# MK7227 **u**1033426 **Dissertation**

# Identifying ESG Correlation with Corporate Financial Performance: Research on Exploration & Production Oil and Gas Companies

A dissertation submitted in partial fulfilment of the requirements of the Royal Docks Business School, University of East London for the degree of MSc Finance and Risk

**May 2015**

**15,232 words**

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# Identifying ESG Correlation with Corporate Financial Performance: Research on Exploration & Production Sector of Oil and Gas Industry

**Master's Thesis on Sustainability Investment**

SUPERVISOR: **CARMELA D'AVINO** // SPRING SEMESTER B 2015

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Return on Assets (ROA),
Tobin's Q (Q)


Tag Cloud
The 50 most common words used in the thesis.
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## Abstract


**Purpose:** The research paper purpose is to investigate the ESG correlation with financial performance from operational accounting and intrinsic firm value perspective. The study thoroughly concentrates on E&P companies in UK, Canada and US because there is a deficiency of studies analysing single industry or sector. Moreover, the study is going to add a particular value to investors and stakeholders involved in the E&P companies.

**Critical Literature Review:** The literature review examines individually E, S, and G factors in prior research papers in order to establish a foundation to construct the current study thesis with particular focus on E-score because of its pivotal impact on E&P sector.

**Methodology** An Ordinary Least Squares (OLS) panel data method is used in EViews 8, econometric software, to test the ESG factors and financial performance correlation. In addition, the companies' financial data is collected via the Bloomberg Professional Service Terminal while the ESG data via Thomson Reuters DataStream.

**Data Analysis:** The empirical framework is divided into two models, which consist of 73 and 34 E&P companies over the period from 2009 to 2014. The first model aims to identify prior studies suggested variables as irrelevant for the E&P sector. Whereas, the second model purpose is to enhance the first model equation and to supplement unique determinants for the E&P companies.

**Findings:** The first model results prove a gap in the previous studies by identifying weak explanatory power in the variables. However, the second model signifies an enhanced model with better-integrated variables. In result, the operating performance demonstrates a positive correlation with E-score while firm value indicates a negative correlation, which is inconsistent with the majority of research papers findings.

## Acknowledgments

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# Table of Contents

# 1. Introduction

Corporate Financial Performance (CFP) is investors' fundamental indicatorto determine suitable companies to invest in, for this reason researchers endeavoured to identify a positive link between the CFP and Environmental, Social, and Governance (ESG) factors, which has been a serious bone of contention until nowadays. The positive relationship between CFP and ESG would translate into the reallocation of investments towards sustainable companies that is the main purpose of the prior researches.

Bowen (1953) was the first to address the complexity of Corporate Social Responsibility (CSR) integration into a company's internal and external activities. Thus, researchers enhanced the importance of the CFP and CSP relationship foremost after the first major wave of social concerns regarding an institution's ethical principles (Sustainability Investment 2012). These concerns made it more imperative to identify a relationship between an institution's ESG and CFP indicators in order to encourage investors to obtain stocks with better governing transparency towards the environment and social initiatives. The desirable outcome that the researchers endeavour to find is a better ESG score to determine premium returns in comparison to worse ESG performing institutions throughout the investment span. More significantly, contemporary research papers such as Derwall (2007), Weber (2010) and Bauer (2005) have investigated how greater transparency may serve as a tool to improve investor trust into institutional management and the necessity for organisations to engage with ESG issues.

The sustainability indices are predominant criteria to evaluate the institution's ESG scores, which are based on the institution's financial statements release and data transparency. Among the most popular sustainability indices are the FTSE4GOOD comprised of European Stocks, the Dow Jones Sustainability Indices consisting mainly of US stocks, and the MSCI

World Sustainability Indices forming an impeccable ESG firm valuation tool. For instance, the application of sustainability indices is revealed in Figure 1; Landier, Augustin and Nair (2009) discovered that the company selected sustainability portfolio outperformed by approximately 5 percent per the S&P 500 index. However, the investor's intrinsic desire for financial performance is likely to be a predominant factor in the portfolio selection process. This further strengthens the thesis that there is a stakeholder interest to investigate upon what extent ESG and CFP are influenced by each other. There is an ESG estimation model restriction noted by Villalonga (2000) that the value could be difficult to interpret;

Villalonga (2000) *"Intangibles appear to be a double-edged sword, as a result of their greater stickiness relative to tangible resources."*

The following characteristic plays a significant role in determining the intangible value of companies highly dependent on their resources, for example, the oil and gas industry.

### *Sustainability Organisations*

The United Nations (UN)'s Principles for Responsible Investment (PRI) initiative is one of the major non-profit organisations promoting institutions to integrate ESG factors. The upward trend of adopting ESG factors by investors, asset managers and institutions is expressed in the latest results produced in the PRI annual report. ESG's rapid expansion among signatories can be confirmed by analysing Figure 2; UN for PRI where there is clear consistent growth in participants, reaching to a 45 billion dollars asset under management (AUM) adopting PRI standards (Press Release 2014). The PRI's six principles aim to implement better ESG governance and comprehension, illustrated in Figure 3 where ESG collaboration is emphasized in order to create a coherent

Sustainability Investment (SI) framework. Moreover, the Global Reporting Initiative (GRI) is a leading organisation in sustainability reporting aiming to create comprehensive guidelines for evaluating institutional ESG performance. The increased growth from 30 to 42 percent clarify the previous inference (Press Release 2014). The ESG's importance is clearly rising at an exponential rate for stakeholders, although it cannot be determined as an investor influential indicator if it is taken in isolation; in other words, it is necessary for academia to determine the link between both CFP and ESG. In fact, the current research paper thesis stems from the question stated above. In addition, ESG requires a comprehensive benchmark among industries and a detailed scoring system for each factor to translate into a valuable indication of firm performance in regards to the ESG standards.

Mercer's (2007) report has demonstrated a well-organized academic literature critical analysis regarding the last decade, and it has discovered valuable results regarding environmental, social, governance, individual, and combined results reflecting the correlations between corporate and social performance. In addition, Mercer's (2006) report complemented Margolis and Walsh's (2003) earlier findings on CFP and CSP correlation that has been dominated by positive paper results. However, it cannot be concluded that the link between CFP and CSP is going to be positive at all times because there are reports such as Chong (2006), Geczy (2005), and Hong and Kacperczyk (2006) that yielded negative results in their corporate studies. Out of Mercer's brokers and academic reports review, there are 30 reports in total: 13 positive relationships; 14 neutral relationships; 3 negative relationships; and 5 resulted in mixed-relationships. Most of the studies focused on a broad industry scale and funds' performance. It is clear that there is a shortage of studies in this area; more specifically, few industry or even sector studies analyse particular ESG factors. This research niche is addressed in the current report. In addition, the Sustainable Investing (2012) report by Deutche bank is consistent with

previous findings that the cost of debt and equity capital is positively correlated with ESG. More than 85 percent of the studies justify that a higher ESG score relates to a company's better operational and market performance. There are only four studies integrating all ESG factors, but they are utilised in a broad aspect where the value recognition for the particular sector or industry has been diluted. In fact, the current study focuses on a narrow sector that is the exploration and production (E&P) companies from the oil and gas industry. Sandor et al. (2014) stated that there is a research gap regarding single industry studies that needs to be developed in order to clear the perplexity about the ESG's effect on operating performance. As a response, the current paper aims to bridge this gap in the literature in order to build a model adopting unique explanatory variables for the E&P sector because there is no evidence of a researcher who focuses on this particular gap in the literature.

### *Canada, US and UK E&P Sector*

Thomson Reuters (2014) defined E&P as the most highly fragmented and unique product-based sector of the oil and gas industry; in other words, there is an oligopoly in the E&P sector because of the high number of acquisitions. The E&P sector has been selected because of its potentially negative impact on the environment, and consequently the ESG factors are going to be crucial indicators for determining operating performance. Hence, Thomson Reuters' highly respected and detailed financial data software, ASSET4, is utilised to identify the link between ESG factors and operating performance collected via Bloomberg software, which is explained in the research methodology part of the paper. The Canada, US and UK sectors have been selected because of the restrictions imposed by the small universe of Thomson Reuters' ASSET4, ESG score, data. On the other hand, the narrow niche market research of the paper is likely to produce valuable results and unprecedented determinants. Another

restriction could be caused by the high numbers of Mergers and Acquisitions (M&A) in the oil and gas industry.

Hughey and Sulkowski (2012) and Graham and Maher (2006) showed that the E&P companies are highly indebted, which translates into negative cash flows, particularly for the small cap companies. It is thus a potential obstacle to analyse data including small companies because it is likely to cause outliers to appear in the data. As it was researched, Brooks (2008) stated that outliers in the data are highly undesirable because they interfere with the normal distribution characteristics of the data. However, the current paper addresses the major concerns in the research methodology. In addition, analysed from the data sample, E&P larger cap companies have shown high consistency attaining higher transparency that is directly translated in higher ESG scores, while smaller E&P companies' lack of reporting consistency automatically reduced the overall score. The results are consistent with Chava's (2011) analysis that wealthier companies tend to obtain higher ESG scores because more money is invested towards sustainability.

It is noteworthy that the Research and Development's (R&D) fundamental determinant utilised in the previous literature by Derwell (2007), Russo and Fouts (1997), and Breuer and Nau (2014) is replaced by an Exploration ratio because E&P companies have inconsistently reported R&D. Furthermore, the reports denoted the growing importance of the environmental factors that are major powers in shifting the current oil and gas industry paradigm. One of the most influential upcoming trends is the anticipated hydrocarbons divestment campaign that may cause the most severe effect to the fossil fuels sector (Clark and Herzog 2014).

***Overview of Contents for each Chapter***

The research paper's purpose is to complement Derwall (2007) and Breur and Nau's (2014) studies in the first model and to create a unique framework to evaluate E&P companies, utilising as a foundation the studies and research models of Russo and Fouts (1997) and Waddock and Graves (1997) in the second model.
The first model aims to establish the current financial models' failure to capture vital determinants for the E&P sector while building similar regression models in order to compare and contrast the results. On the other hand, the second model aims to discover innovative determinants utilizing the most significant constant variables in past research papers. Moreover, the second model has a reduced sample size in order to produce more valuable results. The method of segregation between the two samples seeks to build a uniquely adapted regression model for investigating E&P companies.

The research paper introduces key research paper findings and development in the CSP link to CFP, and the segregation of environmental, social, and governance issues are critically analysed in separate paragraphs. ESG emphasis on the Energy Sector is investigated in the last part of the literature review.

In the research methodology section, the hypothesis construction is elaborated upon in the next part that focuses on creating a relevant link between the literature review and the hypothesis. It is followed by an explanation of the sample size and the time period. Then, the research methodology further strengthens the established link by identifying the regression models' dependent, independent and control variables. In the reliability and validity paragraph, the first and second models are tested for normality and whether the OLS panel data approaches are relevant to the regression models.

In the data analysis section, ESG and ROA's dependent variables analyse the difference between the two models descriptive statistics. The regression results

section establishes the research paper's unique approach and identifies peculiar determinants for the E&P sector.

In the final part, the conclusion reflects on the objectives of the research paper and how the stakeholders could benefit from the results. The recommendation section focuses on confirming the benefit to stakeholders and suggests potential areas for further research.

# 2. Critical Literature Review

The research paper aims to evaluate the relationship between ESG factors and CFP, which concept stems from CSR and corporate governance early research. In the last few decades, academics identified the need to create a model for measuring the immeasurable, corporate social performance, in order to offer a comprehensive framework to investors and promote sustainability investment. Hence, the paper critically analyses Russo and Fouts (1997) and Waddock and Graves' (1997) foundational research papers that provide a link between the core methodologies and the study ESG model application. Furthermore, the key papers are going to be critically analysed, adopting ESG factors' relationship to CFP.

## 2.1 Early Steps towards ESG: CSR Introduction

Bowen (1953), who is known as the CSR pioneer, is the first to address the importance for businessmen to integrate CSR in the business methodology and to set the foundation of a new upcoming wave of academics who would question corporation ethics concerning society.

In the next studies from Davis (1960) and Johnson (1971), a "stakeholder" role of communities, customers and regulators has been translated into the company activities and management, which thoroughly transformed corporations' vision towards society. Non-profit organisations, such as the Committee for Economic Development (1971), have cast a major influence and have strengthened the notion of society as an imperative factor in the business governance process, further contributing to the transparency of corporate social governance within organizations. On the other hand, Freeman's (1980) stakeholder approach research paper was a milestone marking the advent of a new research on stakeholder theory, and in contrast to previous papers, it questioned the responsibilities of stakeholders in the companies. Even though

shareholders have the ultimate power to participate in the corporations' decisions and to be well informed regarding the company outlook, stakeholders including government organizations thus increased their roles in the company governance and the impact of the sustainable campaigns.

As a consequence, Carroll (1979), Davis (1973) and Preston and Post (1975) examined the need for greater transparency beyond the basic corporate financial performance indicators; in other words, the numbers started to be of less importance in evaluating a company, and academic research began to focus on sustainable evaluation instruments and developing responsible investment frameworks in order to measure the corporate social responsibility activities.

Researchers determined an increasing interest in stock market performance and corporate social responsibility. Alexander and Buchholz (1978) commenced research focused on corporate social responsibility relationships with corporate finance at the very early stage, which complemented the social performance responsibility measurement factors and has driven companies to pay more particular attention to society and government's power. As a result, CSP and CFP have emerged as defined concepts that could not be disregarded anymore, a trend that has caused a drastic shift in the research focus and evaluation instruments. Moreover, Carroll (1979) endeavoured to create a CSR composition to evaluate a company's social interaction. It is thus Carroll who identified four factors in his CSR definition; these factors were economic, legal, ethical and discretionary responsibilities that some said were more oriented toward the organizational management side of a business's concept of social responsiveness. For example, Wood (1991) critiqued Carroll's social responsiveness framework as incomplete; there was vague implementation in the business management case. There was a need for a CFP model to capture the company's social activities and to reflect factors more accurately in terms of

the management strategies' execution, such as the environment, stakeholders and policies. The need for a broader concept of corporate social responsibility has led to the creation of a more sustainability comprehensive evaluation model, which was developed by Aupperle et al. (1985) to improve the current model evaluation concept in order to simplify and generalize the application to corporations.

### 2.1.1 CSR Relationship with CFP: The Social Perspective

It took more than few decades for academia to identify that corporate social responsibility is not an extra cost to the company or a generic way to promote corporate activities, but as Kramer and Porter (2006) suggested, an innovative way to converge CFP with CSP is to embed the key principles within a common goal. The company has to build upon its stereotypical comprehension of CSR and to perceive the number of benefits to be obtained, such as enhancing institutional image, reducing risks, and adopting competitive advantage by introducing contemporary CSR reforms (Carroll and Shabana, 2010). On the other hand, Kramer and Porter (p. 82, 2006) argued that,

*"The vehemence of a stakeholder group does not necessarily signify the importance of an issue – either to the company or to the world."*

In other words, stakeholders' views should not be taken for granted because this would not necessarily be the best for social prosperity. Furthermore, corporate social performance aimed to improve financial performance of the company and its comprehension regarding CSP has emerged as a win-win relationship with the stakeholders (Kurucz et al. 2008). This has raised a question regarding stocks that are not socially approved; for instance, in the last few decades, investment in "sin" stocks has decreased because of their

negative influence on the company's relationship with society (Geczy et al. 2005).

This is the reason that an organization's comprehension of CSP has thoroughly shifted to a positive perspective whereby the company transforms its performance strategy and no longer sets different strategies for CSP and CFP; rather, it aligns them together (Derwall 2007, and Guensteret at al. 2005). Following this development, Carroll and Shabana (2010) examined further management's awareness of the CFP and CSP relationship; hence the company's management adhered to the previous methodologies and did not fully grasp the development in sustainable corporate social responsibility. As a consequence, academics such as Abramson and Chung (2000), Bauer, Otten and Rad (2006), Schroder (2004) and Shank, Manullang, and Hill (2005) have differentiated environment, social and governance factors, and they have produced research papers regarding the positive effects on corporate performance integration from the shareholders' perspective. The convergence of CSP with CFP has been enhanced by studies analysing the corporate financial benefits to adopt corporate social principles such as the company's cost of bonds, loans, equity and debt (Klock, Mansi and Maxwell (2004)). The researchers discovered interdependence between the company sustainability and income, although it was concluded in earlier papers that there is a negative correlation between the two factors, and an increasing number of journals identifying a positive correlation. Pivato (2008) clarified that the CSR initiatives should be associated with particular economic factors and situational contingencies. In addition, Pivato emphasizes the importance of trust between CSR and organizational performance to reduce the negative coincidental contingency. As a result, the positive correlation between CFP and CSP could result in mitigating the risk of a negative contingency (Kurucz et al. 2008).

Kurucz et al. (2008) examined that the CSR and CSP is not consistently favourable at all times because of mediating determinants or unpredictable events, and it is not guaranteed to benefit the company with each CSR project. However, the current literature suggests that trust lies deep in the foundation of the CSR and CSP relationship, and a positive stakeholder's relationship with the company is invaluable because this relationship certainly is going to improve a firm's financial performance and cultivate the appreciation of society (Carroll and Shabana 2010).

### 2.1.2 Corporate Governance Relationship with CFP

Previous CSR papers covered some basic corporate governance problems and the relationship between shareholder and management responsibility for financial decisions process, and it should be clarified that CSR studies did not only focus on social aspects of sustainable investment but also gathered ESG indicators together. Shleifer and Vishny (1997) outlined in their survey the corporate governance responsibility to deal with the agency problem, such as management possibilities to govern investors' money and protect shareholders from management misconduct. Furthermore, it has often been the case that management have utilized shareholders' money for projects which were not going to benefit the financiers. However, Shleifer and Vishny (1997) raised the question of shareholders' protection and the corporate governance responsibility to prevent agency issues from occurring and distributing the profits unevenly.

#### *Management Structure*

It is argued in many studies that investors' interest should prevail over a company's benefit and the money operation should be monitored by an external organization or closely governed by externally set policies and rules.

Gillian and Starks (1998) strengthened the agency image through a system of laws and rules controlling an institution's projects, and they have further developed the concept of the external and internal framework practice to maximize company efficiency and tighten internal structure. Moreover, the corporate governance internal control has played paramount importance in the governing endogenous control systems because directors control the power to hire, fire, and compensate the management team who was directly responsible for distributing the profits and finance a wide variety of ventures (Jensen 1993). Jensen (2001) identified a number of studies that claimed the company is closely related to the political legislations, laws and government guidelines, and the economic environment plays a key role in influencing corporate governance principles in different countries. This study extends the finding from Gillian and Starks (1998) that there are a number of interrelated factors and that the logical sequence can be followed from one factor to another, but the principles have different executions in different political and economic environments; the relationships among these can be visualized in Figure 4; Corporate Governance Framework.

It is significant to external and internal corporate governance frameworks to be included in the modelling of corporate financial performance, and corporate governance has a positive correlation with corporate social performance. Brick, Palmon and Wald (2006) discovered that the internal management pay including directors and CEO is negatively correlated with the stock performance, and the excess pay is likely to be followed by poor company performance. Following the same results, Berry, Paige and Wilkins (2006) found that increasing CEO compensation plays a key role in the company's performance; when the higher management levels tend to strengthen their positions, this factor is negatively correlated with corporate performance, leading to underperforming continuation. The shareholders evidently do not benefit from this tighter circle in the boardroom when governance causes a misconception by society and

investors. Hence, the company's lack of transparency decreases the performance and negatively affects shareholders. Denis, Hanouna and Sarin (2006) confirmed the results that the company has a higher chance for fraudulent action if the institution holds the major share of equity and there are external block holders. In fact, a number of research papers prove the positive correlation of potential deceit when those determinants exist in the company. In contrast, Aggarwal and Samwick (2006) identified that the increasing management initiatives lead to an insignificant chance for managers to benefit from the utilized amount of money, and this goes hand in hand with improving company performance. This is an indication that managers genuinely benefit more when there is an overinvestment, and ideally, the situation of underinvestment is going to be avoided because in this situation, managers have higher private costs of investment.

### *Capital Structure*

One of the latest significant methodologies that has been a vital part of the corporate governance research papers is the governance and debt effect on corporate performance. Gompers, Ishii and Metrick (2003) examined that a company with weaker shareholder rights is going to underperform and yield lower gains in comparison to a company with stronger shareholder rights. The research has a strong logic embedded in its policies because stronger investors' rights influence the management board's decisions in a positive way for better company performance. Thus, it ultimately indicates a higher institutional cash flow and that a large part is going to be voted to return to shareholders' accounts because of investors' stronger voting and decision-making rights. On the contrary, Bhojraj and Sengupta (2003) stated that stronger investor rights are going to be counterproductive for company revenues; the main notion is that disproportionally increasing equity is going to influence operating profits negatively, and the company is not going to be competitive in the long run.

Cremers et al. (2007) and Klock et al. (2004) found positive results of the company's lower cost of debt when antitakeover measures were adopted; although the method is not favourable for shareholders, the company is able to obtain a low-cost debt from the capital market. The contemporary corporate governance issue creates an adequate equilibrium between growing the company size and satisfying shareholders. This relates to the institutional aim to improve its score in order to obtain cheaper credit, even though some initiatives are going to be too costly from the return on investment perspective (Chava 2011). In further research, Zhu (2009) discovered that the credit rating agency credit score fluctuates in relation to the corporate governance structure in the company, and a company with stronger corporate governance inclines to qualify for cheaper credit. Given the above research, surprisingly, there are a large number of companies that choose to adopt poor governance in order to benefit members of the boardroom, although the company offers access to a substantial amount of credit on favourable rates (Chen, Chen and Wei 2009). Bhagat and Bolton (2008)'s academic journal suggested a solution to most of the examined issues regarding the corporate governance; it has suggested that the corporate governance board hold a larger share in the equity of the business in order to improve the performance of the business and the shareholders' interests in particular. Thus, it will result in stronger corporate governance because corporate governance is positively correlated with the stock market performance that benefits investors.

### 2.1.3 **Environment Relationship with CFP**

In recent years, the fastest growing sector from the ESG is the environment because of the company's environmental reforms that have achieved a growing influence on company performance. A comprehensive index benchmark is the ideal measure of company environment performance; for example, FTSE4good

index has contributed immeasurably to the promotion of environmental issues awareness, and it has played a key role for distinguishing whether or not a company has adopted a long-term strategy between financial return and corporate sustainability. As a consequence, the company score indicates the engagement and successful implementation of environmental projects. In fact, it is a complex process to evaluate companies from different industries that have different exposures to environmental resources, and most of the organizations' investment or projects are indirectly related through intermediaries (Graham and Maher 2006). As identified in the other corporate social and governance factors, there is a need to establish a positive correlation with CFP in order to demonstrate to shareholders that positive environmental effects will result in better company performance.

Bauer, Derwall and Hann (2009) adopted the same goal of previous corporate governance research studies' strategy to create a positive correlation between CFP and environmental factors in order to demonstrate to shareholders that it is more beneficial for them to invest in higher scored companies. For instance, much research focuses on companies with a higher environmental score that easily obtain access to lower-cost bonds, which directly translates in a company performance benefit (Chava 2011). On the other hand, Schneider (2011) emphasized that the weak environmental compliance has a severe effect on the company's performance and recommended that a company not underestimate this factor because poor environmental governance can result in a company's struggle to meet prospective debt repayments. Epstein and Rejc (2014) examined the environmental governance from a different perspective; a company may use environmental projects to promote its marketing plan or provide a competitive edge in comparison with the competition, for instance, huge multinational companies establishing a positive relationship with society and government through environmental governance (Bauer and Hann 2010). As a result, environmental governance may be a win-win action plan as analysed in

the corporate governance section, but it is proven that the strategy's efficiency can be maximized if it integrates ESG factors, rather than applying them as separate entities.

Climate change and global warming are currently growing concerns for society and the government regarding the fossil fuel shifting energy industry paradigm (Epstein and Rejc 2014). The oil, gas and fossil fuel companies are going to endure severe consequences from fossil fuel divestment campaigns organized by asset managers representing university endowments, pension funds and private wealth owners (Clark and Herzog 2014). Ansar, Caldecott and Tilbury (2013) examined the fossil fuel future risk to create "stranded assets", assets that are devaluated due to the intrinsic-related risks in oil and gas and fossil fuel dependent companies. As a consequence, there will be pressure created in the investors' portfolio to divest from companies related to fossil fuels in order to avoid stigmatization of the industry. However, Fabozzi, Ma and Oliphant (2008) analysed the "sin stocks" downturn and found that actually the companies endeavoured to adapt to the stigmatization process by using socially accepted substitutes for their despised products. For instance, the cigarette industry has gone through a tremendous transformation caused by the negative influence of its product in the last decade, although the tobacco industry had a minimal impact on its cash flow throughout the stigmatization process (Social Funds 2013). In other words, the tobacco divestment campaign's similar process affects are outlined in the illustrated divestment campaign in Figure 5; confirming that it is not positively correlated with the company cash flow and that the reduction of investment could be recovered by diversification. On the other hand, Ansar, Caldecott and Tilbury (2013) stated that "A diminishing pool of debt finance and a higher hurdle rate will thus have the greatest effect on companies and marginal projects related to coal and the least effect on those related to crude oil", although oil and gas reforms could be delayed to some extent. In addition, Butler (2015) stated that the industry shift

is inevitable and companies are encouraged to seek alternative energysolutions in the future.

