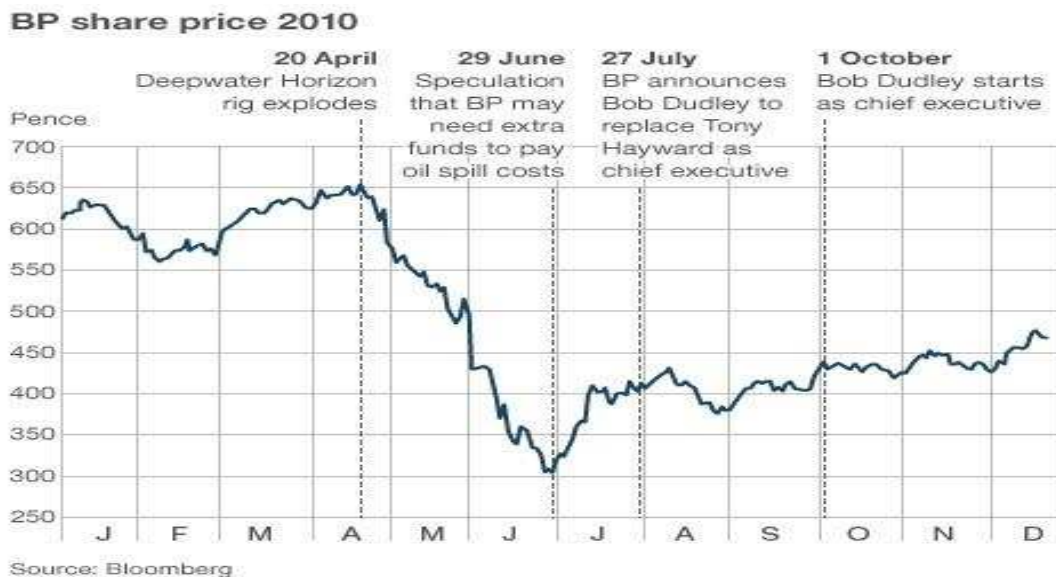
This discussion will dividend into two parts, the first part mainly focus on the impact of environmental news on stock performance of firms in a relative short-term period. The second part focus more on the impact of environmental performance on companies` long-term stock performance.

5.2.1 Short-term period impact on stock performance

Weir (2010) studied how the market react to environmental news, find that stock market does not react to most of the individual firm rankings, but does react negatively to the Newsweek Rankings as a whole. This could mean that investors do not consider the relative environmental choices of firms or that the stock market does not like hearing about environmental news, it also suggests that investors react negatively to news that a company is more environmentally friendly. This paper study the market reaction to the environmental news during a short-term period, this kind of reactions are occurs quickly and normally last for a while, and most of time they are bad news and have negative impact on stock price of company.

Concerning about this kind of impact on stock performance, the suggestion is to apply a two steps method to evaluate to what extent this news may impact the stock performance. The

first step is to identify whether this is good news such as an environmental award, or it is totally bad news that will impact the operation of the company or have a certain amount of loss associated with the event. If it is good news, the market should react positively to it, or even if the market reacts slightly negatively to this news, it won't have a big influence on the stock price. The second step is to evaluate how long this impact will last; the longer it lasts, the more impact it has on the stock price. One of the famous cases from BP, which suffered a huge loss in market value in the Gulf of Mexico explosion on 20 April 2010, saw its stock fall by 52% in 50 days on the New York Stock Exchange, from \$60.57 on 20 April 2010, to \$29.20 on 9 June, with a total value lost of \$105 billion. The figure below shows the stock price change since 20 April, with the sharp fall occurring since the explosion.



Source: Bloomberg, 2010

For this kind of environmental news, the stock price will drop fast as the market reacts quickly to this bad news and the impact will last for a while.

5.2.2 Long-term period impact on stock performance

Long-term period impact focuses on the impact of companies' long-term environmental performance on stock performance. The results of the regression model in this study indicate that environmental variables have an impact on stock performance. Referring to previous studies can also find evidence to support this argument, therefore taking the environmental

performance into account when valuing a stock seems necessary now.