On the other hand, Clark (2015) argued that the divestment from the oiland gas companies will not be a radical solution because the innovators are transforming the energy industry landscape, and a decrease incompany's revenue is going to affect research and development investment aiming to discover alternative energy solutions. However, 350.org (2013) identifiedthe statement as controversial because if there were no divestment campaign,there would be no reason for multinational companies to alter their moneyearning strategy. Thus, asset managers' shift in the methodology is likely to havea negative impact on fossil fuel awareness problems. Butler (2015) stated thatoil and gas companies perceive the technological advances, decreasing their useof hydrocarbons and the risk of damaging their reputations if there are no appropriate reforms in place. This statement is consistent with Durand's(2003) analysis complementing Jensen and Meckling's (1976) studies that organizations' investing in market information tends to decrease positive forecast bias and inaccuracies, which have a negative relationship with organizational illusion bias. Sasarean, Block and Lee (2011) found that oiland gas companies with poor environmental governance history are more likelyto face impeding development in comparison to companies diversifying theirrisks and keeping up-to-date with economic trends. Evans (2015) suggested that thematic investment should strongly consider upcoming trends such as solar energy manufacturers and climate change funds, but investors should be cautious regarding the time horizon. In the next section, sustainability inthe energy sector is analysed.

## 2.2 ESG implementation and development in the EnergySector

The ESG plays a key role in the most problematic area, which is the energy sector, and the majority of sustainable innovations have been introduced from energy companies' management. This is one of the reasons the research paper focuses on the energy industry as it functions as a building block for the core principles of the sustainable development (Bolton et al. 2011). The focal point in ESG performance and development is to determine the relationship with CFP; for that reason, Hughey and Sulkowski (2012) strengthened the thesis with consistent results enhancing their positive correlation, especially in relation to better transparency and clear corporate governance. This is the reason the energy industry required an innovative set of determinants expanding Carroll's (1999) CSR framework that would improve the evaluation and comparison of ESG factors between companies. Hence, Ekatah, Samy and Halabi (2011) stated that the energy company should embrace ESG oriented governance and implement it within its financial performance because companies are extremely likely to reduce operating performance if they neglect stakeholders and focus only on benefiting shareholders. Due to this reason, the long-term goals are inseparable part of a larger institutional strategy because the external perception of the company is completely dependent on the fundamental principles approach towards ESG. Hence, Ekatah, Samy and Halabi (2011) stated that energy companies are at the forefront of ESG improvement; although most of the research papers have established positive correlation, there is an ever-changing relationship that requires consistent monitoring of the highly performing ESG companies. This is the reason Patari et al. (2012) argued that ESG beneficial projects could be utilised in order to curve the company sustainability direction to cover the most significant negative campaigns, which often derive from the energy sector. Furthermore, the increasing number of companies applying ESG factors into their strategies is likely to affect the industry outlook and the relationship between the company sustainability and financial performance, and this dynamic lends another important perspective to the ESG and CFP evaluation. Thus, sustainability indexes and NGO evaluating

services are becoming favourable tools for asset managers and investors. Syrjala and Takala (2009) argued that such services cannot be thoroughly reliable, and a good approach is to verify the ESG information with more than one source; a good example is Thomson Reuters' ESG independent scoring programme complementing Bloomberg Sustainability software.

From a company management perspective, Sharratt et al. (p. 1511, 2007) stated that regulators, such as OFGEM in UK, determine the direction of ESG implementation, and the study proposed

"The four templates are grounded in the empirical research and comprise of: embracing social initiatives; business as usual; management deliberation; and, conflicts with commerce."

These templates help to evaluate the energy company management's integration of ESG in their strategy. Moreover, the paper focuses on regulatory and commercial strategies that change the outcome from a company perspective and the self-development concepts arising from competition and requirements in the industry (Jindrichovska and Purcrea 2011). Jones (2001) suggested that corporate social integration should be developed due to the eager competition in the sector and be built upon pre-existing policies. However, Hunt and Raman (2000) emphasised the importance of an intense regulatory environment that is going to push the corporate social reforms throughout the whole sector. A company takeover is a relevant example to identify the prospective issues in the company culture transformation. For instance, Syrjala and Takala (2009) and Mobus (2012) stated that the energy industry endures constant change due to the vast number of mergers and acquisitions; moreover, the incorporation of core ESG principles to the new takeover management are imperative, and the future acquisition's reputation depends on the very first stakeholders' campaigns. Another crucial approach is

Trapp's (2012) study that suggested a triple bottom line: people, planet and profit. This accounting framework is an important strategy for energy companies in order to improve society's perception of its activities. The energy companies are taking a leading position in the innovation of ESG factors, and the previous research articles have raised the concern that society is at the forefront to influence a company's reforms. However, company management anticipates a consistent ESG implementation; it is still a governed by profitability principles, which do not completely embed sustainability factors, and without an external pressure, companies are functioning to serve profits interest (Patari, Arminen, Tuppura and Jantunen 2014). In fact, this is the reason why the study between the CFP and ESG is of paramount importance; as Hughey, Sulkowski (2012) suggested, the most efficient methodology to promote ESG factors is to integrate it within the company's performance.

This critical review key literature analysis sets a solid foundation to adapt a particular research methodology for the current research paper. The next section will describe this methodology.

# 3. Research Methodology and Data

The methodology part identifies a deficiency in research papers to address the need to investigate the ESG factors link to CFP. The foundational studies such as Waddock and Graves (1997) and Russo and Fouts (1997) aid the research paper to identify relevant hypotheses to address the ESG shortage of studies in E&P sector. The research paper develops two statistical models. The first model purpose is to test recent studies regression equations developed by Derwall (2007) and Waddock and Graves (1997) adapting similar hypothesis and regression equations. Thus, the paper investigates whether the first model is appropriate to be utilised in the E&P sector, although it is expected the result to be insignificant because of the E&P unique product nature. On the other hand, the second statistical model aims to cover the shortage of literature identified in the first and to determine highly explanatory, and significant variables. Fouts and Russo (1997) firm value regression equations is developed further expanding the independent variables but holding the same dependent variables, while Waddock and Graves (1997) operating performance regression equations is adapted to the E&P sector. In the next part both model one and two hypothesis are integrated into the thesis research question that differentiate the current study.

## 3.1 Hypothesis Construction

The literature review analysis are integrated in the development of the first and second model hypotheses. The imperative characteristics is that E, S, and G factors are set in the heart of the hypothesis aiming to address overall and individual score relationship with determinants, operating performance and firm value. In addition, hypothesis emphasis on the environmental issues in particular because E&P companies score is highly volatile due to the environmental factors (Patari 2012).

***First Model***

The first statistical model hypothesis are restructured from Waddock and Graves (1997), Derwall (2007) and Breuer and Nau (2014) to examine if the selected E&P companies are likely to share the same model characteristics. In fact, it is questionable that previous regression models are going to fit the E&P companies' determinants. Hence, the thesis stems from this question and this is the reason it would be beneficial for the current study to identify the below hypothesis as insignificant for the E&P companies.

Derwall et al. (2005) proposes the ESG scores value relationship with operating performance to be the most significant with ROA. As a consequence, the current paper relies on its critical research framework to build the dependent variable. Brooks (2008) states that the reliable dependent variable is from paramount importance to create a comprehensive regression equation. The first hypothesis is developed from Waddock and Graves (1997) operating performance equation, while the second one stems from Derwall (2007) identifying Q ratio as a significant variable for explaining firm value.

*Hypothesis 1: ESG scores are positively correlated to operating performance.*

*Hypothesis 2: ESG scores are positively correlated to firm value.*

Derwall (1997) has significantly contributed in building a research framework concerning the relationship between the ESG and CFP. Thus, the current research develops the most prominent literature thesis outlined in the hypotheses below. Schroder (2004) and Shank (2005) highlight the importance to differentiate issues in order to identify the factors individual importance. This is the key motivation to create hypothesis 3 and 4.

*Hypothesis 3: Higher environmental, social, and governance factors are positively correlated to higher accounting performance.*

*Hypothesis 4: Higher environmental, social, and governance factors are positively correlated to higher economic value.*

***Second Model***

The second statistical research model aims to extend Waddock and Graves (1997), and Russo and Fouts (1997) innovative regression models in order to adapt them to the E&P sector. The current report adopts Waddock and Graves (1997) suggested dependent variable ROA as the most relevant operating performance indicator to measure the firm's profitability while it is being highly significant to CSP score.

*Hypothesis 1: E&P financial indicators improve the positive ESG factors correlation with operating performance.*

The hypothesis aims to adopt similar hypothesis to Waddock and Graves (1997) in order to complement their research such as supplementing determinants specific for E&P companies. The CSP are extended to ESG performance factors in order to distinguish a better transparent model.

In addition to that, it is developed a second regression model utilizing Russo and Fouts (1997) suggested Tobin's Q Ratio for measuring firm value because it has a strong explanatory power for ESG-factors. Russo and Fouts (1997) has determined a positive relationship between CSP and Q ratio. As a motivation, the environmental sustainability score has been applied in a regression model to identify the correlation with corporate performance by both Q ratio and ROA dependent variables. In fact, this approach is complementing Russo and Fouts

(1997) research paper results and the score has been peculiarly applied to the E&P sector, which supplements an innovative feature to the study.

*Hypothesis 2: E&P financial indicators improve the positive ESG factors correlation with firm value.*

The second hypothesis utilises firm value to create a link between financial performance and ESG score. Both dependent variables are selected to test the significance between CSP and CFP but the current report replaces CSP with ESG score obtained via DataStream. Derwall (2007), Bauer and Otten (2006) and Abramson and Chung (2000) interpreted ESG as a better-integrated measure to define company environmental, social and governance internal and external activities. Moreover, the paper focuses on E&P sector that it has not been studied before utilising the current approach, dependent variables and unique determinants tailored to the industry characteristics in the third and fourth hypotheses. Thus, it is expected that better explanatory variables will enhance the correlation with the ESG factors.

*Hypothesis 3: Better E, S, G factors are positively correlated to higher operating performance with emphasis on economic environment factor.*

*Hypothesis 4: Better E, S, G factors are positively correlated to higher firm value with emphasis on economic environment factor.*

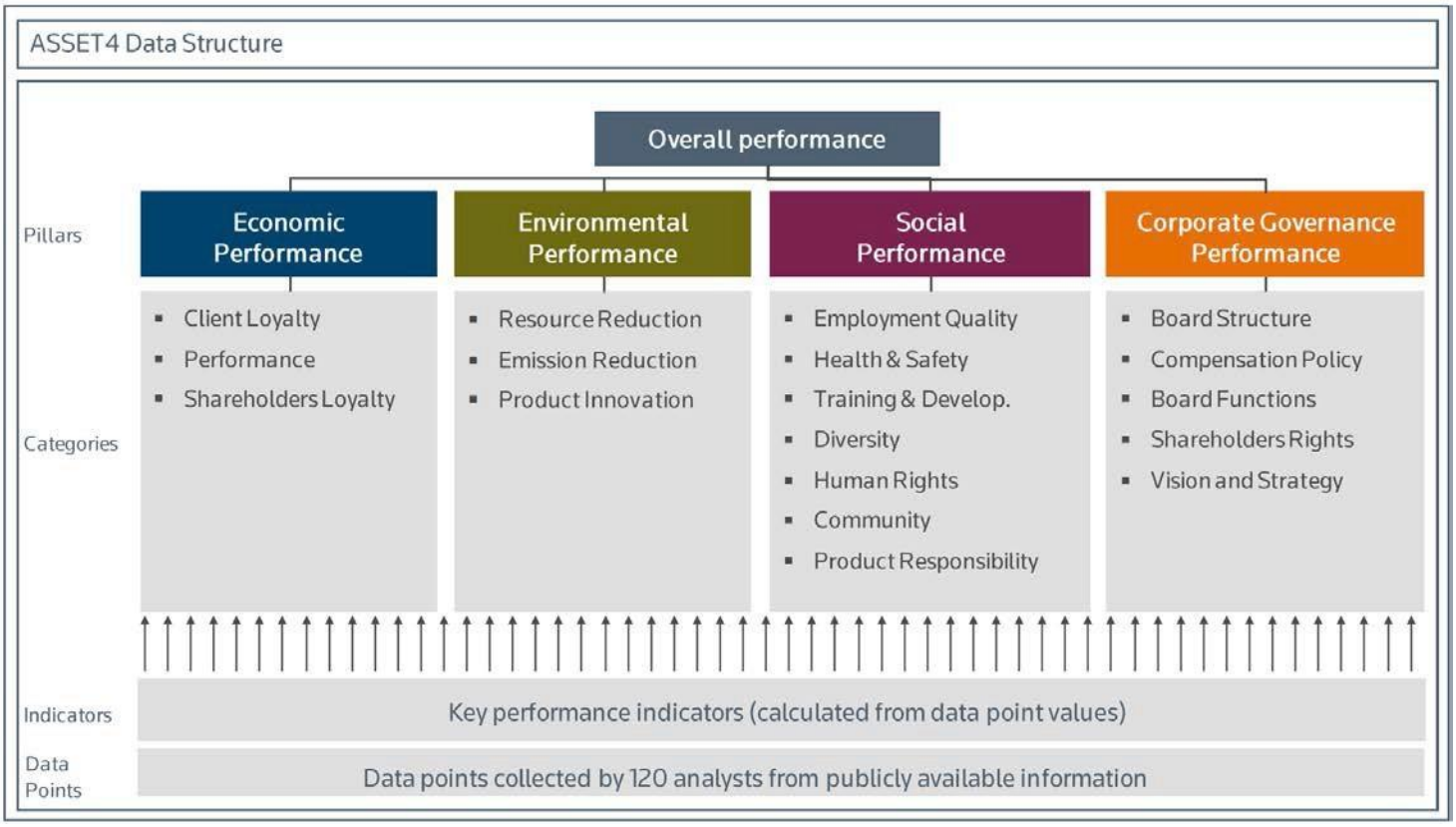
Tobin's Q is utilised to explain the current model and its disadvantages in comparison to the rest of the industries. This is integrated in the fourth hypothesis to explain the unique nature of the oil and gas companies' correlation with environmental factors.

## 3.2 **E&P Companies Data Sample**

The paper exploits the University of East London access to DataStream financial software owned by Thomson Reuters to collect ESG scores data, and then obtains access to E&P companies' financial data via the Bloomberg Professional. As it was mentioned previously, the study is divided into two models. Asset4 ESG (2014) has an entire section devoted to sustainability analysis that contains over 3500 ESG companies' data criteria, for more detail look at Figure 6; and more than 750 data points and key performance indicators (KPI). US Sustainable Investment Forum (SIF) (2013) confirms the best in practice universe of Asset4 ESG in comparison to the other software and for instance, Statman (2000) and (2006), Brammer et al. (2006) and Bello (2005) utilise KLD data to conduct their research, which it has been argued by Geczy et al. (2005) that KLD lacks the great detail of the ESG pillars. However, Asset4 ESG provides a solid structure shown in the Text Figure A below that analyse in depth the factors to determine companies' sustainability performance. The economic performance sustainability indicator has been excluded from the sample size because there was no sufficient data in earlier periods in comparison to ESG.

Out of nearly 4000 companies, the data has been filtered to 200 E&P companies. In the next step, the study focus only on US, Canada and UK listed E&P companies further reducing the sample to 112 companies. Then, the companies with missing data or extreme size difference have also been removed from the sample. Moreover, three of the companies have been delisted from the Asset4 ESG because of low reporting inconsistency and companies such as Addax Petroleum[1], CNX Gas[2], Frontier Oil[3], Highpine Oil & Gas[4], Harvest

[1] Bloomberg (2009) Addax Petroleum is acquired by Sinopec,
[2] Bloomberg (2010) CONSOL Energy Inc. Completes Acquisition of CNX Gas Corporation
[3] Bloomberg (2011) Holly Corporation and Frontier Oil Corporation Announce Merger of Equals
[4] Bloomberg (2009) Daylight Resources Trust Announces Acquisition of Highpine Oil & Gas Limited




In Text Figure A Asset4 ESG Overall Performance

DataStream (2014) Asset4 ESG

Energy[5], Iteration Energy[6], OilLexco[7], Tristar[8], UTS Energy[9], and XTO[10] have been acquisitioned to larger companies. The oligopoly of the E&P sector determines the great number of mergers and acquisitions because there are many start-ups although most of them are taken over by wealthier, diversified production companies (Kaygusuz 2002).

In result, the first model consist of 73 E&P companies. In order to assembly an improved model, the second statistical model removes extreme outliers that

[5] Jung-a (2013) "KNOC looks to sell lossmaking Harvest Energy", Financial Times

[6] Chinook Energy News Release (2010) Iteration Energy Ltd. and Storm Ventures International Inc. Complete Strategic Business Combination to Create Chinook Energy Inc.

[7] Crooks and O'Doherty (2009) "Premier Oil is buying the failed North Sea operations OilLexco"

[8] Burke (2009) "TriStar Rises After Agreeing to Takeover by Petrobank" Bloomberg

[9] Patel (2009) "Total CEO Is Confident of Completing Takeover of UTS Energy" Bloomberg

[10] McNulty (2009) "ExxonMobil shifts strategy with XTO takeover" Financial Times

impede the normal distribution of the first model. The second model is leftwith 34 E&P companies in order to apply industry specific determinants to the new regression model, which could not be applied by the first model due to unavailable data and dependent variable insignificance. Comparable companies analysis feature in the Bloomberg terminal simplify the process of filtering the E&P companies in accordance to the production, size and earnings. In addition, Rosembaum and Pearl (2013) book guided the very first steps of the project undertaken.

### *Time Period*

The time period is restricted due to the DataStream little quarterly change in annual ESG score that has been provided for a period 5 years and avoiding quarterly data is going to reduce extreme outliers. The period span over the period from 2009 to 2014 represents larger observation sample. The current model have a widespread of years in comparison to Breuer and Nau (2014) that model has been limited to only 4 years. It is important to comprehend the sample time period severe impact caused by the Financial Crisis in 2009. The restriction is addressed in greater detail in the analysis part.

The first and second model purpose is not to explain all the variables throughout the period but it is rather to determine the specific determinants for E&P sector.

## 3.3 **Regression Equations**

The first and second model employs a balanced panel data approach for the OLS linear regression method. Panel data is suitable for analysing multidimensional data over different periods of time due to the cross section method that instigate the common pattern between the dependent and independent variables (Brooks 2008). Fouts and Russo (1997) identify OLS data

panel approach as relevant to measure the correlation between CSP and CFP. Thus, the study adopts the same econometric approach because the methodology is tested substantial for this area of research.

Both of the models share the same regression equation structure based on Derwall (2007), Waddock and Graves (1997) and Russo and Fouts (1997) linear models. The ROA and Q ratio linear model are written below:

**ESG performance and operating performance (ROA):**

$$ROA_{it} = \alpha_i + \beta_1 ESG_{it} + \boldsymbol{\gamma_{it}}\mathbf{X_{it}} + \varepsilon_{it}$$

**ESG performance and firm value (Q):**

$$Q_{it} = \alpha_i + \beta_1 ESG\ Score_{it} + \boldsymbol{\gamma_{it}}\mathbf{X_{it}} + \varepsilon_{it}$$

The $ROA_{it}$ and $Q_{it}$ is return on assets and Q ratio consecutively, where "t| stands for the time and "i" addresses each cross-section unit. The intercept is indicated as $\alpha_i$ varying across-sections. The $\beta_n$ is the coefficient, $\mathbf{X_{it}}$ is a vector varying over time "t" and across section "i". Then, $\boldsymbol{\gamma_{it}}$ is a vector coefficient and $\varepsilon_{it}$ is the error term varying over period of time and for each cross section.

**ESG performance and operating performance (ROA):**

$$ROA_{it} = \alpha_i + \beta_0 Environmental\ Score_{it} + \beta_1 Social\ Score_{it} + \beta_2 Governance\ Score_{it} + \boldsymbol{\gamma_{it}}\mathbf{X_{it}} + \varepsilon_{it}$$

**ESG performance and firm value (Q):**

$$Q_{it} = \alpha_i + \beta_0 Environmental\ Score_{it} + \beta_1 Social\ Score_{it} + \beta_2 Governance\ Score_{it} + \boldsymbol{\gamma_{it}}\mathbf{X_{it}} + \varepsilon_{it}$$

Derwall (2007) and Breuer and Nau (2014) expand the linear regression model to include each E, S, G factor in regression equations that for example,

Russo and Fouts (1997) occurred restrictions to identify comprehensive well-structured software to capture each ESG factor in the research time period. The addition factors to the new model are represented in the linear regression as $Environmental\ Score_{it}$, $Social\ Score_{it}$, and $Governance\ Score_{it}$ capturing each cross section over the different time periods.

The financial data is popular with spurious relationship between the variables, although the test adopts robustness check ratios such as EV to PD and EP to DP of BOE. The model also conduct Jarque-Bera normality test, and fixed and random effects that are suitable for panel data OLS method. An autocorrelation is not tested because of the short period analysed in the model.

## 3.4 **Variables**

The linear regression above outlined the expected role of each variable but this section explains the variables and their application. All financial ratios are collected via Bloomberg terminal apart from the ESG scores downloaded from Thomson Reuters, Asset4 ESG. Both of the software are highly respected in the financial and research field this is the reason to trust upon the extracted secondary data. In fact, it is noteworthy to comprehend that there is a little drawbacks in collecting secondary data that are inferior to primary data (Denzin and Lincoln (2005) and Dewhurst (2002)).

### ***Response Variable***

The response values, dependent variables, selected for both models are ROA and Tobin's Q ratio[11], measuring operating performance and firm value consecutively. Waddock and Graves (1997) and Russo and Fouts (1997) confirm the ROA and Q ratio are the most consistent variables when ESG factors are[1]

[1] $\frac{\text{Market Cap + Total Liabilities + Preferred Equity + Minority Interest}}{Total\ Assets}$ Bloomberg definition

examined. The ROA[12] is a popular indicator to measure firm profit and if there is a correlation between the firm profitability and ESG, the result is going to support earlier paper thesis (Wood 1991) and Carroll(1979).

### *Explanatory Variables*

### *First Model*

The independent variables in the first model aim to identify the drawbacks from the previous research paper results for the application of consistent linear regression model. The first model variables are derived from Waddock and Graves (1997) suggested ROA explanatory variables such as book value of assets (BVA)[13], debt to assets (DTOA)[14] and sales[15]. These independent variables are highly explanatory for broad sector of industries, although it is expected that the sales and debt to assets variables to be inconsistent for the E&P sector. To robust check the regression model, the sales variable is replaced with enterprise value to daily production of barrel of oil equivalent[16] endeavouring to represent the E&P profit by capturing the manufactured daily volume of barrels. ESG score is chosen as a constant for the both equations aiming to explain the hypothesis that there is a relationship between ESG and operating performance (ROA).[2]

---

[2] $ROA = \frac{Net\ Income}{Total\ Assets}$
Bloomberg definition ROA utilities: "This account will generally equal Total Assets in the annual report, except when Utility plant is net of deferred income taxes. Deferred income taxes is presented on the credit or liability side of the balance sheet.
[2] Book value of assets is defined as "the sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets "
Bloomberg definition
[2] $\frac{\text{Short Term Debt \& Current Portion of Long Term Debt + Long Term Debt}}{Total\ Assets}$ Bloomberg definition
[2] Sales are defined as "gross sales and other operating revenue less discounts, returns and allowances."
[2] Bloomberg definition how to calculate: Company equity at market value + preferred equity and debt at book value + minority

The first model set to attain in the second equation different result after applying a unique explanatory variables to the model and take a logarithm of ROA variable as Waddock and Graves (1997) and Derwall (2007) suggested. This time in the robustness check the E&P particular ratio endeavours to enhance the relationship between the firm value and ESG. The added ratio is enterprise value (EV) to prove developed (PD) resources[17] in barrels of oil equivalent (BOE)[18]. Kaygusuz, K. (2002) defined that proved developed resources are already discovered wells, which do not require the exploration cost and the reserves value are positively supplemented to the company market value. In addition, Bloomberg stated that a low ratio to prove developed resources indicates that the company is undervalued. PD resources is expected to supplement high explanatory power to the regression model. Furthermore, the ESG is constant variable in both regression equations.