Evidence could be found from the previous studies, such as Kentucky (2011) study the Newsweek Greening Ranking found that environmental scores variables have impact on stock price and equity return. The four scores increase return on equity as much as 0.06%, 0.38%, 0.40%, and 2.06% respectively, a one point improvement in the three environmental scores is associated with an increase in an average firm's value (market capitalization) of \$17,840,820, \$29,043,195, and \$99,576,670 respectively.

Back to the environmental score tested in the model, three of them are positive relate to the stock performance except the overall green score, this in line with the outcome of the study by Kentucky (2011). Unlike the environmental news which impact the stock price within short-term period, the environmental scores are sustaining and long-term impact on the stock performance, and this impact will become much bigger with the increasing awareness of environment protection and stricter environmental policies made by government. The benefit of being green will attract more companies to allocate more resource to improve their environmental performance.

In terms of the three environmental scores (ENVIRON, REPUTAT and POLICIES), they are interrelated and all have impact on stock performance, environmental impact score, which measure how a firm's conduct in mitigating environmental degradation, will impact the reputation of a company, and the behaviors which a firm apply to mitigate environmental degradation is based on the environmental policies of the company, thus these scores should be analyzed together while using them as measures to value a stock. Referring to the results of the regression model, the coefficient of green policies score is 0.017 which is larger than other two scores, this is in line with expectation that environmental policies has the biggest impact on the stock performance. Therefore evaluating the environmental performance impact on stock performance should pay more attention on the environmental policies as only a company have effective policies can support a sustaining and long-term good environmental performance. The reputation is also an important factor as a good reputation could improve companies` image, attracting more investors and customers and ensure the financial performance. However, having good and effective environmental policies can not guarantee companies will follow these policies, therefore the environmental impact score help to check the real actions which companies have done to mitigate environmental

degradation.

In conclusion, incorporating the environmental performance as new measure into stock valuation provide a new way to analyze the value of a stock which different from the traditional methods that focus on the financial statement information and data, as the increasing awareness of environment protection and stricter government environmental policies and rules, this new environment measure will play a more important role in stock valuation.

Chapter 6 Conclusion

This paper aims to study the relationship between corporate environmental performance and firm stock performance, to examine the key determinants that to what extent each of them exert impact on stock performance, and discuss how the environmental issues impact corporate financial performance and stock performance, finally explore a way which incorporate the environmental performance as new measure into stock valuation.

To achieve the aims of this study, previous studies have been reviewed, the studies about the traditional valuation methods were reviewed at first which try to find out the traditional determinants of the stock performance, these determinants normally come from corporate financial statement contains the financial information a company. Next the studies concerning about the relationship between environmental performance and financial performance were reviewed to construct the logical relationship between environment performance and financial performance. Finally focus on the studies about how the market react to the environmental issues, find evidence to support the argument that environmental performance have impact on stock performance.

After reviewing the previous studies several variables have been proposed to be the explanatory variables, studies with the traditional determinants employ variables include Price to equity ratio(P/E), Dividend Yield (DY), return on equity, return on invested capital, cash flow to sales, while four environmental scores from the Newsweek Green Rankings used as environmental variables to measure the corporate environmental performance

Based on the previous studies, this paper investigates the impact of proposed determinants on company's stock performance over the period of 2009 to 2012, to comply with the objective of this research, this paper is based on quantitative research method, and obtain data from the DataStream data base and Newsweek website to construct an econometric model to examine the effect of the determinants on firms stock performance with the multiple regression analysis adopted. A sample size of 228 US companies in the period time of 2009 to 2012 generated an unbalanced panel data set of 532 observations construct the basis of the econometric analysis in order to achieve the research objectives and aims.