In order to avoid explanatory iteration, the first model third and fourth hypotheses adopt identical concept as the first and second hypotheses, except that ESG factors relationship is analysed individually with operating performance and firm value.

### *Second Model*

The aim of the second model is to enhance the explanatory power of the variables in the linear regression model in order to identify the relationship between ESG, and the firm value and operating performance. In comparison to the first model, the second model does not adopt robustness check approach because it integrates the best-fitted financial ratios into the model.

---

[17] Bloomberg definition of PD*: Company equity at market value + preferred equity and debt at book value + minority interest – cash*.

[18] Combined oil and gas reserves are in barrel of oil equivalents (BOE).

The first significant difference is that debt to assets is replaced with total debt to EV[19]. EV to EBITDAX[20] and logarithm of EBITDAX[21] ratios are included in the ROA and Q ratio regressions consecutively. Howard and Harp (2009) stated that companies with low EV to EBITDAX ratio are indicates company is undervalued. EBITDAX logarithm is used for reducing the large number and to be better integrated in the model. Next, E&P per BOE[22] and sales growth[23] ratio is added to ROA and Q ratio equations to enhance the profit from operations increasing the intrinsic E&P company value (Howard and Harp 2009). Lastly, reserve ratio (RR)[24] is added to firm value because it is a strong determinant of the intrinsic value of the company, Bloomberg defines it below:

"Percentage of the company's oil and gas reserves consumed by production during the year that were replaced through acquisition, improved recovery, new discoveries, and net purchases"

The third and fourth hypothesis regression equations adopt similar variables as the first and second, except energy value (EV)[25] is added to the ROA second equation in order to boost the R and R squared.

ESG factors are constant for all of the equations aiming to determine the relationship between ESG and ESG individual factors to operating performance

---

Total Debt is *"Short and long term debt to Periodic Enterprise Value"*

[20] Bloomberg definition: "Company equity at market value + preferred equity and debt at book value + minority interest - cash."

[21] Bloomberg calculates it by the formula: "Earnings before interest, taxes, depreciation and amortization (RR009, EBITDA) plus Exploration Expense"

[22] "Revenues from worldwide oil and gas production per barrel of oil equivalent (BOE) of annual production" Bloomberg definition

[23] Bloomberg definition "Revenue from Current Period - Revenue from Same Period Prior Year) * 100)-1 / Revenue from Same Period Prior Year"

[24] Bloomberg formula to calculate: Reserves-End Year - Reserves-Start Year - Production) * 100 / Production

[25] Bloomberg definition: Total Revenue from Energy Sold

and firm value, while attaining a considerable healthy relationship withthe intendant variables.

The next section is the data analysis part, which is paramount for the research paper and the result are going to determine how significant thethesis interpretation is.

# 4. Data Analysis

The empirical findings section is imperative for evaluating the study practicality to the previous research papers and to investigate whether or not the thesis is interpreted in a meaningful method. It is once again, the data analysis are divided into two sections for each section to indicate as previously the difference between the first and second statistical model.

The first section concentrates on the descriptive correlation between all variables, subsequently the section continuous with analysing separately the ROA, Tobin's Q ratio and ESG scores. Then the second part separately analyses the regression results and interpret the variables correlation.

## 4.1 The First and Second Model Descriptive Statistics

### *First Model*

All first model variables correlation with each other are illustrated in the Table 1 below[26]. The complete names representing the variables are:

Covariance Analysis: Ordinary
Date: 05/12/15 Time: 15:01
Sample: 2009 2014
Included observations: 438

| Correlation | ZROA | Q | ESG_SCORE1 | ENVIRONMENT | SOCIAL | GOVERNANCE | BVA | LOGROA | SALES | EV_TO_PD | EVTODP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ZROA | 1.000000 | | | | | | | | | | |
| Q | 0.213348 | 1.000000 | | | | | | | | | |
| ESG_SCORE1 | 0.210850 | -0.165027 | 1.000000 | | | | | | | | |
| ENVIRONMENTAL | 0.180748 | 0.072335 | 0.276843 | 1.000000 | | | | | | | |
| SOCIAL | 0.218411 | -0.154468 | 0.940180 | 0.242333 | 1.000000 | | | | | | |
| GOVERNANCE | 0.063136 | -0.071869 | 0.690495 | 0.237066 | 0.511715 | 1.000000 | | | | | |
| BVA | 0.223954 | -0.125443 | 0.494088 | 0.212958 | 0.441762 | 0.231302 | 1.000000 | | | | |
| LOGROA | 0.999950 | 0.212569 | 0.210371 | 0.178539 | 0.218671 | 0.062080 | 0.223343 | 1.000000 | | | |
| SALES | 0.198654 | -0.092900 | 0.410530 | 0.176035 | 0.364581 | 0.181147 | 0.968496 | 0.197891 | 1.000000 | | |
| EV_TO_PD | -0.072002 | 0.373767 | -0.161548 | 0.061253 | -0.168083 | -0.038040 | -0.109736 | -0.072381 | -0.087217 | 1.000000 | |
| EVTODP | 0.081995 | 0.060053 | -0.064906 | 0.055756 | -0.082518 | 0.039938 | -0.038537 | 0.081435 | -0.029766 | 0.024778 | 1.000000 |

Table 1 First Model Variables Correlation Table

[26] ROA, Overall ESG Score, Environmental, Social, and Governance factors, BVA, logarithm of ROA, Annual Revenue, EV to prove developed resources (PD), EV to daily production (DP).

The first noteworthy relationship, the Tobin's Q ratio negative correlation with ESG factors that are evidently inconsistent with previous researches. For instance, Lindenberg and Ross (1981), Russo and Fouts (1997), Derwall(2007) indicated positive relationship with Tobin's Q ratio. One of the reasons, the Jarque-Bera, normality test, null hypothesis has been accepted. Brooks(2008) stated that this is a major drawback in OLS panel data method and it is recognised as a serious inconsistency issue, principally when the data sample lack of rational explanation between variables. On contrary, the second sample dependent variables are normally distributed, it is thus significantly rejecting Jarque-Bera test, which is shown in Table 2 below. Furthermore, Q ratio has a negative correlation with BVA, which is explained by Russo and Fouts (1997) paper stating that the energy sector has an expectedly high Tobin's Q ratio because the operations are based on heavily attracted debt at the beginning of the period and it is repaid at the end of the year.

Covariance Analysis: Ordinary
Date: 05/12/15 Time: 15:29
Sample: 2009 2014
Included observations: 204

| Correlation | ROA_Z | Q | ESG_SCORE | ENVIRONMENT | SOCIAL | GOVERNANCE | BVA | DTOV | EV_TO_PD | EP_TO_BOE | RESERVE_RATI | LOGEBITDAX | SALES_GROWT | ENERGY_REV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROA_Z | 1.000000 | | | | | | | | | | | | | |
| Q | 0.323477 | 1.000000 | | | | | | | | | | | | |
| ESG_SCORE | 0.426579 | 0.059889 | 1.000000 | | | | | | | | | | | |
| ENVIRONMENTAL | 0.446213 | 0.022841 | 0.967182 | 1.000000 | | | | | | | | | | |
| SOCIAL | 0.382036 | 0.102487 | 0.958312 | 0.917981 | 1.000000 | | | | | | | | | |
| GOVERNANCE | 0.255683 | 0.012728 | 0.721189 | 0.617697 | 0.599763 | 1.000000 | | | | | | | | |
| BVA | 0.386260 | -0.021936 | 0.507590 | 0.579030 | 0.420215 | 0.278561 | 1.000000 | | | | | | | |
| DTOV | -0.504832 | -0.503303 | -0.280677 | -0.307881 | -0.248035 | -0.158657 | -0.253366 | 1.000000 | | | | | | |
| EV_TO_PD | 0.077318 | 0.385018 | 0.087671 | 0.076917 | 0.113000 | 0.044470 | -0.141435 | 0.050231 | 1.000000 | | | | | |
| EP_TO_BOE | 0.340468 | 0.084977 | 0.326451 | 0.330846 | 0.290185 | 0.229964 | 0.190840 | 0.012165 | 0.460622 | 1.000000 | | | | |
| RESERVE_RATIO | 0.020036 | 0.194359 | 0.055608 | 0.016268 | 0.082410 | 0.031315 | -0.020851 | -0.125591 | -0.179151 | -0.107990 | 1.000000 | | | |
| LOGEBITDAX | 0.567461 | 0.148482 | 0.721760 | 0.752597 | 0.672839 | 0.400610 | 0.744054 | -0.306762 | 0.047103 | 0.396722 | -0.079421 | 1.000000 | | |
| SALES_GROWTH | 0.219473 | 0.308923 | -0.067438 | -0.101942 | -0.036918 | -0.025691 | -0.099396 | -0.048559 | 0.157289 | 0.193780 | 0.129091 | -0.015560 | 1.000000 | |
| ENERGY_REV | 0.433113 | 0.020770 | 0.499493 | 0.570029 | 0.413532 | 0.281630 | 0.977365 | -0.285806 | -0.146996 | 0.226513 | -0.024771 | 0.740606 | -0.072549 | 1.000000 |
| EV_TO_EBITDAX | -0.328756 | 0.063764 | -0.193549 | -0.215441 | -0.199771 | -0.058963 | -0.168969 | -0.016978 | -0.043523 | -0.237293 | 0.271223 | -0.458041 | -0.062886 | -0.173151 |

Table 2 Second Model Variables Correlation Table

Thus, it is standard for E&P companies to commence the operating year with high BVA and low net income because the PD resources are realised at the annual end (iterative circle of operations). Observing the first model, Q ratio correlation with revenue is marginally negative. The result is irrelevant to Russo

and Fouts (1997) and to the study second model correlation at Table 2 because the company sales could only influence positively on firm value.

The second model correlation, Table 2, consist of 2 dependent variables and 13 independent variables in total that the majority of them are unique ratios for the E&P sector. The research paper tenet to identify a significant link between CFP and ESG is bolstered by the logical correlations between the determinants. For instance, EV to EBITDAX is negatively correlated with the BVA and ROA ratios because low ratio indicates better performance (Howard and Harp 2009). On the other hand, DTOA and EV to debt have positive relationship interpreted by the variables lower performance and company value. In the correlation table, the positive relationship with financial performance variables is a positive sign that the model is consistent with the Waddock and Graves (1997) and Russo and Fouts's (1997) CSP or in this case the ESG factors. Another significant example, DTOA and debt to negative effect on Tobin's Q and ROA is consistent with Russo and Fouts (1997) correlation table results. Debt to EV has the equivalent analogy of the DTOA and Q ratio relationship that it is further enhancing the second model cohere structure. Furthermore, RR ratio has a conspicuous but rationally negative relationship with the profit indicator ROA because the institution resources are not transformed into operative income. The lucidity behind the relationships, the replacement ration has a negative influence on ROA because the ratio combines a number of expenses. On contrary, it is rational that higher RR indicates higher firm value, in other words a positive relationship with Q ratio.

Furthermore, EV to PD resources is a financial ratio that additionally supports the second model wellness of fit shown in Table 2 above. Howard and Harp (2009) reinforced the rationality of positive correlation between EV to PD ratio, and ROA and Q ratio. This outcome definitely enhance the thesis that the prior

research papers linear regression variables are not compatible with E&P companies.

### 4.1.1 ESG Scores Analysis

This section includes general descriptive statistics including the E, S, and G scores. Each of the tables below combine first and second model statistics for the ease to compare and contrast a particular factor. To recognise effortlessly both models, the first model contains 438 observations, while the second model contains 204 observations.

Tabulation of ESG_SCORE1
Date: 05/12/15 Time: 17:34
Sample: 2009 2014
Included observations: 438
Number of categories: 5

| Value | Count | Percent | Cumulative Count | Cumulative Percent |
|---|---|---|---|---|
| [0, 20) | 9 | 2.05 | 9 | 2.05 |
| [20, 40) | 145 | 33.11 | 154 | 35.16 |
| [40, 60) | 106 | 24.20 | 260 | 59.36 |
| [60, 80) | 88 | 20.09 | 348 | 79.45 |
| [80, 100) | 90 | 20.55 | 438 | 100.00 |
| Total | 438 | 100.00 | 438 | 100.00 |

Tabulation of ESG_SCORE
Date: 05/12/15 Time: 17:32
Sample: 2009 2014
Included observations: 204
Number of categories: 5

| Value | Count | Percent | Cumulative Count | Cumulative Percent |
|---|---|---|---|---|
| [0, 0.2) | 1 | 0.49 | 1 | 0.49 |
| [0.2, 0.4) | 50 | 24.51 | 51 | 25.00 |
| [0.4, 0.6) | 40 | 19.61 | 91 | 44.61 |
| [0.6, 0.8) | 40 | 19.61 | 131 | 64.22 |
| [0.8, 1) | 73 | 35.78 | 204 | 100.00 |
| Total | 204 | 100.00 | 204 | 100.00 |

Table 3 Overall ESG score descriptive statistics

Table 3 presents ESG overall score statistics and it is evident that the second model have better centred distribution between the observations while the first model indicates significant extreme outliers. Nevertheless, Table 4 demonstrates that there is a nearly normal distribution recognised in both models. However, this is not a dependent variable and there is no requirement for normal distribution requirement from control variables.

| Date: 05/12/15 Time: 17:37<br>Sample: 2009 2014 | |
|---|---|
| | ESG_SCORE1 |
| Mean | 54.59589 |
| Median | 49.00000 |
| Maximum | 95.00000 |
| Minimum | 10.00000 |
| Std. Dev. | 22.57221 |
| Skewness | 0.233457 |
| Kurtosis | 1.702340 |
| Jarque-Bera | 34.71026 |
| Probability | 0.000000 |
| Sum | 23913.00 |
| Sum Sq. Dev. | 222653.5 |
| Observations | 438 |

| Date: 05/12/15 Time: 17:54<br>Sample: 2009 2014 | |
|---|---|
| | ESG_SCORE |
| Mean | 0.627794 |
| Median | 0.695000 |
| Maximum | 0.950000 |
| Minimum | 0.170000 |
| Std. Dev. | 0.233195 |
| Skewness | -0.216840 |
| Kurtosis | 1.461197 |
| Jarque-Bera | 21.72595 |
| Probability | 0.000019 |
| Sum | 128.0700 |
| Sum Sq. Dev. | 11.03911 |
| Observations | 204 |

Table 4 ESG Descriptive Statistics

Single examining the ESG overall score, it can be concluded that both first and second model score are distributed similarly with standard deviation approximately 23.

The E, S, G scores are analysed individually in Table 8, Table 9, and Table 10 consecutively. The E-score demonstrate positive skewness consistent with the overall score and both models yielding a lower kurtosis of 1.46 and 1.37 consecutively for the first and second model. In addition, S and G-score indicate the same pattern of platokurtic distribution with fat tails, although Brooks (2008) stated that financial data is leptokurtic because of the high value of kurtosis causing the centre to extend up high and to thinner the tails. G-score demonstrates a consistent high score of 82-83 and low standard deviation of 13 percent that indicates possible restrictions and a difficulty to explain the trend movement; the G-score statistics are illustrated in Table 10. In

comparison to E and S-score proving higher volatility, 30 percent standard deviation, and a lower fluctuation of its core.

The high median in the data indicates better reporting of the particular factor. It is noteworthy to indicate the median is higher in the first model in comparison to the second model indicating difference from 10 and 30 and 1 percentage points for E, S and G-score consecutively. Thus, it is a positive factor that the second model is going to capture the positive relationship between ESG and CFP.

### 4.1.2 **ROA and Q Scores Analysis and Tests**

#### ***First Model***

The first model ROA and Q ratio descriptive statistics is shown in Table 5. The dependent variable requires a normal distribution as stated in Brooks (2008) in order to identify a pattern between the dependent variables and to produce meaningful results. The first model dependent variables are accepting Jarque Bera normality test, which indicates a weak explanatory power to cohere the variables in a valuable regression equation. Russo and Fouts (1997) found a higher Tobin's Q for the energy sector because of its indebted nature, and the other factor is 2009 financial recession consequence in the subsequent periods. Hence, the ROA adopts better normal distribution statistics with negative 0.79 skewness and 3.79 kurtosis (Table 5.)

| Date: 05/12/15 Time: 18:10<br>Sample: 2009 2014 | |
|---|---|
| | ROA |
| Mean | 0.051389 |
| Median | 0.051906 |
| Maximum | 0.059733 |
| Minimum | 0.040491 |
| Std. Dev. | 0.003284 |
| Skewness | -0.776778 |
| Kurtosis | 3.798345 |
| Jarque-Bera | 55.67876 |
| Probability | 0.000000 |
| Sum | 22.50858 |
| Sum Sq. Dev. | 0.004712 |
| Observations | 438 |

| Date: 05/12/15 Time: 18:10<br>Sample: 2009 2014 | |
|---|---|
| | Q |
| Mean | 1.523470 |
| Median | 1.405000 |
| Maximum | 4.710000 |
| Minimum | 0.320000 |
| Std. Dev. | 0.622057 |
| Skewness | 1.773084 |
| Kurtosis | 7.763263 |
| Jarque-Bera | 643.5678 |
| Probability | 0.000000 |
| Sum | 667.2800 |
| Sum Sq. Dev. | 169.0991 |
| Observations | 438 |

Table 5 First Model ROA and Q ratio Descriptive Statistics

***Second Model***

## 1.0 ROA and Q Ratio Jarque-Bera Test for Normality

The second model is reduced with best-in-class selection process and similar size E&P companies are only included in the sample. Furthermore, the model removes the extreme outliers prolonging the tails causing excess kurtosis.

Thus, ROA and Tobin's Q reject Jarque-Bera normality test at the remarkable 5 and 10 percent consecutively in Table 6 below (Brooks 2008). The second model adopts enhanced dependent statistics aiming to improve R squared in order to create a comprehensive link to support the thesis arguments.

| Date: 05/12/15 Time: 18:11<br>Sample: 2009 2014 | |
|---|---|
| | ROA_Z |
| Mean | -0.159257 |
| Median | 1.15E-15 |
| Maximum | 2.149795 |
| Minimum | -2.878755 |
| Std. Dev. | 1.002460 |
| Skewness | -0.378408 |
| Kurtosis | 2.958175 |
| Jarque-Bera | 4.883427 |
| Probability | 0.087012 |
| Sum | -32.48845 |
| Sum Sq. Dev. | 204.0000 |
| Observations | 204 |

| Date: 05/12/15 Time: 18:12<br>Sample: 2009 2014 | |
|---|---|
| | Q |
| Mean | 1.351475 |
| Median | 1.320163 |
| Maximum | 2.234888 |
| Minimum | 0.556079 |
| Std. Dev. | 0.315178 |
| Skewness | 0.292266 |
| Kurtosis | 2.599981 |
| Jarque-Bera | 4.264380 |
| Probability | 0.118577 |
| Sum | 275.7009 |
| Sum Sq. Dev. | 20.16540 |
| Observations | 204 |

Table 6 Second Model ROA and Q ratio Descriptive Statistics

To strengthen the normality test, the kurtosis is 2.95, which is extremely close to the normal distribution kurtosis of 3 and the skewness is also nearing to the normal distribution of 0. To conclude, the ROA dependent variable appears to show characteristics to build a strong foundation for the regression model, which was not significant for the first statistical model.

Tobin's Q is the second dependent variable and its probability is immensely improved from the first model in Table 8 to the current reduced sample statistics in Table 9. Lindenberg and Ross (1981) received results that oil and gas industry adopts high-yielding Tobin's Q ratios but the data was from a large sample. Thus, the Tobin's Q variation could be explained and accepted because of the removed smaller oil and gas companies that are usually over-valued because of specializing in the niche market segments. This is the reason, the larger E&P companies have higher competition that it explains the lower Tobin's Q (Russo and Fouts 1997).

### *Second Model Fixed and Random Effects Tests*

The fixed and random effect models are conducted to test whether the panel data is suitable approach and the intercepts are similar over the cross-sectional units (Brooks 2008). The significant drawback of the second model is the small number of observations. However, the reliability results from all models reject significantly the null hypothesis, the tests can are shown in the appendices section at the end of the research paper[27].

The ROA and Q ratio equation 2 capture a disturbance term in the Period F and Chi-square. However, the null hypothesis is accepted at 1 percent indicating that the variables are treated as exogenous confirming the panel data approach. The Hausman Test and Likelihood Ratio Test have p-value of less than 1 percent that it can be interpreted that restrictions are not supported by the data and the pool sample cannot be adopted (Brooks 2008).

## 4.2. Regression Results

### 4.2.1 ESG Correlation with ROA (operating performance)

### *First Model*

[27] Equation 9 Second Model Regression 1; Fixed Effects Likelihood Ratio Test
Equation 10 Second Model ROA Regression 1; Random Effects Hausman Test
Equation 11 Second Model ROA Regression 2; Fixed Effects Likelihood Ratio Test
Equation 12 Second Model ROA Regression 2; Random Effects Hausman Test
Equation 13 Second Model Q Regression 1; Fixed Effects Likelihood Ratio Test
Equation 14 Second Model Q Regression 1; Random Effects Hausman Test
Equation 15 Second Model Q Regression 2; Fixed Effects Likelihood Ratio Test
Equation 16 Second Model Q Regression 2; Random Effects Hausman Test

The first section embarks upon ROA first model regression equation followed by its robustness check in order to enhance the model after adding a peculiar explanatory variables for the E&P sector. The Equation 1 support hypothesis 1 below and it aims to identify a positive correlation between ESG scores and ROA.

*Hypothesis 1: ESG scores are positively correlated to operating performance.*

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/12/15 Time: 11:25
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.051713 | 0.000531 | 97.46799 | 0.0000 |
| ESG_SCORE1 | 1.14E-05 | 8.08E-06 | 1.409722 | 0.1593 |
| BVA | 1.39E-14 | 9.63E-15 | 1.448046 | 0.1483 |
| DTOA | -5.08E-05 | 1.07E-05 | -4.730984 | 0.0000 |
| SALES | -6.72E-15 | 7.76E-15 | -0.865798 | 0.3871 |

| | | | |
|---|---|---|---|
| R-squared | 0.111731 | Mean dependent var | 0.051389 |
| Adjusted R-squared | 0.103526 | S.D. dependent var | 0.003284 |
| S.E. of regression | 0.003109 | Akaike info criterion | -8.697609 |
| Sum squared resid | 0.004186 | Schwarz criterion | -8.651009 |
| Log likelihood | 1909.776 | Hannan-Quinn criter. | -8.679222 |
| F-statistic | 13.61629 | Durbin-Watson stat | 1.026005 |
| Prob(F-statistic) | 0.000000 | | |

Equation 1 First Model ROA Equation

The Equation 1 has 11 percent R-squared that is considered considerably low for a regression equation and it is interpreted as a weak model explanatory indicator. One of the reasons, ROA adopts a leptokurtic distribution, it is thus implausible to establish a significant relationship among the variables. As a consequence, the BVA, ESG overall score and Sales showinsignificant

probability of more than 10 percent, and they are poorly integrated into the regression equation. Breuer and Nau (2014) and Derwall (2007) utilised the same variable in their regression equation and they have received positive significant relationship among the variables, although their models are not specific for the oil and gas industry. It is evident that the determinants are not appropriate for investigating the relationship between ESG score and CFP. In the next equation, the sales ratio is replaced with EV to DP of BOE ratio aiming to attain better fit for the test and to concrete the thesis that the previous research results are inappropriate for E&P companies.

The ROA robustness equation is observed in Equation 2 results table below

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/12/15 Time: 11:27
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.051532 | 0.000532 | 96.81411 | 0.0000 |
| ESG_SCORE1 | 1.45E-05 | 7.68E-06 | 1.887830 | 0.0597 |
| BVA | 6.00E-15 | 2.52E-15 | 2.380622 | 0.0177 |
| DTOA | -4.88E-05 | 1.08E-05 | -4.535320 | 0.0000 |
| EVTODP | 1.66E-07 | 9.59E-08 | 1.735538 | 0.0834 |

| | | | |
|---|---|---|---|
| R-squared | 0.116341 | Mean dependent var | 0.051389 |
| Adjusted R-squared | 0.108177 | S.D. dependent var | 0.003284 |
| S.E. of regression | 0.003101 | Akaike info criterion | -8.702812 |
| Sum squared resid | 0.004164 | Schwarz criterion | -8.656211 |
| Log likelihood | 1910.916 | Hannan-Quinn criter. | -8.684424 |
| F-statistic | 14.25195 | Durbin-Watson stat | 1.033144 |
| Prob(F-statistic) | 0.000000 | | |

Equation 2 First Model ROA Robustness Check

As a result, the R-squared is insignificantly improved in comparison to thefirst equation, although EV to DP ratio significantly improves the model as identifying a similar trend that enhances the relationship between the dependent and independent variables. This is the reason ESG score to indicate 5 percent probability and BVA has a probability close to 1 percent. The robustness check equation is generally improved. However, Hypothesis 1 is poorly accepted, for the reason that ESG and ROA relationship obtains probability at 10 percent. This result supports the paper thesis and it confirms that better regression is required for the E&P sector. Furthermore, EV to DPof BOE ratio is a superior measure to value E&P company performance becausethe daily production of barrels of oil measure is a unique characteristic of the sector that the sales ratio cannot capture.

The result proves that there is a niche in the research and it leads tothe second model purpose to identify E&P unique determinants to testthe relationship.

***Second Model***

The second model receives outstanding results shown in Equation 3 below;in contrast to the first model, which improves R-squared to 50 percent that is 5 times better than the first model. There are two major improvements tothe second model, the ROA demonstrates normal distribution characteristics identified from rejecting Jarque-Bera normality test and four explanatory variables are added to the regression equation that are peculiarly selected to explain the E&P companies' operating performance.

Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/12/15 Time: 12:30
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.112893 | 0.237703 | -0.474933 | 0.6354 |
| ESG_SCORE | 0.589724 | 0.267462 | 2.204888 | 0.0286 |
| BVA | 1.63E-12 | 6.35E-13 | 2.573674 | 0.0108 |
| DTOV | -3.354803 | 0.421076 | -7.967214 | 0.0000 |
| EV_TO_EBITDAX | -0.033022 | 0.007522 | -4.389869 | 0.0000 |
| EP_TO_BOE | 0.008552 | 0.002589 | 3.303515 | 0.0011 |
| SALES_GROWTH | 0.005968 | 0.001794 | 3.327178 | 0.0010 |

| | | | |
|---|---|---|---|
| R-squared | 0.508063 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.493080 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.713734 | Akaike info criterion | 2.197099 |
| Sum squared resid | 100.3551 | Schwarz criterion | 2.310956 |
| Log likelihood | -217.1041 | Hannan-Quinn criter. | 2.243156 |
| F-statistic | 33.90967 | Durbin-Watson stat | 1.601131 |
| Prob(F-statistic) | 0.000000 | | |

Equation 3 Second Model ROA Equation

The Equation 3 above proves the determinants improved relationship between each other that it can be interpreted from the probability results. As a consequence, the ESG score and BVA show probability of 2.8 and 1 percent consecutively, which indicates the equation robust explanatory power to identify a significant similarity between ESG and ROA. In addition, DTOV, EV to EBITDAX, EP to BOE independent variables are with probability lower than 1 percent that additionally strengthens the model value. The current model has adopted unique control variables such as debt to value that it has been swapped with the debt to assets variable from the original model. The debt to value ratio is more significant for the oil and gas companies because of the

industry highly indebted and fragmented nature (Russo and Founts 1997). Thus, debt to assets cannot capture the high investments that have beenmade throughout the year and more likely is going to be identified in the nextyear gains in the balance sheet.

The main result, the ROA has a positive correlation with ESG that it is consistent with Waddock and Graves (1997). In fact, the ROA and ESGpositive correlation is highly significant at 5 percent probability with ESG coefficientof 0.58 that it can be interpreted that the two variables are followingalmost identical trends.

*Hypothesis 1: E&P financial indicators improve the positive ESGfactors correlation with operating performance.*

In result, the positive ROA with ESG coefficient of 58 percent supports second model's hypothesis 1, in other words, theESG score follow same trend with 58 percent certainty. Thus, the hypothesis oneis strongly supports Equation 3. The coefficient pattern is drasticallyimproved from the first model. Moreover, Bryan (2012) determined a positivecorrelation between EP to BOE that is relevant with Equation 3 results. This proves thatthe profitability of a company is dependent on the ESG score. Hence, thehypothesis 1 is accepted and explained by the regression in Equation3.

### 4.2.2 **ESG Correlation with Q ratio (firm value)**

***First Model***

This section purpose is to investigate the relationship between ESG scoreand firm value. The first and second model are analysed in a differentsection.

The Equation 4 below is based on Derwall (2007) regression equation, although it can be observed that it is poorly explained with modest R-squared of 10 percent. The crucial inconsistency of the model below is the negative BVA's coefficient that indicates the model as an irrelevant to measure any meaningful relationship, even though ESG and BVA probability is highly significant at 1 percent.

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:35
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.442588 | 1.351270 | 6.987935 | 0.0000 |
| ESG_SCORE1 | -0.003850 | 0.001540 | -2.499887 | 0.0128 |
| BVA | -4.53E-12 | 1.84E-12 | -2.468039 | 0.0140 |
| LOGROA | 2.569145 | 0.454647 | 5.650857 | 0.0000 |
| DTOA | -0.000594 | 0.002092 | -0.284087 | 0.7765 |
| SALES | 3.00E-12 | 1.48E-12 | 2.029651 | 0.0430 |

| | | | |
|---|---|---|---|
| R-squared | 0.107510 | Mean dependent var | 1.523470 |
| Adjusted R-squared | 0.097180 | S.D. dependent var | 0.622057 |
| S.E. of regression | 0.591059 | Akaike info criterion | 1.799801 |
| Sum squared resid | 150.9193 | Schwarz criterion | 1.855721 |
| Log likelihood | -388.1563 | Hannan-Quinn criter. | 1.821866 |
| F-statistic | 10.40780 | Durbin-Watson stat | 0.659400 |
| Prob(F-statistic) | 0.000000 | | |

Equation 4 First Model Q ratio Equation

To verify the irrationality in the concept, Derwall (1997), and Breuer and Nau (2014) indicated BVA and logarithm of ROA to provide significantly positive relationship with ROA, which is only supported for logarithm of ROA. In addition, these variables are identified to adopt high explanatory power to

operating performance link with ESG when analysing broad spectrum of industries. On the other hand, E&P sector cannot adopt similar variables as it is deducted from the Equation 4.

As a result, Hypothesis 2 is accepted at 5 percent probability, although the model proves to be inconsistent with the previous literature results. An argument arises from the first model that is examined with the robustness test in the regression equation.

*Hypothesis 2: ESG scores are positively correlated to firm value.*

The first model robustness check in Equation 5 purpose is to address the E&P sector restrictions from previous papers and to identify if the test result will improve if EV to PD resources ratio is added.

It is first vital to indicate the EV to PD resources ratio is highly relevant to the E&P companies' firm value. Harp et al. (2009) identified EV to PD reserves ratio to determine a positive relationship with E&P companies because the proved developed reserves, realised wells resources, add both intrinsic and market value to the company while there is no exploration expense. There is an incredible model improvement after EV to PD ratio is added to the regression in Equation 5 that this increment in improved R-squared to 23 percent indicates strong explained coefficients. However, the drawbacks from the insignificant dependent variable still persist in the model such as negative BVA and low probability of DTOA that are one of the key independent explanatory determinants in the previous research papers. The EV to PD ratio also corrects the insignificant negative relationship between firm value and ESG score. Hence, the first model equation is successfully proven inconsistent and the discovered ESG and firm value negative relationship is arguable.

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:34
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.779839 | 1.252452 | 7.808551 | 0.0000 |
| ESG_SCORE1 | -0.002362 | 0.001437 | -1.643207 | 0.1011 |
| BVA | -3.85E-12 | 1.70E-12 | -2.262654 | 0.0242 |
| LOGROA | 2.802775 | 0.422082 | 6.640353 | 0.0000 |
| DTOA | 0.001801 | 0.001959 | 0.919410 | 0.3584 |
| SALES | 2.58E-12 | 1.37E-12 | 1.886106 | 0.0600 |
| EV_TO_PD | 0.005269 | 0.000619 | 8.506626 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.235813 | Mean dependent var | 1.523470 |
| Adjusted R-squared | 0.225175 | S.D. dependent var | 0.622057 |
| S.E. of regression | 0.547560 | Akaike info criterion | 1.649164 |
| Sum squared resid | 129.2234 | Schwarz criterion | 1.714405 |
| Log likelihood | -354.1669 | Hannan-Quinn criter. | 1.674906 |
| F-statistic | 22.16634 | Durbin-Watson stat | 0.684059 |
| Prob(F-statistic) | 0.000000 | | |

Equation 5 First Model Q ratio Equation Check

The robustness check increased R-squared with 13 percent because of the EV to PD resources explanatory significance to the regression. As a result, the Hypothesis 2 is rejected from both tests.

***Second Model***

The second model expands the previous model with highly significant variables to prove that E&P sector requires a restructured regression equation in order to test the ESG correlation with firm value.

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:56
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.465476 | 0.290127 | 1.604386 | 0.1102 |
| ESG_SCORE | -0.305951 | 0.097087 | -3.151313 | 0.0019 |
| EV_TO_PD | 0.011055 | 0.001229 | 8.997397 | 0.0000 |
| EP_TO_BOE | -0.002558 | 0.000899 | -2.845936 | 0.0049 |
| DTOV | -1.199140 | 0.129053 | -9.291833 | 0.0000 |
| RESERVE_RATIO | 0.012221 | 0.002973 | 4.110669 | 0.0001 |
| LOGEBITDAX | 0.043417 | 0.014309 | 3.034242 | 0.0027 |
| SALES_GROWTH | 0.002179 | 0.000549 | 3.967540 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.546372 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.530171 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.216036 | Akaike info criterion | -0.188321 |
| Sum squared resid | 9.147587 | Schwarz criterion | -0.058199 |
| Log likelihood | 27.20878 | Hannan-Quinn criter. | -0.135685 |
| F-statistic | 33.72459 | Durbin-Watson stat | 0.674089 |
| Prob(F-statistic) | 0.000000 | | |

Equation 6 Second Model Q ratio Equation

Tobin's Q ratio regression in Equation 6 above adopts very comprehensive determinants; hence the R-squared is boost to 54 percent, although the regression equation is not expected to explain each variable. ESG score having high probability, while the link is still comprehensive between intrinsic firm value and ESG score. However, the ESG coefficient is negative at 30 percent indicating opposite coefficient movement with firm value. One of the reasons

could be due to the caveat concerning the data or the E&P companies' data is collected at the end of the year when the intrinsic value of the company is decreased because companies borrow large amount of debt during the end of year (Bryan 2012). This is a peculiar example for relationship in E&P industry because of its highly indebted nature, firms has larger intrinsic value when there is a high level of debt obtained. The regression model at Equation 6 produces $p<0.01$ for ESG score, EV to PD, EP to BOE, DTOV, Reserve ratio, logarithm of EBITDAX and Sales Growth. The negative relationship between Q ratio, and DTOV and EP to BOE is rationale because the debt or the exploration cost increase is going to reduce the value of the firm. On the other hand the other two innovative independent variables Reserve ratio and log of EBITDAX have a significant positive coefficient with firm value. Russo and Fouts (1997) discovered a positive relationship between first growth rate and firm value, which it is supported from the regression above representing firm growth rate through EBITDAX. Moreover, Howard and Harp (2009) stated that the oil and gas reserve ratio is positive to firm value that it is supported in the Equation 6 above.

The ESG score and Q ratio positive correlation is vital to support hypothesis 2 below. On contrary, a negative correlation is indicated in Equation 6 above, the result is controversial to Russo and Fouts' (1997) research paper result and the result is examined in detail the second model, q ratio section in order to identify, which one of the E, S, and G Factors have negative relationship with Q ratio

The regression equation indicates improved model with better relationship between the variables, although the negative correlation between ESG and Q ratio inclines to reject Hypothesis 2.

*Hypothesis 2: E&P financial indicators improve the positive ESG factors correlation with firm value.*

### 4.2.3 Environmental, Social, and Governance correlation with ROA and Q

***E, S, G and ROA correlation***
***First Model***

The second part of the data analysis examines the relationship between each E, S, and G-score and ROA and Q ration. The current section analyse the first model E, S, G factors relationship with ROA. The first model regression equation purpose is to determine variables' constraints in the previous research papers.

The first model regression followed by its robustness check set the foundation for building the second model's regression equation.

The Equation 7 below demonstrates a modest, rather low R-squared of 12 percent that is consistent with the previous first model results for the reason ROA did not obtain positive results for the normal distribution. When the E, S,G scores are analysed separately, it is observed a distinguishable correlation with the other determinants. There is a clear inconsistency with the previous models because only DTOA probability is accepted at 1 percent. However, it is noteworthy to signify the slight positive correlation of E, S-score with ROA at 10 percent probability. The E, S relationship is consistent with Waddock and Graves (1997) Derwall (2007) and Breuer and Nau (2014).

*Hypothesis 3: Higher environmental, social, and governance factors are positively correlated to higher accounting performance.*

The hypothesis 3 is partially supported for the E, S positive correlation with ROA, although G-score is statistically insignificant for the regression model. It is thus the reason the Hypothesis 3 is not strongly supported.

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/12/15 Time: 11:23
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.052371 | 0.000892 | 58.73290 | 0.0000 |
| ENVIRONMENTAL | 0.000929 | 0.000530 | 1.752702 | 0.0804 |
| SOCIAL | 0.001205 | 0.000638 | 1.888443 | 0.0596 |
| GOVERNANCE | -0.001476 | 0.001182 | -1.248929 | 0.2124 |
| BVA | 1.26E-14 | 9.46E-15 | 1.336196 | 0.1822 |
| DTOA | -4.44E-05 | 1.11E-05 | -3.982851 | 0.0001 |
| SALES | -5.87E-15 | 7.69E-15 | -0.762812 | 0.4460 |

| | | | |
|---|---|---|---|
| R-squared | 0.121531 | Mean dependent var | 0.051389 |
| Adjusted R-squared | 0.109302 | S.D. dependent var | 0.003284 |
| S.E. of regression | 0.003099 | Akaike info criterion | -8.699571 |
| Sum squared resid | 0.004139 | Schwarz criterion | -8.634330 |
| Log likelihood | 1912.206 | Hannan-Quinn criter. | -8.673828 |
| F-statistic | 9.937732 | Durbin-Watson stat | 1.052316 |
| Prob(F-statistic) | 0.000000 | | |

Equation 7 E S G factors correlation with ROA

The Equation 8 is the robustness check of the first regression equation and an independent variable representing the ratio EVTODP of BOE is added to enhance the equation. However, the R-square in the second equation remains modest and E and S score probability increases to 9.4 and 3.6 percent consecutively. The slight increase in probability proves that there is a

questionable relationship between the variables and it provides the necessityto build a new coherent regression.

The hypothesis 3 is also poorly supported with the robustness check in Equation 8. As a consequence, it is established a need to create a better regression equation that is going to provide a more comprehensive modelthat potentially is going to support the hypothesis 3.

***Second Model***

The second hypothesis is justified by the Equation 7 and Equation 8. The regression model in Equation 9 has a reasonable explanation through the control variables producing an R-squared of 48 percent. The key indicators to identify the hypothesis are only E-score because S and G score are not identified as linked to ROA, while Sales Growth, Energy Revenue and DTOV variables are all highly significant at 1 percent. The environment factor accepts 5 percent probability that it further supports the first model regression equations and Russo and Fouts (1997). On the other hand, the S and G score insignificance could be the result of, the caveat concerning sample of companies or the investment projects are at a cost in the current period because the investment intangible return cannot be translated in an instant improvement of thescore.
The environment factor proves an identical movement with ROA ratio, which exceeds the expected results from previous literature. The positive relationship indicates that the E&P companies capitalise on their environmentalinvestments and benefit the environment as well with the operating performance. In other words, the environmental issues are tackled with investments that improvethe E&P companies' productivity. The relationship between BVA and ROA indicates not following consistency from previous regression equations, it is thus the sample suffers from caveat concerning the sample, once the outliers havebeen removed.

Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/12/15 Time: 12:29
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.078941 | 0.363238 | -0.217325 | 0.8282 |
| ENVIRONMENTAL | 1.098476 | 0.540268 | 2.033207 | 0.0434 |
| SOCIAL | -0.202021 | 0.453282 | -0.445685 | 0.6563 |
| GOVERNANCE | -0.104842 | 0.504079 | -0.207987 | 0.8355 |
| BVA | -6.73E-12 | 2.77E-12 | -2.425857 | 0.0162 |
| DTOV | -2.654169 | 0.451578 | -5.877538 | 0.0000 |
| SALES_GROWTH | 0.007959 | 0.001876 | 4.242644 | 0.0000 |
| ENERGY_REV | 3.29E-11 | 1.05E-11 | 3.132862 | 0.0020 |

| | | | |
|---|---|---|---|
| R-squared | 0.449581 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.429923 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.756892 | Akaike info criterion | 2.319233 |
| Sum squared resid | 112.2855 | Schwarz criterion | 2.449355 |
| Log likelihood | -228.5618 | Hannan-Quinn criter. | 2.371870 |
| F-statistic | 22.87033 | Durbin-Watson stat | 1.446575 |
| Prob(F-statistic) | 0.000000 | | |

Equation 8 ROA correlation with E, S, G score

The results from Equation 9 demonstrate weak support to the Hypothesis 3, although the highly significant positive relationship with E-score determines a valuable link that requires to be examined in more detail.

*Hypothesis 3: Higher environmental, social, and governance factors are positively correlated to higher accounting performance.*

### *E, S, G and Q ratio correlation*

### *First Model*

The next section is based on Russo and Fouts' (1997) studies with climax on environmental score correlation with the firm value. The first model purpose is to prove previously suggested variables are irrelevant for E&Psector.

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:36
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.088257 | 1.353740 | 6.713442 | 0.0000 |
| ENVIRONMENTAL | 0.211230 | 0.101065 | 2.090043 | 0.0372 |
| SOCIAL | -0.315148 | 0.121816 | -2.587088 | 0.0100 |
| GOVERNANCE | 0.080013 | 0.225178 | 0.355333 | 0.7225 |
| BVA | -5.19E-12 | 1.80E-12 | -2.879916 | 0.0042 |
| LOGROA | 2.535293 | 0.455596 | 5.564783 | 0.0000 |
| DTOA | 0.000307 | 0.002157 | 0.142407 | 0.8868 |
| SALES | 3.41E-12 | 1.46E-12 | 2.331542 | 0.0202 |

| | | | |
|---|---|---|---|
| R-squared | 0.117540 | Mean dependent var | 1.523470 |
| Adjusted R-squared | 0.103174 | S.D. dependent var | 0.622057 |
| S.E. of regression | 0.589093 | Akaike info criterion | 1.797631 |
| Sum squared resid | 149.2233 | Schwarz criterion | 1.872192 |
| Log likelihood | -385.6813 | Hannan-Quinn criter. | 1.827051 |
| F-statistic | 8.182011 | Durbin-Watson stat | 0.660877 |
| Prob(F-statistic) | 0.000000 | | |

Equation 9 Q ratio correlation with E, S, G score

The first model results are illustrated in Equation 9 above and the equation is tested to identify if Hypothesis 4 is supported.

*Hypothesis 4: Higher environmental, social, and governance factors are positively correlated to higher economic value.*

The regression equation demonstrates R-squared of 11.7 percent that is consistent with previous first model's equations. The BVA shows negative coefficient with firm value that is not relevant as discussed previously. Moreover, DTOA and Governance are not explanatory for the regression equation indicating some limitations of the constructed model. On contrary, log ROA and the revenue are consistent with previous results. The E-score has a positive at 10 percent and S-score surprisingly negative correlation at 1 percent.

On the other hand, the same regression equation is tested in Equation 10 robustness check with added EV to PD resources variable. The results are consistent with the prior Q ratio and ESG score relationship indicating enhanced R-squared of 23 percent and insignificant relationship between Q and E-score. This can be interpreted as additional support to the argument that E&P companies cannot be tested with the previously accepted determinants.

***Second Model***

The regression Equation 11 below determines the importance of the research paper. The R-squared is 58 percent supporting the explanatory power of the regression model between the variables.

The most significant relationship in the regression equation is between Q ratio relationship with E-score and S-score. The E-score indicates opposite relationship in comparison when ROA was dependent variable.

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:56
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.092755 | 0.322113 | 0.287959 | 0.7737 |
| ENVIRONMENTAL | -0.731636 | 0.143324 | -5.104757 | 0.0000 |
| SOCIAL | 0.379400 | 0.120431 | 3.150358 | 0.0019 |
| GOVERNANCE | 0.066925 | 0.138332 | 0.483799 | 0.6291 |
| EV_TO_PD | 0.010550 | 0.001190 | 8.867921 | 0.0000 |
| EP_TO_BOE | -0.002132 | 0.000869 | -2.452190 | 0.0151 |
| DTOV | -1.290910 | 0.125094 | -10.31954 | 0.0000 |
| RESERVE_RATIO | 0.010639 | 0.002866 | 3.711540 | 0.0003 |
| LOGEBITDAX | 0.058945 | 0.014295 | 4.123362 | 0.0001 |
| SALES_GROWTH | 0.001724 | 0.000535 | 3.223485 | 0.0015 |

| | | | |
|---|---|---|---|
| R-squared | 0.589423 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.570375 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.206586 | Akaike info criterion | -0.268427 |
| Sum squared resid | 8.279451 | Schwarz criterion | -0.105774 |
| Log likelihood | 37.37956 | Hannan-Quinn criter. | -0.202631 |
| F-statistic | 30.94506 | Durbin-Watson stat | 0.770513 |
| Prob(F-statistic) | 0.000000 | | |

Equation 10 Q ratio correlation with E, S, G score

The Equation 11 demonstrates a satisfying R-squared at 59 percent, as it can be perceived by the better correlated variables, which it creates a good statistical model that it is vastly improved from the first statistical model. In addition, the regression model attains in identifying highly significant control variables accepted at 1 percent probability except for book value of assets and

ESG score. Waddock and Graves (1997) regression model is utilised to build the above equation's foundation. Secondly, the EP to BOE and DTOV ration demonstrate a significant negative correlation with the Q ratio because the higher exploration and production cost translates into less profitability for the company when it is not supported with strong production of BOE. Thirdly, enterprise value to prove developed resources and sales growth determine $p<1$ percent relationship with ROA, which it was expected to be more vivid from the sales growth variable. However, it could be accepted that the sales growth is not a significant determinant for the E&P companies which performance is measured by barrels of oil equivalent depending on the proved developed reserves (oil and gas wells) (Patari, Arminen, Tuppura etc. 2014).

The innovative relationship in Equation 11 indicates that E&P companies adopt controversial relationship between Q ratio and E-score. The E-score result is consistent with Geczy et al. (2005), Chong et al. (2006) and Hong et al. (2006) that have also determined negative correlation with E-score, although their samples were tested in broad universe of funds. Hence, the E&P companies invest in E-score because of necessity rather than adding value to the company. It is noteworthy to state that larger E&P companies have diversified operations and a rigid inner management to diminish the severe negative effects of undertaking new EP operations.

*Hypothesis 4: Better E, S, G factors are positively correlated to higher firm value with emphasis on economic environment factor.*

As a consequence, the research paper results are controversial in comparison to the most ESG studies. The innovative result strongly rejects Hypothesis 4 and it provides a foundation for new wave of studies to investigate the controversial discoverability.

# 5. Conclusion

The second model results indicate a positive correlation in Equation 3 between ESG overall score with operating performance; while the Equation 6 indicates an ESG overall score negative correlation with firm value. In support to the above results, the second model results are consistent with the first two findings and they provide an extra value for the research paper because the regressions examine separately the E, S, and G factors correlation with operating performance and firm value. In fact, the utmost finding is based in Equation 11 indicating a negative correlation between E-score and firm value. Thus, this innovative finding is the paramount of the research paper, providing a new perspective to investigate the ESG score influence on the firm.

The findings uprise an argument with previous studies from Waddock and Graves (1997) and Derwall's (2007) results. However, the current research paper focus on the single sector of E&P within the oil and gas industry, more specifically the E&P sector comprise a unique nature, and in support Russo and Fouts (1997) stated that it has one of the highest, volatile Tobin's q ratios in comparison to other industries. The ESG score negative correlation to Q ratio benefit the thesis of the paper that the E&P sector requires a differentiate regression equation in order to analyse the relationship above. Hence, an enhanced model is observed when the highly significant variables are added to the regression equation.