The empirical results and findings from the model of this study suggest that: P/E ratio is positively related to the SR, but statistically insignificant, it means that P/E ratio has little relationship on stock performance. However, previous studies found evidence indicate that P/E ratio has relationship with stock performance, both negative and positive, to summarize the impact of P/E ratio on stock performance is ambiguous even it has been used in practice by many investors and analysts to study the stock performance, and further research is required. Second, the model also reports the dividend yield has a negative impact on stock performance with statistical significance, it implies that high dividend yield lead to low stock return. However, the low coefficient which is nearly to zero implies that dividend yield has little impact on stock performance in our model. Third, only ROIC shows a positive result with statistic significant among the three financial performance variables, implies that the efficiency a company could generate returns through using its money has important impact on stock performance of a company, the rest two variables is statistic insignificance in the model of this study, however, previous studies found evidence that they have impact on company stock performance. Finally the outcome of environmental performance variables shows that they all have impact on the stock performance, which is in line with expectation that environmental performance play an important role in the stock performance, except the overall green score which is negative relate the stock return, the other three scores all report a positive relationship with stock performance, and the coefficient of environment policies score is relatively high compared with other two variables, this is in line with the analysis that corporate environmental behaviors is based on its environmental policies, only when firms have made a effective policies could support a good environmental performance, and the reputation gain from the environmental behaviors which engage in mitigating environmental degradation.

As the findings indicate that the three environmental performance scores (ENVIRON, POLICIES and REPUTAT) do have positive impact on stock performance, the further discussion on how to use the environmental as a new measure to value a stock is included in Chapter 5, in particular, it provides a briefly discussion of the findings from chapter 4, then discussing how to take the environmental issues into account while valuing a stock. This discussion include two parts, the first part discuss the short-term period impact on stock performance, this mainly relate to the unpredictable environmental news impact on the stock price within a short-term period, and a two-steps method was introduced which the first step

is identify weather it is a good news, and second step is evaluate how long the impact of the environmental new will last, if it is a good news, then the longer the impact lasts, the more the stock value will increase, otherwise, the stock price will fall and normally this fall will occur quickly as the market reaction to this news is fast.

The second part focus on long-term period impact on stock performance, unlike the environmental news which impact the stock price within short-term period, this part discuss how the stock performance could be affected by corporate` long-term environmental performance, this is particularly for the investors who willing to hold a stock for relatively long time, as the environmental behaviors can not immediately show a significant impact on stock performance. Based on the findings from chapter 4, compared with other two environmental variables, the environmental policies is the basis of companies environmental performance as only effective environmental policies can support long-term environmental behaviors, thus the environmental policies is important that need pay more attention on it when analyze environmental performance of a company. The better environmental performance a company achieves implies a better stock performance, taking the environmental performance into account while valuing a stock make the valuation process more comprehensive and reliable.

6.1 limitations and future research suggestion

This paper provide a examination of the relationship between corporate environmental performance and stock performance, as stated in section 3.7, there are some limitations associated with this study, as the study is mainly based on quantitative method that data are all secondary obtained from the Datastream database and the Newsweek website, bias may exist in this source, especially the environmental scores which calculated according to the information submit by companies themselves. The samples only are selected from US companies that may not represent the situation in other countries, as corporate environmental performance rely on people`s awareness and government policies on environment protection, using the samples from developing countries may lead to a different outcome, thus the future research should examine this relationship by using samples from other countries and compare the outcomes to provide a more comprehensive study and improve the outcome`s reliability.

The time scale is also not wide enough as it has only four years, the further research is required to study a longer time period to improve the reliability of the estimation.

Due to the time constraints and data available, this study does not examine the impact of macroeconomic variables such as the GDP growth on stock performance, these omitted variables may have impact on stock performance, the future research should include these variables into the model to spot the potential macroeconomic factors that have impact on corporate stock performance.