The E-score and the intrinsic value correlation yield a highly negative correlation indicating that larger E&P companies' environmental investments are with negative effect on the companies' real asset value. Firstly, the E&P companies endure different productive cycles in comparison to other industries, the sector is highly indebted and it is accepted for normal companies to adopt a negative profitability at the beginning of the period because a number of

investments are made for exploration (Howard and Harp 2009). The exploration is a unique feature for the E&P companies, which it is heavily based on undeveloped resources that are implied only as an expense and this is the reason for E&P companies to occur negative revenues. Secondly, the period from 2010 to 2014 has been unprecedented for the energy industry including E&P companies including the post financial stagnation period and commodity devaluation in 2014 playing a key role for the negative effect on the firm value. In addition, the correlation between firm value and ESG factors is greatly represented by excluding the intangible E&P companies' assets and aggressive accounting techniques in order to consolidate the triple bottom line. However, the severe economic circumstance reflected into stricter policies as suggested by Sharratt et al. (2007). Thirdly, the E&P companies operate in an oligopoly environment, which permits a huge number of new entrants to the market because of a potential market niches. As a consequence, there are a significant mergers and acquisition affecting additionally the ESG factors, the reason is that smaller companies tend to obtain lower ESG scores and in general higher reserve resources that are considered as an intangible assets. This is the reason not to be realised in the intrinsic firm value translating in a company evaluation increase while decreasing the ESG score. Furthermore, the second sample of E&P companies excludes the extreme outliers; firms with highly negative or positive margins, demonstrating a significant diluted explanatory behaviour from ESG factors perspective. The Sasarean et al. (2008) statement is consistent with the study results that larger E&P companies, such as the US Anadarko and Exxon, are occurring an insignificant valuation risk due to diversification of oil and gas resources, while a single focused production companies, such as Chesapeake Energy, EnCana, Ultra Petroleum, Range Resources, and Cabot Oil and Gas are challenged with higher risks. In fact, the less diversified production companies outlined above were included in the first model sample, in contrast to the second model sample that is actually identifying them as outliers

because of its volatility, it is thus they have been removed from the second sample causing enhancement to the model.

The S-score demonstrated a significant positive correlation with firm value in Equation 11 while in the Equation 8 proves a negative insignificant correlation with operating performance. On the other hand, the first model Equation 9 demonstrates a negative correlation with S-factors. As a support to the above results, Sasarean et al. (2008) highlighted the support to the controversial results, stating that companies, such as Cabot Oil and Gas, BP and Chesapeake Energy, with previous downgraded environmental and social score are prospective to be challenged by the community opposition and their future growth to be impeded. For instance, the second sample of companies excludes the Chesapeake Energy and Cabot Oil that were part of the first model, although BP remains in the second sample because of its large size and diversified services, which are decreasing the overall negative long-term outlook. As a consequence, the first and second models' indicate ROA inconsistency causing a major drawback with the caveat concerning the sample. This is the reason the outlined restriction to partially agree with Geczy et al. (2005), Chong et al. (2006), and Hong et al. (2006) that the S-score has an undermined interest from investors and a negative correlation with operating performance as discovered in the first model Equation 7. On the other hand, The S-score pillar in Figure 6 demonstrates that social internal factors, such as Health and Safety, Diversity and Opportunity, Employment Quality, are translated into firm positive long-term growth as it is indicated in the second model Equation 11 and it is also consistent with Sasarean's et al. (2008) study.

The G-score is not significant with either of the models. This is partially because it demonstrates lower standard deviation in Table 10 causing restrictions to the econometric software to identify a similar trend with operating performance and firm value. On the other side, Sharratt (2007) and

Hatheway (2015) stated that oil and gas industry experience a growing regulatory and policies enforcement deterring a consistent G-score trend.

The most imperative sustainability factors are presented in World Economic Forum in Davos, where Gordon (2015) outlined the intensification of environmental and social issues to demonstrate upward trend, more specifically the prevalent concern to water management issues that are indicated as the most problematic area. Furthermore, Hatheway (2015) stated that the US shale revolution have already had severe effects on Europe and Asia oil and gas industry because of its indefinitely cheaper and larger resources discovered. On contrary, China and part of Europe are pressured to introduce further ventures to increase its portfolio of renewable energies and to reduce the revolution effect from divestment campaigns (Figure 5). Hence, the energy industry commenced an unprecedented transformation of its global landscape. The ESG factors are going to play a paramount role in determining companies' ability to adapt to the future challenging economic environment. This is the reason for the researches to examine oil and gas industry, including E&P sector, with particular focus on companies' ESG factors that embed a prospective link with operating performance and firm value in order to benefit investors, stakeholders and society.

# 6. **Recommendations**

The current research paper provides an innovative perspective to investigate the ESG factors and CFP for the E&P sector. The study provides a cohere framework to analyse each of the E, S, and G scores from accounting and economic perspective, with a particular focus on E-score because of its significance to the E&P companies. The discovered results provide a significant need for further investigation and analysis. Firstly, the firm value identified a negative correlation with the E-score indicating a valuable contribution to prior research papers and investors, stakeholders, and society. Secondly, the operating performance determined a positive correlation with E and S-score, which is consistent with the majority of previous studies. Lastly, the results prove that firm value and accounting performance measure methodology differentiate from each other and there are certain implications in approaches.

The results from the second model might be of a particular interest to investors and managers in E&P companies. In fact, the firm value and ESG-score negative correlation requires a special attention from both investors and managers. The investor shall not consider the negative correlation as obstruction to attain profitability because the operating performance relationship with ESG issues indicates that the firm profitability is going to be enhanced in the long-term. In other words, the operating performance is prospective to provide higher firm profitability translated into the distribution of more significant dividends.

Furthermore, it is recommended for the investor to decompose E, S, and G-score and to investigate E&P companies individually in order to determine the nature and diversification of products. The prior characteristics are vital to indicate the long-term sustainability of the company from both macro and micro economic perspective. For instance, the thematic investment is an

innovative selection for long-term investments that include divestment campaigns and following an uprising renewable energy diversification for E&P companies. Thus, the risky investors should consider investments in smaller companies for short period of time because ESG issues reflect the unsustainability of the company future performance. On the other hand, companies with higher enterprise value indicate implications in their results as the E-score has a value creation characteristic towards operating performance while it adopts value-destroying effect on firm intrinsic value. In addition, the investors should perceive the importance for E&P companies to invest in environmental pillar illustrated in Figure 6[28], and its long-term effects on company performance and value. One of the implications is that the study examines the turbulent economic period from 2009 to 2014 and there is a tenet that a longer-period sample is required to capture the true E&P companies' relationship between ESG and CFP. However, the E-score indicates the second model as counterproductive for the firm value but the substantial investments are required for larger companies to concrete its relationship with local governments and society. It is discovered that the intangible value investing in social investment have positive long-term relationship as indicated in the results. As a consequence, it is recommended for investors to consider shortcomings to meet short-term results when investing in E&P companies and to prefer companies that are distributing a higher dividend than the average for the sector.

The study is also valuable for the management of E&P companies. The managers should examine individually ESG issues effect on CFP. Firstly, the positive relationship between ESG score and operating performance demonstrates a requirement for managers to enhance the integration of ESG factors in the management projects in order to benefit from higher profitability.

[28] The key Environment Pillar Factors to determine a firm score are: containing Renewable Energy Use/Clean Energy, Water Efficiency/Used Total/Recycled, Emission Production Policy and ProductInnovation/Impact Minimisation

The E-score is observed to affect predominantly the overall ESG score in the test results. Secondly, the managers need to take into consideration the consistent and developing reporting procedures in order to maintain and improve the ESG score. The impetus upon ESG score is directly translated into improved operating performance, although the firm value results influence negatively to firm value. Thus, the E&P companies' managers should comprehend the necessity to invest in environmental projects because otherwise the tenet is the long-term value decreases over long time horizon. The study suggests that managers should rank the E-factors pillar in relation to the firm's long-term goals and to invest in the prospective key E-factors outlined below[29]. It is also advisable that managers implement forward-looking strategies, such as thematic investment and the augmentation of the portfolio with innovative renewable energy strategies.

The research paper focuses on a niche research area of contemporary ESG and CFP relationship. The findings indicate the need for particular E&P sector determinants to explain the ESG and CFP correlation. Moreover, the study determines a significant importance for researchers to investigate operating performance and firm value with ESG issues for specific industry and sectors because the results prove that common determinants cannot be applied to oil and gas industry.

Both first and second model tests are conducted for the period from 2009 to 2014, and indicate positive relationship between operating performance and ESG factors while demonstrate a negative relationship to firm value. It would be beneficial to investors and managers to receive further researches focusing on the oil and gas industry determinants in order to identify each of the E, S, and G factors impact on firm value and operating performance over a longer time horizon.

[29] Renewable Energy Use/Clean Energy, Water Efficiency/Used Total/Recycled, Emission Production Policy and Product Innovation/Impact Minimisation

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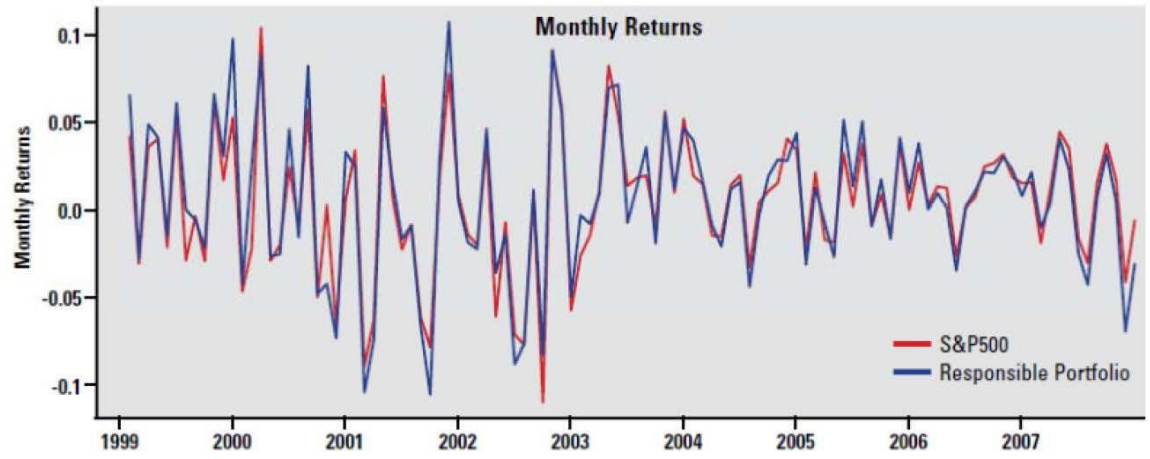
# 8. Appendices

## 8.1 Figures




*Source: Investing for Change: Profit from Sustainable Investment", Landier, Augustin, & Nair, Oxford University Press, 2009*

**Figure 22: Industry-Balanced Responsible Portfolio vs. S&P 500, Cumulative Returns**


*Source: Investing for Change: Profit from Sustainable Investment", Landier, Augustin, & Nair, Oxford University Press, 2009*

Figure 1 S&P 500 and Responsible Portfolio Comparison

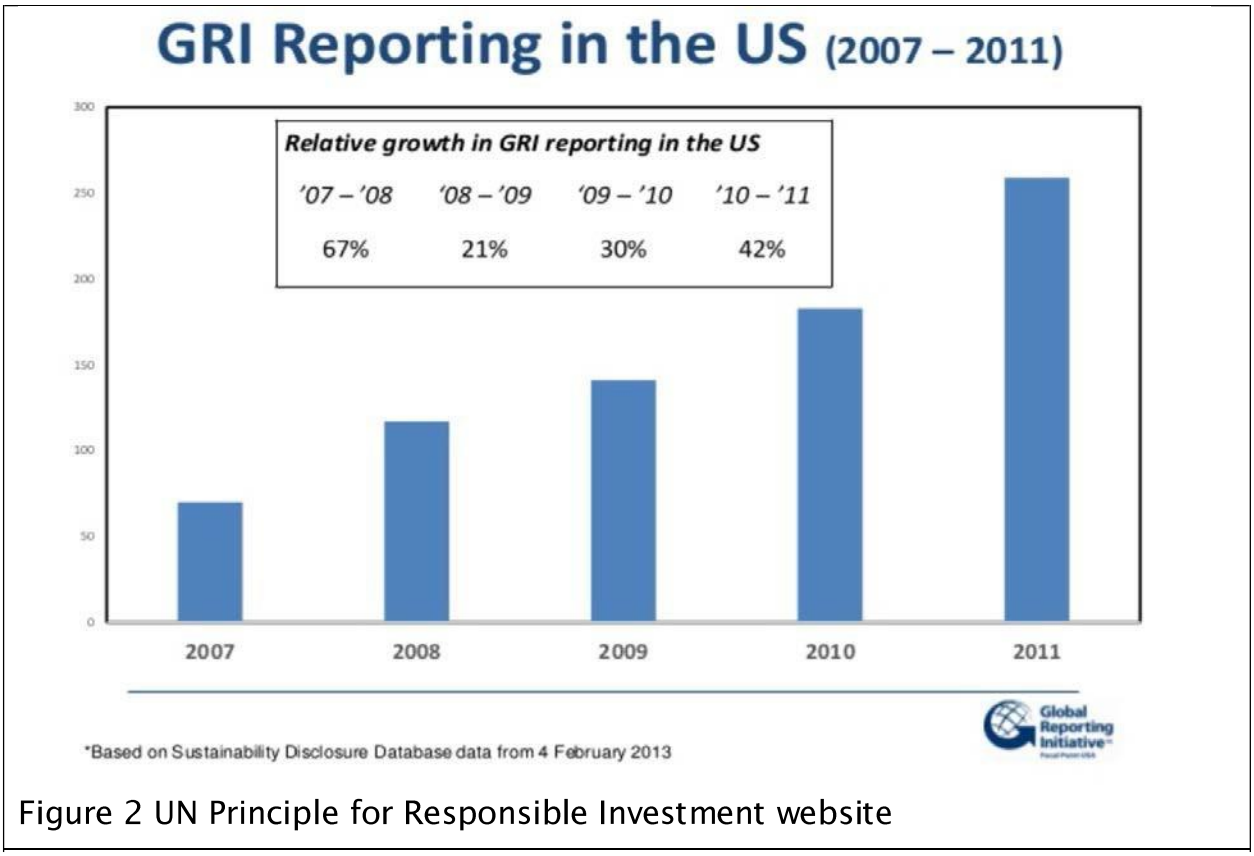



Figure 2 UN Principle for Responsible Investment website

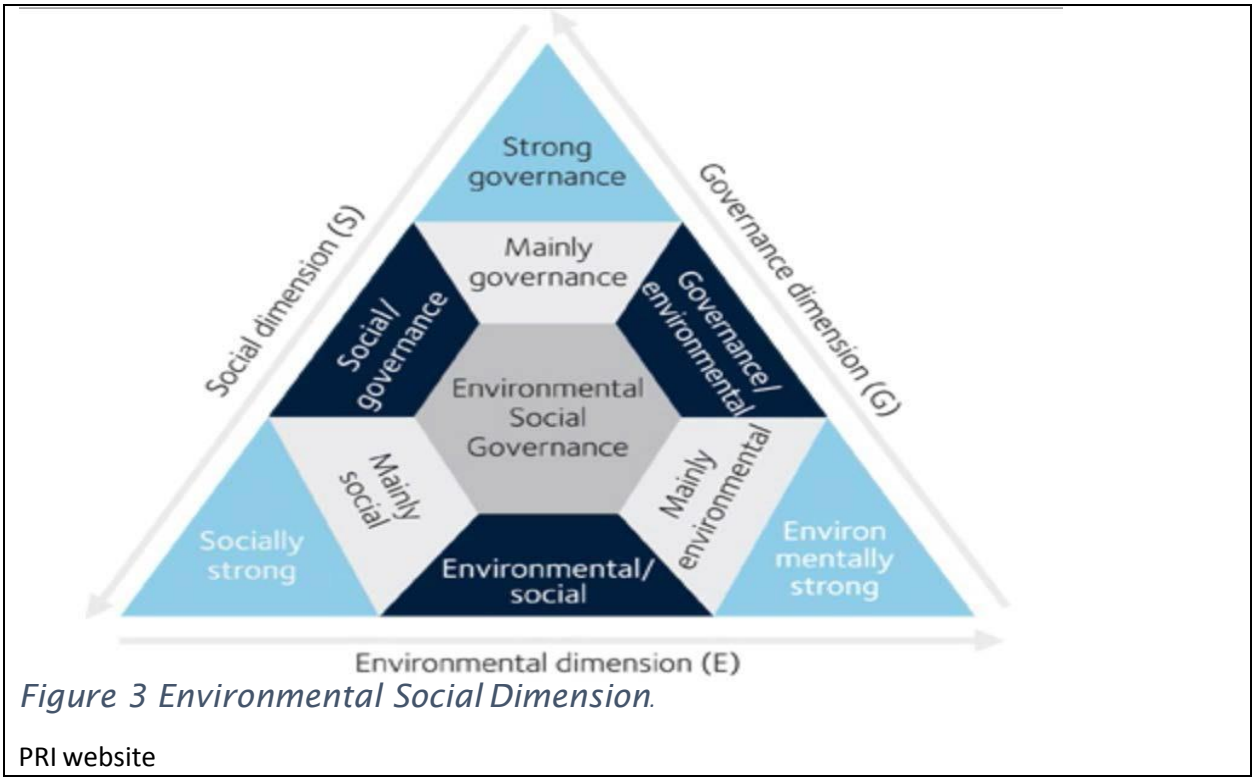



*Figure 3 Environmental Social Dimension.*

PRI website

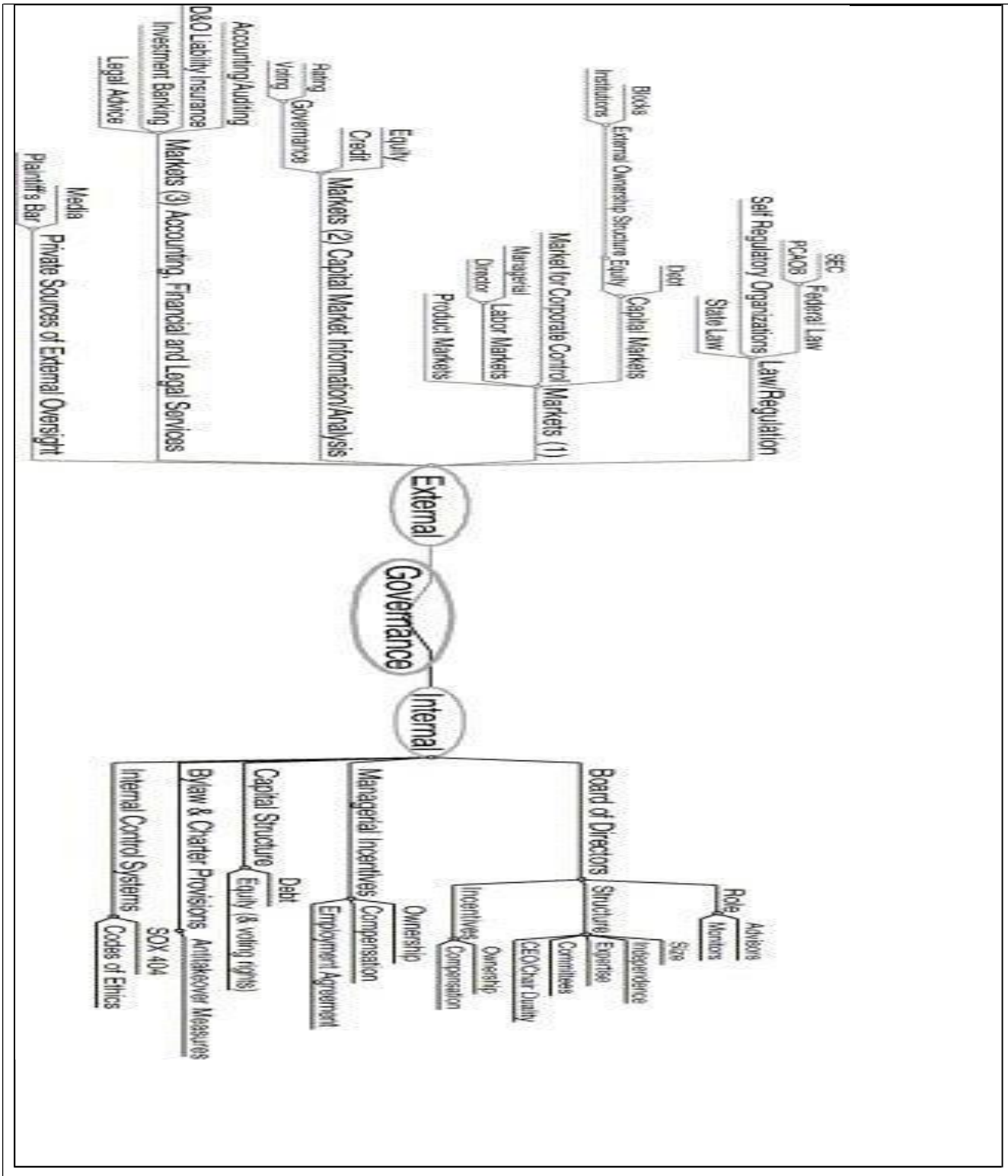



Figure 4 Corporate Governance: A Broad Framework, Carrol(1997)

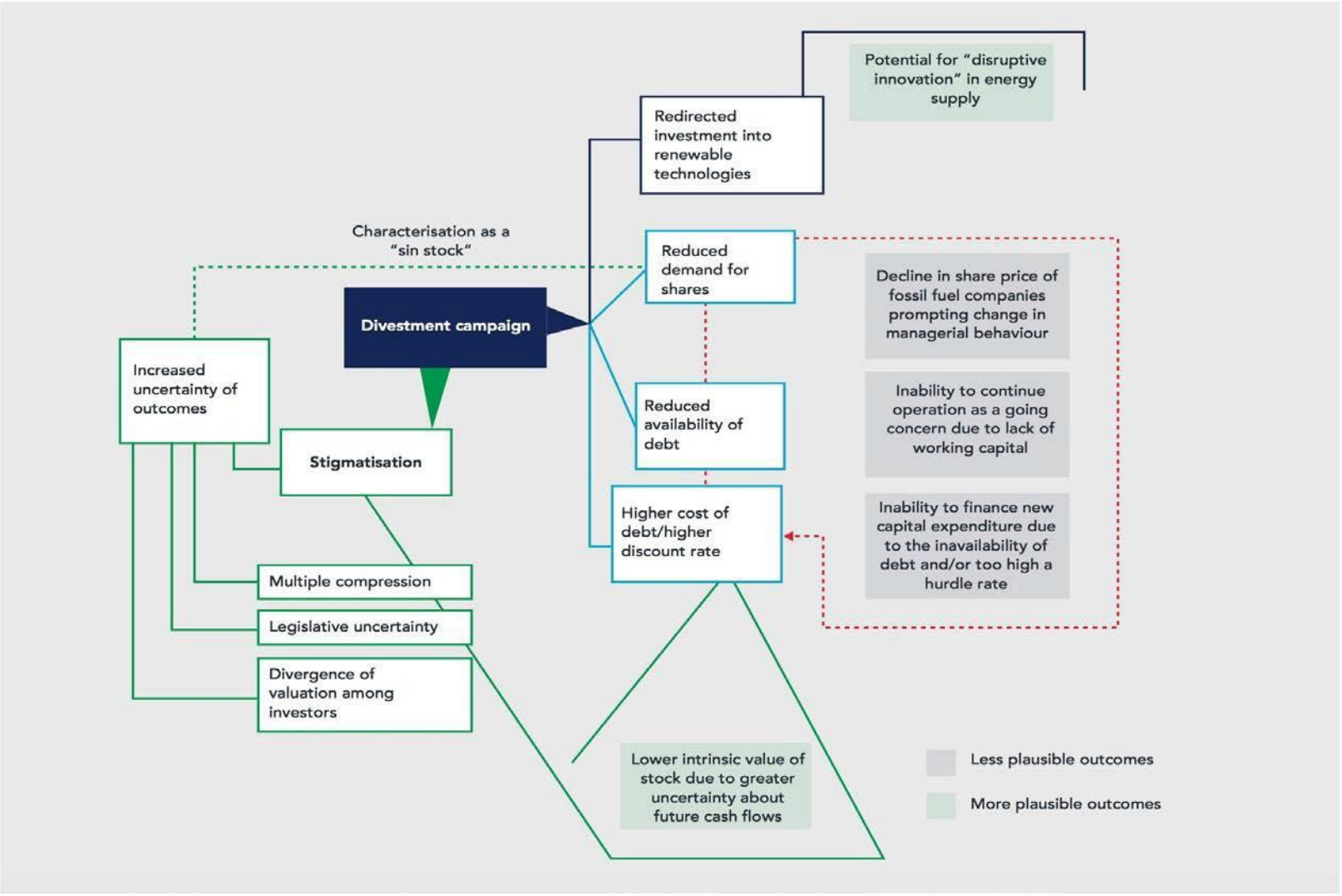



Figure 5 Divestment Campaign Structure.

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| Sample of ASSET4 ESG Datatypes available on Datastream Premium and Direct | | |
|---|---|---|
| **Environmental** | **Social** | **Corporate Governance** |
| Environmental Pillar Score | Social Pillar Score | Corporate Governance Pillar Score |
| Emissions Reduction Policy | Employment Quality/Policy | Board Structure/Policy |
| CO2 Equivalents Emission Total | Employee Satisfaction | Board Structure/Background and Skills |
| Emission Reduction/CO2 Reduction | Employment Quality/Salaries | Board Structure/Size of Board |
| Ozone-Depleting Substances Reduction | Employment Quality/Salaries Distribution | Board Structure/Board Diversity |
| Waste Total | Bonus Plan for Employees | Board Meeting Attendance Average |
| Non-Hazardous Waste | Generous Fringe Benefits | Compensation Policy |
| Hazardous Waste | Employment Quality/Employment Awards | Highest Remuneration Package |
| Emission Reduction/Waste Recycling Ratio | Trade Union Representation | Board Member Compensation |
| Water Pollutant Emissions | Employees Leaving | Stock Option Program |
| Waste Reduction Total | Turnover of Employees | Audit Committee Independence |
| Environmental Expenditures | Health & Safety/Policy | Audit Committee Management Independence |
| Energy Efficiency Policy | Total Injury Rate | Audit Committee Expertise |
| Energy Use Total | Lost Time Injury Rate | Compensation Committee Independence |
| Renewable Energy Use | Lost Days | Senior Executive Long-term Comp Incentives |
| Green Buildings | Average Training Hours | Vesting of Stock Options/Restricted Stock |
| Water Efficiency Policy | Training Costs Total | Shareholder Rights/Policy |
| Water Use Total | Management Training | Voting Rights |
| Water Recycled | Diversity and Opportunity/ Policy | Ownership |
| Environmental Supply Chain Management | Women Employees | Classified Board Structure |
| Energy Footprint Reduction | Women Managers | Staggered Board Structure |
| Environmental R&D Expenditures | Flexible Working Hours | CSR Sustainability Committee |
| Renewable/Clean Energy Products | Day Care Services | CSR Sustainability Report Global Activities |
| Water Technologies | Human Rights/Policy | CSR Sustainability External Audit |
| Product Innovation/Product Impact Minimization | Donations Total | GRI Report Guidelines |

Figure 6 Asset4 ESG Data Type Criteria

**Canadian Listed E&P Companies**

| | |
|---|---|
| AAV CN Equity | ADVANTAGE OIL & GAS LTD |
| CPG CN Equity | CRESCENT POINT ENERGY CORP |
| BNP CN Equity | BONAVISTA ENERGY CORP |
| IMO CN Equity | IMPERIAL OIL LTD |
| PRE CN Equity | PACIFIC RUBIALES ENERGY CORP |
| TLM CN Equity | TALISMAN ENERGY INC |
| CNQ CN Equity | CANADIAN NATURAL RESOURCES |
| DNR US Equity | DENBURY RESOURCES INC |
| BNK CN Equity | BANKERS PETROLEUM LTD |
| PXX CN Equity | BLACKPEARL RESOURCES INC |
| NKO CN Equity | NIKO RESOURCES LTD |
| ECA CN Equity | ENCANA CORP |
| POU CN Equity | PARAMOUNT RESOURCES LTD -A |
| PWT CN Equity | PENN WEST PETROLEUM LTD |
| SU CN Equity | SUNCOR ENERGY INC |
| PGF CN Equity | PENGROWTH ENERGY CORP |
| VET CN Equity | VERMILION ENERGY INC |
| CLL CN Equity | CONNACHER OIL & GAS LTD |
| COS CN Equity | CANADIAN OIL SANDS LTD |
| ARX CN Equity | ARC RESOURCES LTD |
| ERF CN Equity | ENERPLUS CORP |
| FRU CN Equity | FREEHOLD ROYALTIES LTD |
| PEY CN Equity | PEYTO EXPLORATION & DEV CORP |
| BIR CN Equity | BIRCHCLIFF ENERGY LTD |
| HSE CN Equity | HUSKY ENERGY INC |
| PMT CN Equity | PERPETUAL ENERGY INC |
| NVA CN Equity | NUVISTA ENERGY LTD |
| QEC CN Equity | QUESTERRE ENERGY CORP - A |
| CR CN Equity | CREW ENERGY INC |
| BTE CN Equity | BAYTEX ENERGY CORP |
| CVE CN Equity | CENOVUS ENERGY INC |
| ATH CN Equity | ATHABASCA OIL CORP |

**UK Listed E&P Companies**

| | |
|---|---|
| BG/ LN Equity | BG GROUP PLC |
| BP/ LN Equity | BP PLC |
| CNE LN Equity | CAIRN ENERGY PLC |
| PMO LN Equity | PREMIER OIL PLC |
| TLW LN Equity | TULLOW OIL PLC |
| JKX LN Equity | JKX OIL & GAS PLC |
| SIA LN Equity | SOCO INTERNATIONAL PLC |
| RDSB LN Equity | ROYAL DUTCH SHELL PLC-B SHS |
| SMDR LN Equity | SALAMANDER ENERGY PLC |

**American Listed E&P Companies**

| | |
|---|---|
| HES US Equity | HESS CORP |
| APC US Equity | ANADARKO PETROLEUM CORP |
| APA US Equity | APACHE CORP |
| COG US Equity | CABOT OIL & GAS CORP |
| CVX US Equity | CHEVRON CORP |
| EGN US Equity | ENERGEN CORP |
| EOG US Equity | EOG RESOURCES INC |
| EQT US Equity | EQT CORP |
| XOM US Equity | EXXON MOBIL CORP |
| MUR US Equity | MURPHY OIL CORP |
| NBL US Equity | NOBLE ENERGY INC |
| OXY US Equity | OCCIDENTAL PETROLEUM CORP |
| COP US Equity | CONOCOPHILLIPS |
| STR US Equity | QUESTAR CORP |
| SWN US Equity | SOUTHWESTERN ENERGY CO |
| MRO US Equity | MARATHON OIL CORP |
| WMB US Equity | WILLIAMS COS INC |
| CRK US Equity | COMSTOCK RESOURCES INC |
| RRC US Equity | RANGE RESOURCES CORP |
| UPL US Equity | ULTRA PETROLEUM CORP |
| SM US Equity | SM ENERGY CO |
| CHK US Equity | CHESAPEAKE ENERGY CORP |
| NFX US Equity | NEWFIELD EXPLORATION CO |
| PXD US Equity | PIONEER NATURAL RESOURCES CO |
| KWKAQ US Equity | QUICKSILVER RESOURCES INC |
| QEP US Equity | QEP RESOURCES INC |
| DVN US Equity | DEVON ENERGY CORP |
| XEC US Equity | CIMAREX ENERGY CO |
| WLL US Equity | WHITING PETROLEUM CORP |
| SD US Equity | SANDRIDGE ENERGY INC |
| XCO US Equity | EXCO RESOURCES INC |
| CXO US Equity | CONCHO RESOURCES INC |

Figure 7 First Model 73 E&P Companies

**Canadian Listed E&P Companies**

AAV CN Equity
BNP CN Equity
CVE CN Equity
HSE CN Equity
NVA CN Equity
PRE CN Equity
PWT CN Equity
SU CN Equity

TLM CN Equity

**American Listed E&P Companies**

APC US Equity
COP US Equity
CRK US Equity
CVX US Equity
CXO US Equity
EGN US Equity
EOG US Equity
EQT US Equity
HES US Equity
MRO US Equity
MUR US Equity
NBL US Equity
OXY US Equity
PXD US Equity
QEP US Equity
RRC US Equity
SM US Equity
WLL US Equity
WMB US Equity
XOM US Equity

**UK Listed E&P Companies**

BG/ LN Equity
BP/ LN Equity
PMO LN Equity
RDSB LN Equity
TLW LN Equity

Figure 8 Second Model 34 E&P Companies

## 8.2 Tables

The full name of the variables in a consequence order is:

ESG average score (ESG_SCORE),

Environmental score (ENVIRONMENTAL),

Social score (SOCIAL),

Governance Score (GOVERNANCE),

Z-score of return on assets

(ROA_Z), Tobin's Q (Q),

Book value of assets (BVA),

Debt to assets (DTOA),

Debt to enterprise value (DTOV),

Enterprise value to EBITDAX (EV_TO_EBITDAX),

Enterprise value to prove developed reserves (EV_TP_PD),

Revenue (SALES),

Revenue annual growth percentage (SALES_GROWTH),

Exploration and production to barrel of oil equivalent (EP_TO_BOE),

Energy total current cost to (ENERGY_COST),

Energy total revenue (ENERGY_REV),

Total reserve production ratio (RESERVE_RATIO),

Enterprise value to daily production (EVTODP),

One-year growth rate in operating cash flow from oil and gas exploration and production activities (EP_TO_CASH),

Energy total debt to EBITDAX (ENERGY_DEBT),

Earnings before interest, tax, depreciation, amortization and exploration cost (EBITDAX),

Percentage of the company's oil and gas reserves consumed by production during the year that were replaced through acquisition, improved recovery, new discoveries, and net purchases (REPLACEMENT_RATIO).

**Table 7 The First Model Independent, Dependent and Control Variables explained.**

| Date: 05/12/15 Time: 17:39<br>Sample: 2009 2014 | |
|---|---|
| | ENVIRONMEN |
| Mean | 0.499555 |
| Median | 0.470000 |
| Maximum | 0.980000 |
| Minimum | 0.060000 |
| Std. Dev. | 0.304177 |
| Skewness | 0.084671 |
| Kurtosis | 1.463510 |
| Jarque-Bera | 43.60800 |
| Probability | 0.000000 |
| Sum | 218.8050 |
| Sum Sq. Dev. | 40.43274 |
| Observations | 438 |

| Date: 05/12/15 Time: 17:56<br>Sample: 2009 2014 | |
|---|---|
| | ENVIRONMEN |
| Mean | 0.524637 |
| Median | 0.574000 |
| Maximum | 0.940000 |
| Minimum | 0.090000 |
| Std. Dev. | 0.309066 |
| Skewness | -0.050497 |
| Kurtosis | 1.372345 |
| Jarque-Bera | 22.60542 |
| Probability | 0.000012 |
| Sum | 107.0260 |
| Sum Sq. Dev. | 19.39097 |
| Observations | 204 |

Table 8 Environmental Factor Score Statistics

| Date: 05/12/15 Time: 17:39<br>Sample: 2009 2014 | |
|---|---|
| | SOCIAL |
| Mean | 0.431313 |
| Median | 0.355000 |
| Maximum | 1.011000 |
| Minimum | 0.005000 |
| Std. Dev. | 0.306803 |
| Skewness | 0.349279 |
| Kurtosis | 1.624440 |
| Jarque-Bera | 43.43775 |
| Probability | 0.000000 |
| Sum | 188.9150 |
| Sum Sq. Dev. | 41.13389 |
| Observations | 438 |

| Date: 05/12/15 Time: 17:56<br>Sample: 2009 2014 | |
|---|---|
| | SOCIAL |
| Mean | 0.554230 |
| Median | 0.630000 |
| Maximum | 1.011000 |
| Minimum | 0.034000 |
| Std. Dev. | 0.319188 |
| Skewness | -0.209212 |
| Kurtosis | 1.430338 |
| Jarque-Bera | 22.43082 |
| Probability | 0.000013 |
| Sum | 113.0630 |
| Sum Sq. Dev. | 20.68190 |
| Observations | 204 |

Table 9 Social Factor Statistics

| Date: 05/12/15 Time: 17:43<br>Sample: 2009 2014 | |
|---|---|
| | GOVERNANC |
| Mean | 0.781174 |
| Median | 0.820000 |
| Maximum | 1.069000 |
| Minimum | 0.120000 |
| Std. Dev. | 0.147930 |
| Skewness | -1.436235 |
| Kurtosis | 5.846713 |
| Jarque-Bera | 298.4762 |
| Probability | 0.000000 |
| Sum | 342.1540 |
| Sum Sq. Dev. | 9.562953 |
| Observations | 438 |

| Date: 05/12/15 Time: 17:57<br>Sample: 2009 2014 | |
|---|---|
| | GOVERNANC |
| Mean | 0.798917 |
| Median | 0.830000 |
| Maximum | 1.034000 |
| Minimum | 0.230000 |
| Std. Dev. | 0.135607 |
| Skewness | -1.271963 |
| Kurtosis | 4.828555 |
| Jarque-Bera | 83.42899 |
| Probability | 0.000000 |
| Sum | 162.9790 |
| Sum Sq. Dev. | 3.733024 |
| Observations | 204 |

Table 10 Governance Score Statistics

## 8.3 **Equations**

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/01/15 Time: 12:53
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.052396 | 0.000889 | 58.92023 | 0.0000 |
| ENVIRONMENTAL | 0.000888 | 0.000529 | 1.678573 | 0.0940 |
| SOCIAL | 0.001351 | 0.000641 | 2.107196 | 0.0357 |
| GOVERNANCE | -0.001684 | 0.001184 | -1.422088 | 0.1557 |
| BVA | 1.30E-14 | 9.44E-15 | 1.380991 | 0.1680 |
| DTOA | -4.24E-05 | 1.12E-05 | -3.799552 | 0.0002 |
| SALES | -6.11E-15 | 7.67E-15 | -0.796088 | 0.4264 |
| EVTODP | 1.78E-07 | 9.63E-08 | 1.852733 | 0.0646 |

| | | | |
|---|---|---|---|
| R-squared | 0.128488 | Mean dependent var | 0.051389 |
| Adjusted R-squared | 0.114301 | S.D. dependent var | 0.003284 |
| S.E. of regression | 0.003090 | Akaike info criterion | -8.702955 |
| Sum squared resid | 0.004107 | Schwarz criterion | -8.628394 |
| Log likelihood | 1913.947 | Hannan-Quinn criter. | -8.673536 |
| F-statistic | 9.056507 | Durbin-Watson stat | 1.066091 |
| Prob(F-statistic) | 0.000000 | | |

Equation 11 E S G factors correlation with ROA; Robustness Check

Dependent Variable: Q
Method: Panel Least Squares
Date: 05/12/15 Time: 11:37
Sample: 2009 2014
Periods included: 6
Cross-sections included: 73
Total panel (balanced) observations: 438

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 9.443860 | 1.263707 | 7.473139 | 0.0000 |
| ENVIRONMENTAL | 0.131635 | 0.094305 | 1.395854 | 0.1635 |
| SOCIAL | -0.222625 | 0.112391 | -1.980809 | 0.0482 |
| GOVERNANCE | -0.025812 | 0.210188 | -0.122805 | 0.9023 |
| BVA | -9.09E-13 | 4.38E-13 | -2.075516 | 0.0385 |
| LOGROA | 2.728103 | 0.425720 | 6.408206 | 0.0000 |
| DTOA | 0.002295 | 0.002028 | 1.132026 | 0.2583 |
| EV_TO_PD | 0.005237 | 0.000626 | 8.370243 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.231584 | Mean dependent var | 1.523470 |
| Adjusted R-squared | 0.219075 | S.D. dependent var | 0.622057 |
| S.E. of regression | 0.549711 | Akaike info criterion | 1.659249 |
| Sum squared resid | 129.9385 | Schwarz criterion | 1.733810 |
| Log likelihood | -355.3756 | Hannan-Quinn criter. | 1.688669 |
| F-statistic | 18.51321 | Durbin-Watson stat | 0.674033 |
| Prob(F-statistic) | 0.000000 | | |

Equation 12 Q ratio correlation with E, S, G score Robustness check

Redundant Fixed Effects Tests
Equation: ROAEQ01
Test cross-section and period fixed effects

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 1.919803 | (33,159) | 0.0043 |
| Cross-section Chi-square | 68.414317 | 33 | 0.0003 |
| Period F | 1.158576 | (5,159) | 0.0033 |
| Period Chi-square | 7.300180 | 5 | 0.0019 |
| Cross-Section/Period F | 1.852570 | (38,159) | 0.0046 |
| Cross-Section/Period Chi-square | 74.776783 | 38 | 0.0003 |

Cross-section fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 14:56
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.076769 | 0.254046 | -0.302185 | 0.7628 |
| ESG_SCORE | 0.573417 | 0.267497 | 2.143643 | 0.0333 |
| BVA | 1.58E-12 | 6.39E-13 | 2.469488 | 0.0144 |
| EV_TO_EBITDAX | -0.033311 | 0.007530 | -4.423856 | 0.0000 |
| DTOV | -3.389214 | 0.455544 | -7.439922 | 0.0000 |
| EP_TO_BOE | 0.008484 | 0.002729 | 3.109253 | 0.0022 |
| SALES_GROWTH | 0.004087 | 0.002159 | 1.893131 | 0.0598 |

Effects Specification

Period fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.523169 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.495851 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.711781 | Akaike info criterion | 2.214930 |
| Sum squared resid | 97.27346 | Schwarz criterion | 2.410114 |
| Log likelihood | -213.9229 | Hannan-Quinn criter. | 2.293886 |
| F-statistic | 19.15079 | Durbin-Watson stat | 1.603219 |
| Prob(F-statistic) | 0.000000 | | |

Period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 14:56
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -1.463262 | 0.571340 | -2.561104 | 0.0113 |
| ESG_SCORE | 2.357841 | 0.763123 | 3.089725 | 0.0024 |
| BVA | -2.29E-12 | 3.39E-12 | -0.674578 | 0.5009 |
| EV_TO_EBITDAX | -0.014963 | 0.008472 | -1.766260 | 0.0792 |
| DTOV | -2.900877 | 0.547966 | -5.293903 | 0.0000 |
| EP_TO_BOE | 0.012252 | 0.004101 | 2.987263 | 0.0032 |

| | | | | |
|---|---|---|---|---|
| SALES_GROWTH | 0.007329 | 0.001933 | 3.792101 | 0.0002 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.646606 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.562568 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.663014 | Akaike info criterion | 2.189861 |
| Sum squared resid | 72.09229 | Schwarz criterion | 2.840473 |
| Log likelihood | -183.3658 | Hannan-Quinn criter. | 2.453045 |
| F-statistic | 7.694150 | Durbin-Watson stat | 2.146362 |
| Prob(F-statistic) | 0.000000 | | |

Cross-section and period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 14:56
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.112893 | 0.237703 | -0.474933 | 0.6354 |
| ESG_SCORE | 0.589724 | 0.267462 | 2.204888 | 0.0286 |
| BVA | 1.63E-12 | 6.35E-13 | 2.573674 | 0.0108 |
| EV_TO_EBITDAX | -0.033022 | 0.007522 | -4.389869 | 0.0000 |
| DTOV | -3.354803 | 0.421076 | -7.967214 | 0.0000 |
| EP_TO_BOE | 0.008552 | 0.002589 | 3.303515 | 0.0011 |
| SALES_GROWTH | 0.005968 | 0.001794 | 3.327178 | 0.0010 |

| | | | |
|---|---|---|---|
| R-squared | 0.508063 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.493080 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.713734 | Akaike info criterion | 2.197099 |
| Sum squared resid | 100.3551 | Schwarz criterion | 2.310956 |
| Log likelihood | -217.1041 | Hannan-Quinn criter. | 2.243156 |
| F-statistic | 33.90967 | Durbin-Watson stat | 1.601131 |
| Prob(F-statistic) | 0.000000 | | |

Equation 13 Second Model Regression 1; Fixed Effects Likelihood Ratio Test

Correlated Random Effects - Hausman Test
Equation: ROAEQ01
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 18.875057 | 6 | 0.0044 |

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| ESG_SCORE | 2.357841 | 0.706673 | 0.496756 | 0.0191 |
| BVA | -0.000000 | 0.000000 | 0.000000 | 0.2463 |
| EV_TO_EBITDAX | -0.014963 | -0.028623 | 0.000017 | 0.0009 |
| DTOV | -2.900877 | -3.228983 | 0.118637 | 0.3408 |
| EP_TO_BOE | 0.012252 | 0.008670 | 0.000010 | 0.2473 |
| SALES_GROWTH | 0.007329 | 0.006476 | 0.000001 | 0.3142 |

Cross-section random effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 14:59
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -1.463262 | 0.571340 | -2.561104 | 0.0113 |
| ESG_SCORE | 2.357841 | 0.763123 | 3.089725 | 0.0024 |
| BVA | -2.29E-12 | 3.39E-12 | -0.674578 | 0.5009 |
| EV_TO_EBITDAX | -0.014963 | 0.008472 | -1.766260 | 0.0792 |
| DTOV | -2.900877 | 0.547966 | -5.293903 | 0.0000 |
| EP_TO_BOE | 0.012252 | 0.004101 | 2.987263 | 0.0032 |
| SALES_GROWTH | 0.007329 | 0.001933 | 3.792101 | 0.0002 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.646606 | Mean dependent var | -0.159257 |
| Adjusted R-squared | 0.562568 | S.D. dependent var | 1.002460 |
| S.E. of regression | 0.663014 | Akaike info criterion | 2.189861 |
| Sum squared resid | 72.09229 | Schwarz criterion | 2.840473 |
| Log likelihood | -183.3658 | Hannan-Quinn criter. | 2.453045 |
| F-statistic | 7.694150 | Durbin-Watson stat | 2.146362 |
| Prob(F-statistic) | 0.000000 | | |

Equation 14 Second Model ROA Regression 1; Random Effects HausmanTest

Redundant Fixed Effects Tests
Equation: ROAEQ02
Test cross-section and period fixed effects

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 2.003056 | (33,125) | 0.0033 |
| Cross-section Chi-square | 72.162883 | 33 | 0.0001 |
| Period F | 1.259687 | (4,125) | 0.0028 |
| Period Chi-square | 6.718185 | 4 | 0.0015 |
| Cross-Section/Period F | 1.982949 | (37,125) | 0.0028 |
| Cross-Section/Period Chi-square | 78.508674 | 37 | 0.0001 |

Cross-section fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.302952 | 0.387390 | 0.782034 | 0.4354 |
| ENVIRONMENTAL | 1.235373 | 0.541768 | 2.280262 | 0.0239 |
| SOCIAL | 0.063814 | 0.462786 | 0.137890 | 0.8905 |
| BVA | -5.33E-12 | 2.94E-12 | -1.813870 | 0.0716 |
| GOVERNANCE | -0.715556 | 0.517153 | -1.383643 | 0.1684 |
| DTOV | -3.096499 | 0.601308 | -5.149603 | 0.0000 |
| SALES_GROWTH | 0.004976 | 0.002178 | 2.284158 | 0.0237 |
| ENERGY_REV | 2.61E-11 | 1.09E-11 | 2.405440 | 0.0173 |

Effects Specification

Period fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.528067 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.495211 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.699441 | Akaike info criterion | 2.190904 |
| Sum squared resid | 77.29649 | Schwarz criterion | 2.412254 |
| Log likelihood | -174.2268 | Hannan-Quinn criter. | 2.280725 |
| F-statistic | 16.07211 | Durbin-Watson stat | 1.372616 |
| Prob(F-statistic) | 0.000000 | | |

Period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.680412 | 0.612650 | -1.110605 | 0.2688 |
| ENVIRONMENTAL | 0.506978 | 0.806676 | 0.628478 | 0.5308 |
| SOCIAL | 1.153576 | 0.763197 | 1.511504 | 0.1331 |
| BVA | -2.01E-12 | 6.92E-12 | -0.290057 | 0.7722 |
| GOVERNANCE | -0.161587 | 0.676381 | -0.238899 | 0.8116 |

Equation 15 Second Model ROA Regression 2; Fixed Effects Likelihood Ratio Test

| | | | | |
|---|---|---|---|---|
| DTOV | -2.511042 | 0.826181 | -3.039338 | 0.0029 |
| SALES_GROWTH | 0.008020 | 0.001970 | 4.071729 | 0.0001 |
| ENERGY_REV | 2.68E-11 | 1.78E-11 | 1.507825 | 0.1340 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.678863 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.579285 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.638543 | Akaike info criterion | 2.147111 |
| Sum squared resid | 52.59809 | Schwarz criterion | 2.903392 |
| Log likelihood | -141.5045 | Hannan-Quinn criter. | 2.454001 |
| F-statistic | 6.817438 | Durbin-Watson stat | 2.102829 |
| Prob(F-statistic) | 0.000000 | | |

Cross-section and period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.124919 | 0.372210 | 0.335613 | 0.7376 |
| ENVIRONMENTAL | 1.192338 | 0.541698 | 2.201112 | 0.0291 |
| SOCIAL | 0.102224 | 0.464080 | 0.220273 | 0.8259 |
| BVA | -6.38E-12 | 2.90E-12 | -2.203961 | 0.0289 |
| GOVERNANCE | -0.606648 | 0.501788 | -1.208973 | 0.2284 |
| DTOV | -2.745924 | 0.573044 | -4.791821 | 0.0000 |
| SALES_GROWTH | 0.007612 | 0.001791 | 4.248768 | 0.0000 |
| ENERGY_REV | 3.09E-11 | 1.06E-11 | 2.900575 | 0.0042 |

| | | | |
|---|---|---|---|
| R-squared | 0.510118 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.488950 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.703766 | Akaike info criterion | 2.181173 |
| Sum squared resid | 80.23636 | Schwarz criterion | 2.328740 |
| Log likelihood | -177.3997 | Hannan-Quinn criter. | 2.241054 |
| F-statistic | 24.09880 | Durbin-Watson stat | 1.387998 |
| Prob(F-statistic) | 0.000000 | | |