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Appendix

Appendix 1

Table 1 Definition notation of the variables of regression model on stock performance

	Variables	Notation	Description
Dependent variable	Stock return	SR	A financial ratio shows how much a company pays out in dividends each year relative to its share price
Independent variables	Return on equity	ROE	Annual Net Income/Average Stockholders' Equity: profitability of stockholders' investments,
	Return on invested capital	ROIC	This ratio used to assess the efficiency of firm to allocate the capital under its control to profitable investments
	Earning per share	EPS	Earning per share indicate the portion of a company`s profit allocated to each outstanding share of common stock
	Cash flow/sales	CFS	Cash flow to sales ratio shows the amount of operating cash flows per one dollar of sales. sales into cash
	Green score	GREEN	It is calculated as the weighted sum of the three components
	Environment impact score	ENVIRON	is a comprehensive and standardized quantitative performance measurement captures the total cost of all environmental impacts of a corporation's global operations
	Green policies score	POLICIES	It reflects an analytic assessment of a company's environmental policies and performance

	Reputation score	REPUT	It is based on an opinion survey of corporate social responsibility (CSR)
	Price to earning ratio	P/E	Market value per share/Earning per share
	Dividend yield	DY	Annual dividend per share/Price per share

Appendix 2

Table 2 Table 2 Independent Variables Correlation

	PE	DY	ROE	ROIC	CFS	GREEN	ENVIRON	POLICIES	REPUTAT
PE	1.0000								
DY	-0.0329	1.0000							
ROE	-0.0494	0.2274	1.0000						
ROIC	-0.075	-0.0793	0.259	1.0000					
CFS	0.1159	0.0719	-0.055	0.0371	1.0000				
GREEN	-0.007	-0.0351	0.0348	0.1367	-0.0087	1.0000			
ENVIRON	0.0757	-0.1403	0.0562	0.0552	-0.0088	0.3964	1.0000		
POLICIE	-0.0873	0.1547	0.0473	0.1089	-0.0859	0.5561	0.1717	1.0000	
S									
REPUTAT	-0.0904	0.0867	0.0021	0.0252	-0.0314	0.5472	-0.0109	0.536	1.0000

The correlation matrix shows that there is no multicollinearity problem as none of the correlation coefficients are more than 0.75.

Table 3 Descriptive Statistics of variables

Variable	Obs	Mean	Std.Dev	Min	Max
Log SR	530	3.309887	0.771195	0.96	6.61
P/E	489	19.51963	26.36775	1.3	528.5
DY	531	1.92162	1.788606	0	11.26
ROE	512	22.33953	64.55972	-118.92	1265.78
ROIC	521	12.11265	11.37817	-88.87	59.95
CFS	529	18.40242	12.17044	-44.07	70.38
GREEN	530	61.09923	17.55826	1	100
ENVIRON	530	52.68672	24.21548	0	100
POLICIES	530	50.16526	21.67491	1	100
REPUTAT	530	38.53423	27.58457	0	100

Appendix 3

Table 4 Estimation for fixed effect model

Independent variable	Dependent variable: Log SR
P/E	.000578 (0.765)
DY	-.0351513 (0.000)
ROE	.0001378 (0.496)
ROIC	.0035597 (0.002)
CFS	.000907 (0.365)
GREEN	-.0032375 (0.000)
ENVIRON	.0008294 (0.008)
POLICIES	.0016923 (0.000)
REPUTAT	.0006013 (0.014)
Cons	3.408962
R ²	0.3602
Prob>F	0.0000
210 firms, period 2009-2012, no.of observation=464 P-values in parentheses Significant at 5% level	

Appendix 4

Model Selection: Hausman Test

```
. hausman fixed random
```

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fixed	(B) random		
pe	.0000578	.0000627	-4.94e-06	.
dy	-.0351513	-.0301814	-.0049699	.0007819
roe	.0001378	.0001443	-6.53e-06	.0000544
roic	.0035597	.0036845	-.0001247	.0001131
cfs	.000907	.0010723	-.0001652	.000146
green	-.0032375	-.0031198	-.0001178	.
environ	.0008294	.0008343	-4.88e-06	.
policies	.0016923	.0017034	-.0000111	.
reputat	.0006013	.000607	-5.70e-06	.

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(9) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 31.32
Prob>chi2 = 0.0003
(V_b-V_B is not positive definite)
```