Correlated Random Effects - Hausman Test
Equation: ROAEQ02
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 4.024370 | 7 | 0.0077 |

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| ENVIRONMENTAL | 0.506978 | 0.861031 | 0.285746 | 0.5078 |
| SOCIAL | 1.153576 | 0.383333 | 0.306898 | 0.1644 |
| BVA | -0.000000 | -0.000000 | 0.000000 | 0.5068 |
| GOVERNANCE | -0.161587 | -0.376893 | 0.159456 | 0.5898 |
| DTOV | -2.511042 | -2.580193 | 0.281740 | 0.8963 |
| SALES_GROWTH | 0.008020 | 0.007796 | 0.000001 | 0.7915 |
| ENERGY_REV | 0.000000 | 0.000000 | 0.000000 | 0.7838 |

Cross-section random effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:04
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.680412 | 0.612650 | -1.110605 | 0.2688 |
| ENVIRONMENTAL | 0.506978 | 0.806676 | 0.628478 | 0.5308 |
| SOCIAL | 1.153576 | 0.763197 | 1.511504 | 0.1331 |
| BVA | -2.01E-12 | 6.92E-12 | -0.290057 | 0.7722 |
| GOVERNANCE | -0.161587 | 0.676381 | -0.238899 | 0.8116 |
| DTOV | -2.511042 | 0.826181 | -3.039338 | 0.0029 |
| SALES_GROWTH | 0.008020 | 0.001970 | 4.071729 | 0.0001 |
| ENERGY_REV | 2.68E-11 | 1.78E-11 | 1.507825 | 0.1340 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.678863 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.579285 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.638543 | Akaike info criterion | 2.147111 |
| Sum squared resid | 52.59809 | Schwarz criterion | 2.903392 |
| Log likelihood | -141.5045 | Hannan-Quinn criter. | 2.454001 |
| F-statistic | 6.817438 | Durbin-Watson stat | 2.102829 |
| Prob(F-statistic) | 0.000000 | | |

Equation 16 Second Model ROA Regression 2; Random Effects HausmanTest

Redundant Fixed Effects Tests
Equation: QEQ01
Test cross-section and period fixed effects

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 10.705867 | (33,159) | 0.0000 |
| Cross-section Chi-square | 238.678714 | 33 | 0.0000 |
| Period F | 3.426634 | (5,159) | 0.0057 |
| Period Chi-square | 20.876574 | 5 | 0.0009 |
| Cross-Section/Period F | 10.451407 | (38,159) | 0.0000 |
| Cross-Section/Period Chi-square | 255.436574 | 38 | 0.0000 |

Cross-section fixed effects test equation:
Dependent Variable: Q
Method: Panel Least Squares
Date: 05/11/15 Time: 14:49
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.952365 | 0.330168 | 2.884489 | 0.0044 |
| ESG_SCORE | -0.225765 | 0.111935 | -2.016931 | 0.0451 |
| EP_TO_BOE | 0.001707 | 0.000977 | 1.746764 | 0.0823 |
| DTOV | -1.030272 | 0.161798 | -6.367657 | 0.0000 |
| RESERVE_RATIO | 0.007880 | 0.003399 | 2.318233 | 0.0215 |
| LOGEBITDAX | 0.025207 | 0.016332 | 1.543357 | 0.1244 |
| SALES_GROWTH | 0.003734 | 0.000757 | 4.929203 | 0.0000 |

Effects Specification

Period fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.409562 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.375735 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.249023 | Akaike info criterion | 0.114482 |
| Sum squared resid | 11.90642 | Schwarz criterion | 0.309665 |
| Log likelihood | 0.322872 | Hannan-Quinn criter. | 0.193437 |
| F-statistic | 12.10748 | Durbin-Watson stat | 0.648536 |
| Prob(F-statistic) | 0.000000 | | |

Period fixed effects test equation:
Dependent Variable: Q
Method: Panel Least Squares
Date: 05/14/15 Time: 14:49
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.819676 | 0.673734 | 2.700883 | 0.0076 |
| ESG_SCORE | -0.075031 | 0.197070 | -0.380732 | 0.7039 |
| EP_TO_BOE | -0.000207 | 0.000943 | -0.219645 | 0.8264 |
| DTOV | -1.405915 | 0.133222 | -10.55318 | 0.0000 |
| RESERVE_RATIO | -0.011423 | 0.004788 | -2.385913 | 0.0182 |
| LOGEBITDAX | 0.002643 | 0.032154 | 0.082209 | 0.9346 |

| | | | | |
|---|---|---|---|---|
| SALES_GROWTH | 0.000949 | 0.000478 | 1.987192 | 0.0486 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.797000 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.748725 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.157990 | Akaike info criterion | -0.678666 |
| Sum squared resid | 4.093580 | Schwarz criterion | -0.028054 |
| Log likelihood | 109.2239 | Hannan-Quinn criter. | -0.415482 |
| F-statistic | 16.50976 | Durbin-Watson stat | 1.676865 |
| Prob(F-statistic) | 0.000000 | | |

Cross-section and period fixed effects test equation:
Dependent Variable: Q
Method: Panel Least Squares
Date: 05/14/15 Time: 14:49
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.164344 | 0.331442 | 3.512962 | 0.0005 |
| ESG_SCORE | -0.224645 | 0.114615 | -1.959999 | 0.0514 |
| EP_TO_BOE | 0.001024 | 0.000956 | 1.071902 | 0.2851 |
| DTOV | -1.217707 | 0.152997 | -7.959022 | 0.0000 |
| RESERVE_RATIO | 0.007334 | 0.003466 | 2.116047 | 0.0356 |
| LOGEBITDAX | 0.019690 | 0.016675 | 1.180762 | 0.2391 |
| SALES_GROWTH | 0.002662 | 0.000648 | 4.106944 | 0.0001 |

| | | | |
|---|---|---|---|
| R-squared | 0.359012 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.339489 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.256151 | Akaike info criterion | 0.147608 |
| Sum squared resid | 12.92578 | Schwarz criterion | 0.261465 |
| Log likelihood | -8.056059 | Hannan-Quinn criter. | 0.193666 |
| F-statistic | 18.38965 | Durbin-Watson stat | 0.617899 |
| Prob(F-statistic) | 0.000000 | | |

Equation 17 Second Model Q Regression 1; Fixed Effects Likelihood RatioTest

Correlated Random Effects - Hausman Test
Equation: QEQ01
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 21.806071 | 6 | 0.0013 |

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| ESG_SCORE | -0.075031 | -0.073396 | 0.019046 | 0.9906 |
| EP_TO_BOE | -0.000207 | -0.000018 | 0.000000 | 0.6243 |
| DTOV | -1.405915 | -1.362632 | 0.002753 | 0.4094 |
| RESERVE_RATIO | -0.011423 | -0.004548 | 0.000008 | 0.0162 |
| LOGEBITDAX | 0.002643 | 0.001246 | 0.000583 | 0.9538 |
| SALES_GROWTH | 0.000949 | 0.001234 | 0.000000 | 0.0791 |

Cross-section random effects test equation:
Dependent Variable: Q
Method: Panel Least Squares
Date: 05/11/15 Time: 14:46
Sample: 2009 2014
Periods included: 6
Cross-sections included: 34
Total panel (balanced) observations: 204

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.819676 | 0.673734 | 2.700883 | 0.0076 |
| ESG_SCORE | -0.075031 | 0.197070 | -0.380732 | 0.7039 |
| EP_TO_BOE | -0.000207 | 0.000943 | -0.219645 | 0.8264 |
| DTOV | -1.405915 | 0.133222 | -10.55318 | 0.0000 |
| RESERVE_RATIO | -0.011423 | 0.004788 | -2.385913 | 0.0182 |
| LOGEBITDAX | 0.002643 | 0.032154 | 0.082209 | 0.9346 |
| SALES_GROWTH | 0.000949 | 0.000478 | 1.987192 | 0.0486 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.797000 | Mean dependent var | 1.351475 |
| Adjusted R-squared | 0.748725 | S.D. dependent var | 0.315178 |
| S.E. of regression | 0.157990 | Akaike info criterion | -0.678666 |
| Sum squared resid | 4.093580 | Schwarz criterion | -0.028054 |
| Log likelihood | 109.2239 | Hannan-Quinn criter. | -0.415482 |
| F-statistic | 16.50976 | Durbin-Watson stat | 1.676865 |
| Prob(F-statistic) | 0.000000 | | |

Equation 18 Second Model Q Regression 1; Random Effects HausmanTest

Redundant Fixed Effects Tests
Equation: ROAEQ02
Test cross-section and period fixed effects

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| Cross-section F | 2.003056 | (33,125) | 0.0033 |
| Cross-section Chi-square | 72.162883 | 33 | 0.0001 |
| Period F | 1.259687 | (4,125) | 0.0028 |
| Period Chi-square | 6.718185 | 4 | 0.0015 |
| Cross-Section/Period F | 1.982949 | (37,125) | 0.0028 |
| Cross-Section/Period Chi-square | 78.508674 | 37 | 0.0001 |

Cross-section fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.302952 | 0.387390 | 0.782034 | 0.4354 |
| ENVIRONMENTAL | 1.235373 | 0.541768 | 2.280262 | 0.0239 |
| SOCIAL | 0.063814 | 0.462786 | 0.137890 | 0.8905 |
| BVA | -5.33E-12 | 2.94E-12 | -1.813870 | 0.0716 |
| GOVERNANCE | -0.715556 | 0.517153 | -1.383643 | 0.1684 |
| DTOV | -3.096499 | 0.601308 | -5.149603 | 0.0000 |
| SALES_GROWTH | 0.004976 | 0.002178 | 2.284158 | 0.0237 |
| ENERGY_REV | 2.61E-11 | 1.09E-11 | 2.405440 | 0.0173 |

Effects Specification

Period fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.528067 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.495211 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.699441 | Akaike info criterion | 2.190904 |
| Sum squared resid | 77.29649 | Schwarz criterion | 2.412254 |
| Log likelihood | -174.2268 | Hannan-Quinn criter. | 2.280725 |
| F-statistic | 16.07211 | Durbin-Watson stat | 1.372616 |
| Prob(F-statistic) | 0.000000 | | |

Period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.680412 | 0.612650 | -1.110605 | 0.2688 |
| ENVIRONMENTAL | 0.506978 | 0.806676 | 0.628478 | 0.5308 |
| SOCIAL | 1.153576 | 0.763197 | 1.511504 | 0.1331 |
| BVA | -2.01E-12 | 6.92E-12 | -0.290057 | 0.7722 |
| GOVERNANCE | -0.161587 | 0.676381 | -0.238899 | 0.8116 |

Equation 19 Second Model Q Regression 2; Fixed Effects Likelihood RatioTest

| | | | | |
|---|---|---|---|---|
| DTOV | -2.511042 | 0.826181 | -3.039338 | 0.0029 |
| SALES_GROWTH | 0.008020 | 0.001970 | 4.071729 | 0.0001 |
| ENERGY_REV | 2.68E-11 | 1.78E-11 | 1.507825 | 0.1340 |

Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.678863 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.579285 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.638543 | Akaike info criterion | 2.147111 |
| Sum squared resid | 52.59809 | Schwarz criterion | 2.903392 |
| Log likelihood | -141.5045 | Hannan-Quinn criter. | 2.454001 |
| F-statistic | 6.817438 | Durbin-Watson stat | 2.102829 |
| Prob(F-statistic) | 0.000000 | | |

Cross-section and period fixed effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:03
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.124919 | 0.372210 | 0.335613 | 0.7376 |
| ENVIRONMENTAL | 1.192338 | 0.541698 | 2.201112 | 0.0291 |
| SOCIAL | 0.102224 | 0.464080 | 0.220273 | 0.8259 |
| BVA | -6.38E-12 | 2.90E-12 | -2.203961 | 0.0289 |
| GOVERNANCE | -0.606648 | 0.501788 | -1.208973 | 0.2284 |
| DTOV | -2.745924 | 0.573044 | -4.791821 | 0.0000 |
| SALES_GROWTH | 0.007612 | 0.001791 | 4.248768 | 0.0000 |
| ENERGY_REV | 3.09E-11 | 1.06E-11 | 2.900575 | 0.0042 |

| | | | |
|---|---|---|---|
| R-squared | 0.510118 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.488950 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.703766 | Akaike info criterion | 2.181173 |
| Sum squared resid | 80.23636 | Schwarz criterion | 2.328740 |
| Log likelihood | -177.3997 | Hannan-Quinn criter. | 2.241054 |
| F-statistic | 24.09880 | Durbin-Watson stat | 1.387998 |
| Prob(F-statistic) | 0.000000 | | |

Correlated Random Effects - Hausman Test
Equation: ROAEQ02
Test cross-section random effects

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| Cross-section random | 4.024370 | 7 | 0.0077 |

Cross-section random effects test comparisons:

| Variable | Fixed | Random | Var(Diff.) | Prob. |
|---|---|---|---|---|
| ENVIRONMENTAL | 0.506978 | 0.861031 | 0.285746 | 0.5078 |
| SOCIAL | 1.153576 | 0.383333 | 0.306898 | 0.1644 |
| BVA | -0.000000 | -0.000000 | 0.000000 | 0.5068 |
| GOVERNANCE | -0.161587 | -0.376893 | 0.159456 | 0.5898 |
| DTOV | -2.511042 | -2.580193 | 0.281740 | 0.8963 |
| SALES_GROWTH | 0.008020 | 0.007796 | 0.000001 | 0.7915 |
| ENERGY_REV | 0.000000 | 0.000000 | 0.000000 | 0.7838 |

Cross-section random effects test equation:
Dependent Variable: ROA_Z
Method: Panel Least Squares
Date: 05/11/15 Time: 15:04
Sample: 2009 2013
Periods included: 5
Cross-sections included: 34
Total panel (balanced) observations: 170

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.680412 | 0.612650 | -1.110605 | 0.2688 |
| ENVIRONMENTAL | 0.506978 | 0.806676 | 0.628478 | 0.5308 |
| SOCIAL | 1.153576 | 0.763197 | 1.511504 | 0.1331 |
| BVA | -2.01E-12 | 6.92E-12 | -0.290057 | 0.7722 |
| GOVERNANCE | -0.161587 | 0.676381 | -0.238899 | 0.8116 |
| DTOV | -2.511042 | 0.826181 | -3.039338 | 0.0029 |
| SALES_GROWTH | 0.008020 | 0.001970 | 4.071729 | 0.0001 |
| ENERGY_REV | 2.68E-11 | 1.78E-11 | 1.507825 | 0.1340 |

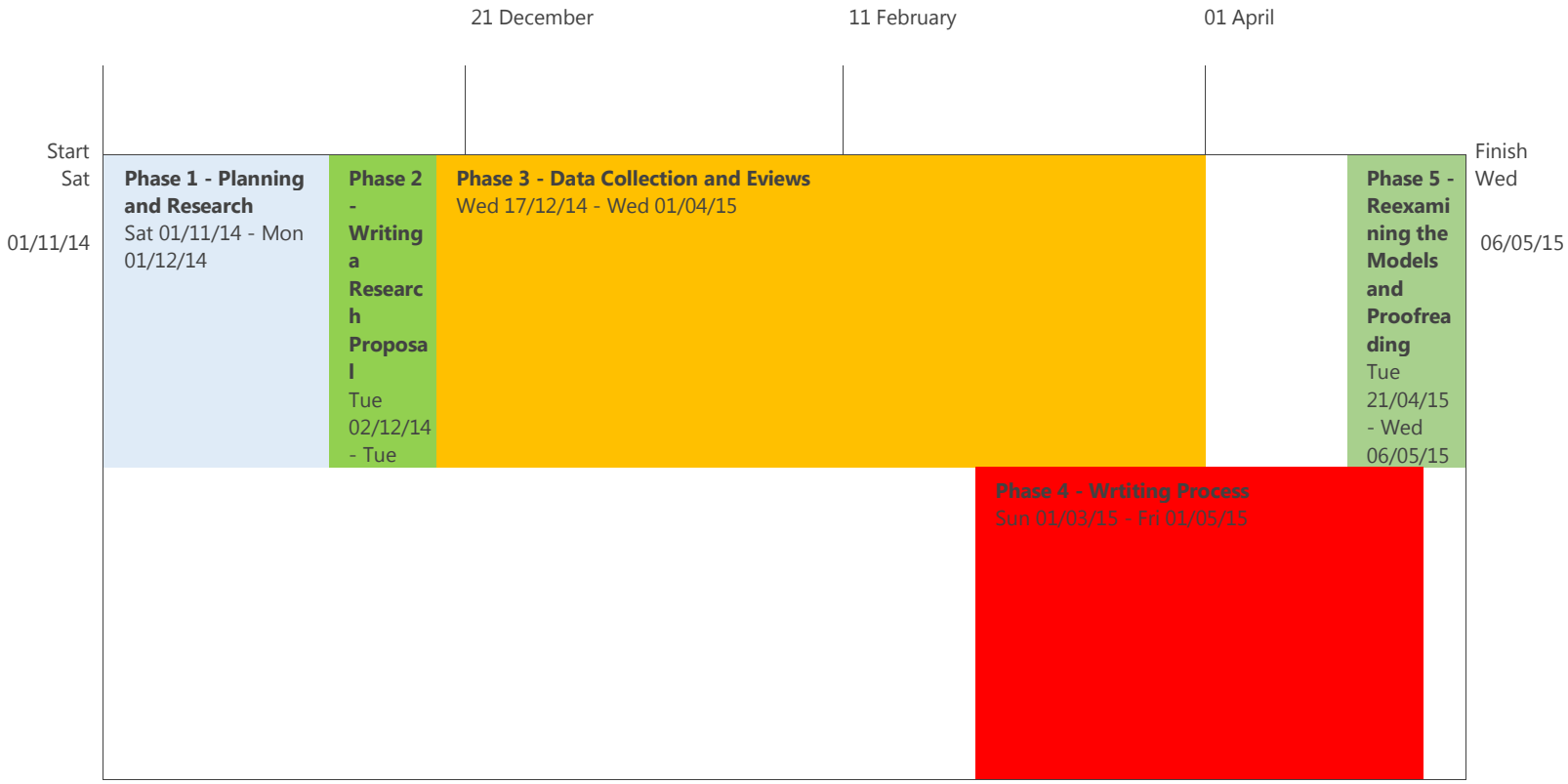
Effects Specification

Cross-section fixed (dummy variables)

| | | | |
|---|---|---|---|
| R-squared | 0.678863 | Mean dependent var | -0.121160 |
| Adjusted R-squared | 0.579285 | S.D. dependent var | 0.984456 |
| S.E. of regression | 0.638543 | Akaike info criterion | 2.147111 |
| Sum squared resid | 52.59809 | Schwarz criterion | 2.903392 |
| Log likelihood | -141.5045 | Hannan-Quinn criter. | 2.454001 |
| F-statistic | 6.817438 | Durbin-Watson stat | 2.102829 |
| Prob(F-statistic) | 0.000000 | | |

Equation 20 Second Model Q Regression 2; Random Effects Hausman Test

## 9. Master's Thesis Schedule and Evaluation in Microsoft Project 2013 – Gantt Chart



| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 0 | **0** | | **Dissertation** | **133 days** | **Sat 01/11/1** | **Wed 06/05/** | **As Soon As P** |
| 1 | **1** | | **Phase 1 - Planning and Research** | **22 days** | **Sat 01/11/14** | **Mon 01/12/1** | **As Soon As Po** |
| 2 | **1.1** | | **Filtering Topics of Interest** | **8 days** | **Sat 01/11/14** | **Tue 11/11/14** | **As Soon As Po** |
| 3 | 1.1.1 | | Relevant Research Topic to the Job Ma | 3 days | Sat 01/11/14 | Wed 05/11/14 | As Soon As Po |
| 4 | 1.1.2 | | Innovative Research Topics | 2.5 days | Thu 06/11/14 | Mon 10/11/14 | As Soon As Po |
| 5 | 1.1.3 | | To Select an Appropriate Topic of Interest and Career Field | 1.5 days | Mon 10/11/14 | Tue 11/11/14 | As Soon As Possible |
| 6 | **1.2** | | **Define the Area of Research** | **7 days** | **Wed 12/11/1** | **Thu 20/11/14** | **As Soon As Po** |
| 7 | 1.2.1 | | Research the prior academic literature | 2 days | Wed 12/11/1 | Thu 13/11/14 | As Soon As Po |
| 8 | 1.2.2 | | Identify academic research niches | 2 days | Fri 14/11/14 | Mon 17/11/14 | Finish No Earli |
| 9 | 1.2.3 | | Analyse the economic and political trends regarding E&P companies | 3 days | Tue 18/11/14 | Thu 20/11/14 | Finish No Earlier Than |

3 Oct '14 | 15 | 21 | 27 Oct '14 | 27 | 02 | 10 Nov '14 | 08 | 14

1

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task

Duration-only

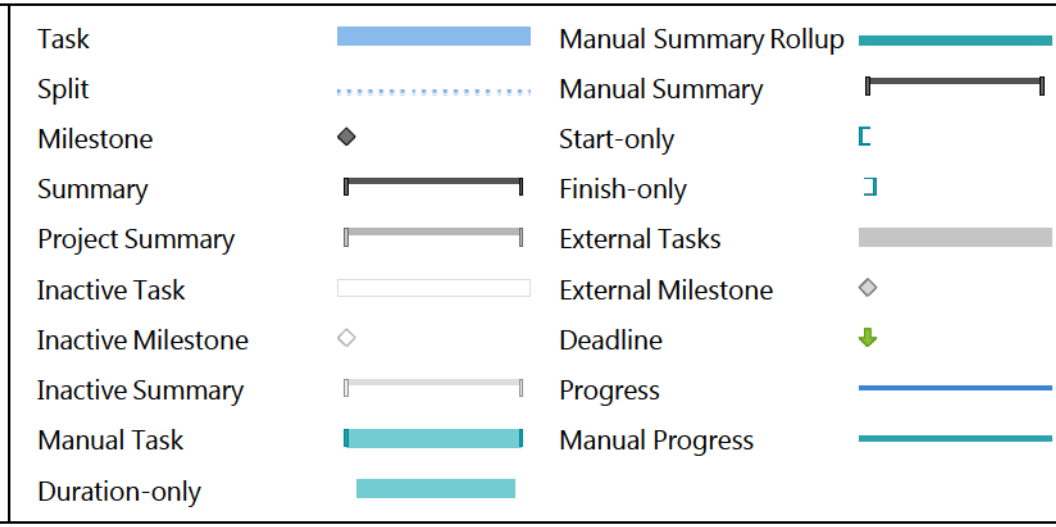
Project: Dissertation
Date: Fri 01/05/15

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |
| M | | | u | ollup Manual Summary | |
| a | | | m | Start-only | |
| n | | | m | Finish-only | |
| u | | | a | External Tasks | |
| a | | | r | External Milestone | |
| l | | | y | Deadline | |
| | | | | Progress | |
| S | | | R | Manual Progress | |
| | | | | Page 1 | |
| | | | | | |
| | | | | | |
| | | | | | |

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 10 | **1.3** | | **Evaluate The Planning Approach** | **7 days** | **Fri 21/11/14** | **Mon 01/12/1** | **As Soon As Po** |
| 11 | 1.3.1 | | Review Personal Suitability | 1 day | Fri 21/11/14 | Fri 21/11/14 | As Soon As Po |
| 12 | 1.3.2 | | Assess needed software availability | 3 days | Sat 22/11/14 | Wed 26/11/14 | As Soon As Po |
| 13 | 1.3.3 | | Evaluate potential problems with the software | 2 days | Wed 26/11/14 | Thu 27/11/14 | As Soon As Possible |
| 14 | 1.3.4 | | Summarize planning approach | 1 day | Thu 27/11/14 | Thu 27/11/14 | As Soon As Po |
| 15 | 1.3.5 | | Review and modify the strategic plan | 1 day | Fri 28/11/14 | Fri 28/11/14 | As Soon As Po |
| 16 | 1.3.6 | | Confirm decision to proceed | 1 day | Sat 29/11/14 | Mon 01/12/14 | As Soon As Po |
| 17 | **2** | | **Phase 2 - Writing a Research Proposal** | **11 days** | **Tue 02/12/1** | **Tue 16/12/14** | **As Soon As Po** |
| 18 | **2.1** | | **Identifying the Key Research Papers** | **7 days** | **Tue 02/12/1** | **Wed 10/12/1** | **As Soon As Po** |
| 19 | 2.1.1 | | Access available information | 2 days | Tue 02/12/14 | Wed 03/12/14 | As Soon As Po |



Project: Dissertation
Date: Fri 01/05/15



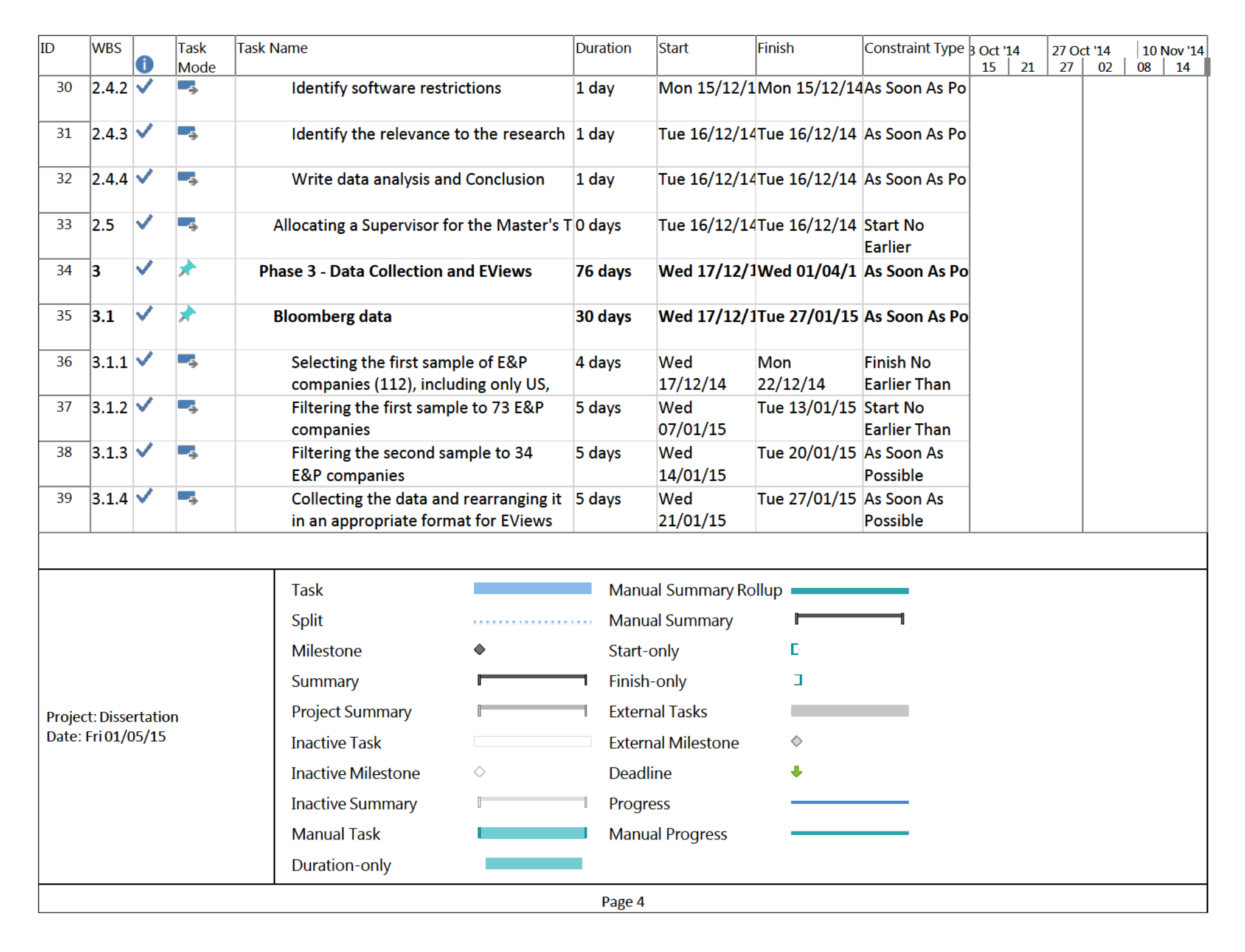
| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 20 | 2.1.2 | | Confirm research focus | 1 day | Wed 03/12/1 | Wed 03/12/14 | As Soon As Po |
| 21 | 2.1.3 | | Implement ESG analysis | 3 days | Thu 04/12/14 | Mon 08/12/14 | As Soon As Po |
| 22 | 2.1.4 | | Link ESG to E&P sector studies | 3 days | Mon 08/12/1 | Wed 10/12/14 | As Soon As Po |
| 23 | 2.1.5 | | Summarise the discoveries | 1 day | Tue 09/12/14 | Tue 09/12/14 | As Soon As Po |
| 24 | **2.2** | | **Summarise Phase 1 and Structure the Research Proposal** | **6 days** | **Mon 08/12/14** | **Mon 15/12/14** | **As Soon As Possible** |
| 25 | 2.2.1 | | Write an introduction | 2 days | Wed 10/12/1 | Thu 11/12/14 | As Soon As Po |
| 26 | 2.2.2 | | Write a literature review | 3 days | Thu 11/12/14 | Mon 15/12/14 | As Soon As Po |
| 27 | 2.3 | | Review and modify the selected studies | 1 day | Mon 15/12/1 | Mon 15/12/14 | As Soon As Po |
| 28 | **2.4** | | **Bloomberg and Thomson Reuters Gathering Data Approach** | **2 days** | **Mon 15/12/14** | **Tue 16/12/14** | **As Soon As Possible** |
| 29 | 2.4.1 | | Select a data approach | 1 day | Mon 15/12/14 | Mon 15/12/14 | As Soon As Possible |




Project: Dissertation
Date: Fri 01/05/15

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

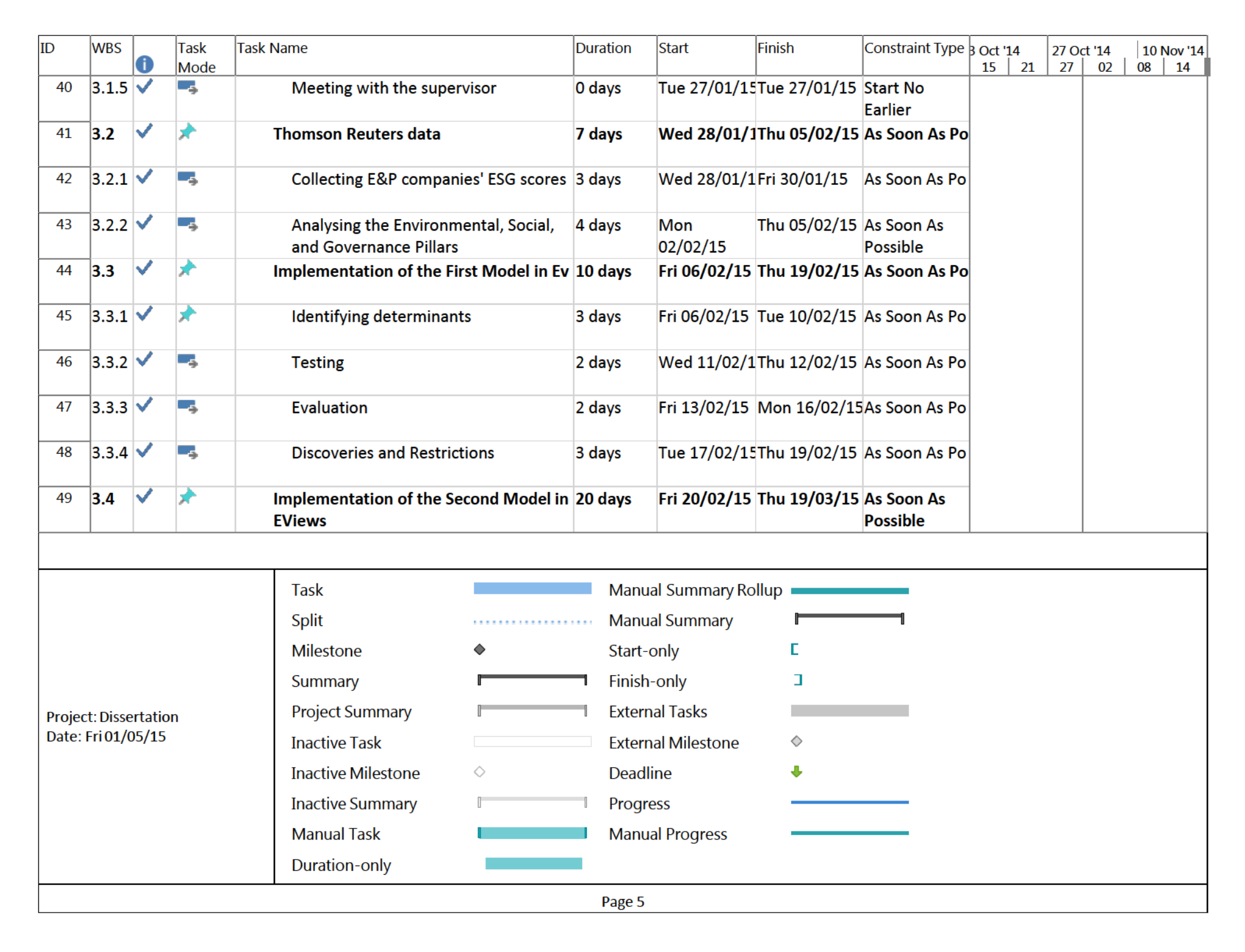
| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 30 | 2.4.2 | | Identify software restrictions | 1 day | Mon 15/12/1 | Mon 15/12/14 | As Soon As Po |
| 31 | 2.4.3 | | Identify the relevance to the research | 1 day | Tue 16/12/14 | Tue 16/12/14 | As Soon As Po |
| 32 | 2.4.4 | | Write data analysis and Conclusion | 1 day | Tue 16/12/14 | Tue 16/12/14 | As Soon As Po |
| 33 | 2.5 | | Allocating a Supervisor for the Master's T | 0 days | Tue 16/12/14 | Tue 16/12/14 | Start No Earlier |
| 34 | **3** | | **Phase 3 - Data Collection and EViews** | **76 days** | **Wed 17/12/1** | **Wed 01/04/1** | **As Soon As Po** |
| 35 | **3.1** | | **Bloomberg data** | **30 days** | **Wed 17/12/1** | **Tue 27/01/15** | **As Soon As Po** |
| 36 | 3.1.1 | | Selecting the first sample of E&P companies (112), including only US, | 4 days | Wed 17/12/14 | Mon 22/12/14 | Finish No Earlier Than |
| 37 | 3.1.2 | | Filtering the first sample to 73 E&P companies | 5 days | Wed 07/01/15 | Tue 13/01/15 | Start No Earlier Than |
| 38 | 3.1.3 | | Filtering the second sample to 34 E&P companies | 5 days | Wed 14/01/15 | Tue 20/01/15 | As Soon As Possible |
| 39 | 3.1.4 | | Collecting the data and rearranging it in an appropriate format for EViews | 5 days | Wed 21/01/15 | Tue 27/01/15 | As Soon As Possible |




Project: Dissertation
Date: Fri 01/05/15

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

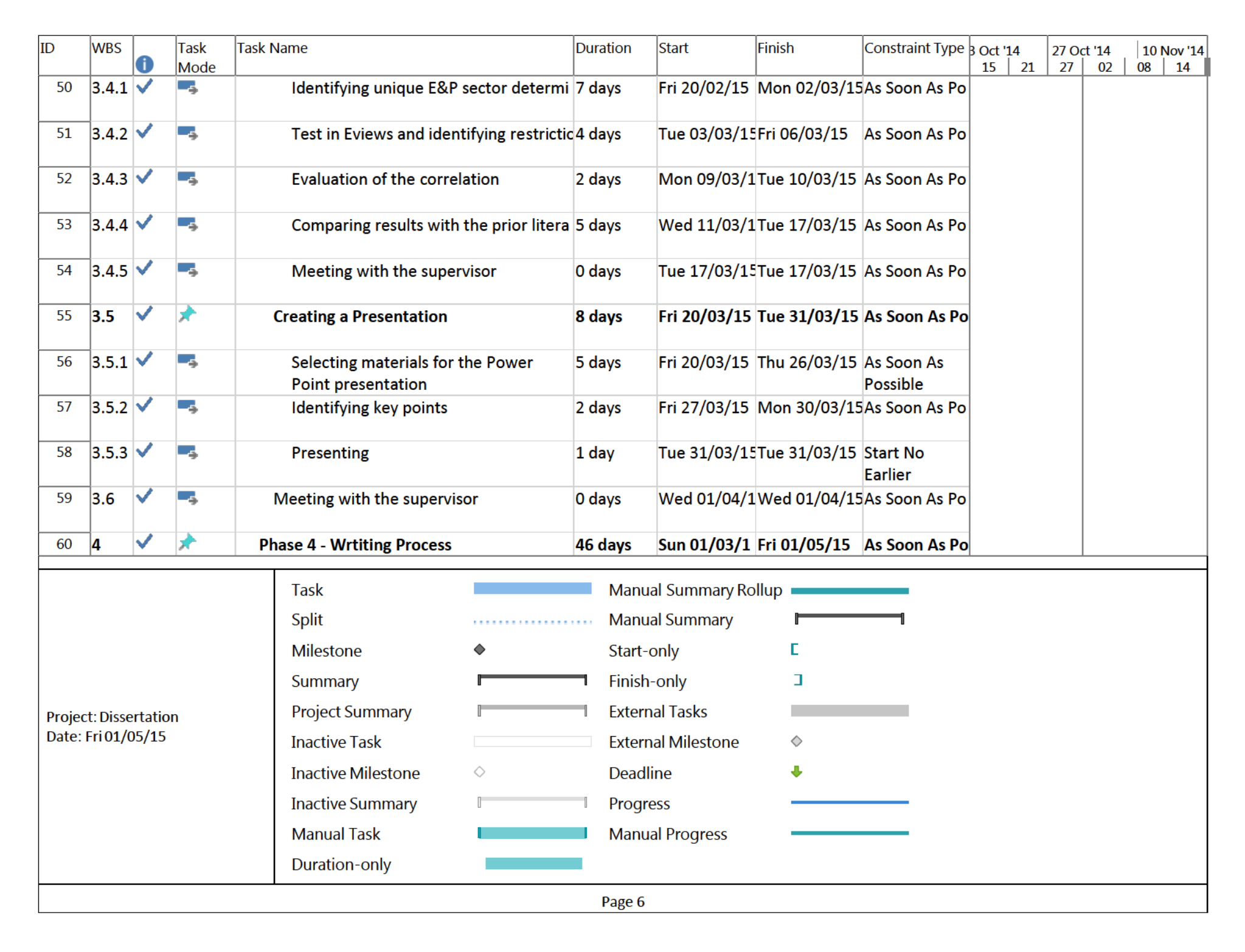
| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 40 | 3.1.5 | | Meeting with the supervisor | 0 days | Tue 27/01/15 | Tue 27/01/15 | Start No Earlier |
| 41 | **3.2** | | **Thomson Reuters data** | **7 days** | **Wed 28/01/1** | **Thu 05/02/15** | **As Soon As Po** |
| 42 | 3.2.1 | | Collecting E&P companies' ESG scores | 3 days | Wed 28/01/1 | Fri 30/01/15 | As Soon As Po |
| 43 | 3.2.2 | | Analysing the Environmental, Social, and Governance Pillars | 4 days | Mon 02/02/15 | Thu 05/02/15 | As Soon As Possible |
| 44 | **3.3** | | **Implementation of the First Model in Ev** | **10 days** | **Fri 06/02/15** | **Thu 19/02/15** | **As Soon As Po** |
| 45 | 3.3.1 | | Identifying determinants | 3 days | Fri 06/02/15 | Tue 10/02/15 | As Soon As Po |
| 46 | 3.3.2 | | Testing | 2 days | Wed 11/02/1 | Thu 12/02/15 | As Soon As Po |
| 47 | 3.3.3 | | Evaluation | 2 days | Fri 13/02/15 | Mon 16/02/15 | As Soon As Po |
| 48 | 3.3.4 | | Discoveries and Restrictions | 3 days | Tue 17/02/15 | Thu 19/02/15 | As Soon As Po |
| 49 | **3.4** | | **Implementation of the Second Model in EViews** | **20 days** | **Fri 20/02/15** | **Thu 19/03/15** | **As Soon As Possible** |




Project: Dissertation
Date: Fri 01/05/15

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

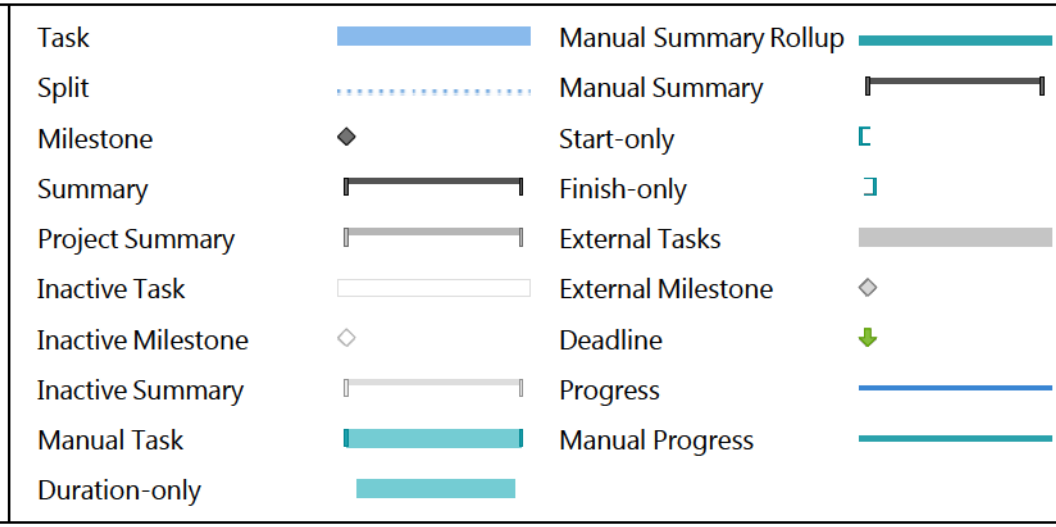
| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 50 | 3.4.1 | | Identifying unique E&P sector determi | 7 days | Fri 20/02/15 | Mon 02/03/15 | As Soon As Po |
| 51 | 3.4.2 | | Test in Eviews and identifying restrictic | 4 days | Tue 03/03/15 | Fri 06/03/15 | As Soon As Po |
| 52 | 3.4.3 | | Evaluation of the correlation | 2 days | Mon 09/03/1 | Tue 10/03/15 | As Soon As Po |
| 53 | 3.4.4 | | Comparing results with the prior litera | 5 days | Wed 11/03/1 | Tue 17/03/15 | As Soon As Po |
| 54 | 3.4.5 | | Meeting with the supervisor | 0 days | Tue 17/03/15 | Tue 17/03/15 | As Soon As Po |
| 55 | **3.5** | | **Creating a Presentation** | **8 days** | **Fri 20/03/15** | **Tue 31/03/15** | **As Soon As Po** |
| 56 | 3.5.1 | | Selecting materials for the Power Point presentation | 5 days | Fri 20/03/15 | Thu 26/03/15 | As Soon As Possible |
| 57 | 3.5.2 | | Identifying key points | 2 days | Fri 27/03/15 | Mon 30/03/15 | As Soon As Po |
| 58 | 3.5.3 | | Presenting | 1 day | Tue 31/03/15 | Tue 31/03/15 | Start No Earlier |
| 59 | 3.6 | | Meeting with the supervisor | 0 days | Wed 01/04/1 | Wed 01/04/15 | As Soon As Po |
| 60 | **4** | | **Phase 4 - Wrtiting Process** | **46 days** | **Sun 01/03/1** | **Fri 01/05/15** | **As Soon As Po** |




Project: Dissertation
Date: Fri 01/05/15

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 61 | **4.1** | | **Critical Literature Review** | **15 days** | **Sun 01/03/1** | **Thu 19/03/15** | **As Soon As Po** |
| 62 | 4.1.1 | | 2.1 Early Steps towards ESG: CSR Introduction | 4 days | Sun 01/03/15 | Wed 04/03/15 | As Soon As Possible |
| 63 | 4.1.2 | | 2.1.1 CSR Relationship with CFP: The Social Perspective | 4 days | Thu 05/03/15 | Tue 10/03/15 | As Soon As Possible |
| 64 | 4.1.3 | | 2.1.2 Corporate Governance Relationship with CFP | 2 days | Wed 11/03/15 | Thu 12/03/15 | As Soon As Possible |
| 65 | 4.1.4 | | 2.1.3 Environment Relationship with CFP | 3 days | Thu 12/03/15 | Mon 16/03/15 | As Soon As Possible |
| 66 | 4.1.5 | | 2.2 ESG implementation and development in the Energy Sector | 4 days | Sun 15/03/15 | Thu 19/03/15 | As Soon As Possible |
| 67 | 4.1.6 | | Meeting with the supervisor | 0 days | Wed 18/03/15 | Wed 18/03/15 | Start No Earlier Than |
| 68 | **4.2** | | **Research Methodology and Data** | **10 days** | **Thu 19/03/1** | **Wed 01/04/1** | **As Soon As Po** |
| 69 | 4.2.1 | | 3.1 Hypothesis Construction | 3 days | Thu 19/03/15 | Sat 21/03/15 | As Soon As Possible |

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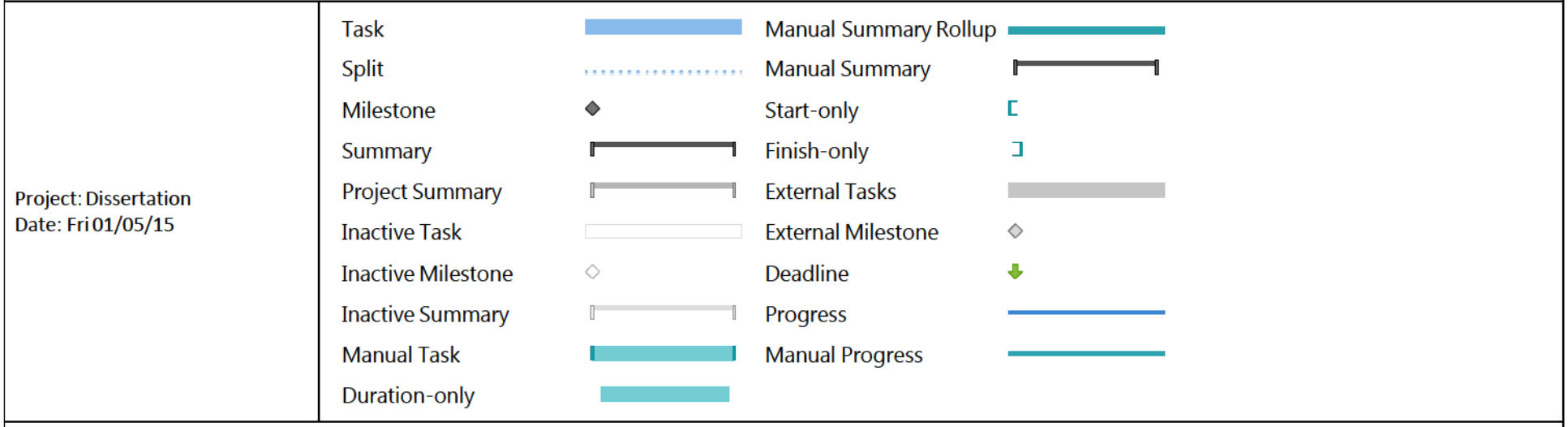
| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
|---|---|---|---|---|---|---|---|
| 70 | 4.2.2 | | 3.2 E&P Companies Data Sample | 2 days | Sun 22/03/15 | Tue 24/03/15 | As Soon As Possible |
| 71 | 4.2.3 | | 3.3 Regression Equations | 2 days | Tue 24/03/15 | Wed 25/03/15 | As Soon As Possible |
| 72 | 4.2.4 | | 3.4 Variables | 5 days | Wed 25/03/1 | Tue 31/03/15 | As Soon As Po |
| 73 | 4.2.5 | | Meeting with the supervisor | 0 days | Tue 31/03/15 | Tue 31/03/15 | Start No Earlier |
| 74 | **4.3** | | **Data Analysis** | **38 days** | **Sun 01/03/1** | **Tue 21/04/15** | **As Soon As Po** |
| 75 | 4.3.1 | | 4.1 The First and Second Model Descriptive Statistics | 4 days | Wed 01/04/15 | Mon 06/04/15 | As Soon As Possible |
| 76 | 4.3.2 | | 4.1.1 ESG Scores Analysis | 4 days | Tue 07/04/15 | Fri 10/04/15 | As Soon As Possible |
| 77 | 4.3.3 | | 4.1.2 ROA and Q Scores Analysis and Tests | 3 days | Fri 10/04/15 | Tue 14/04/15 | As Soon As Possible |
| 78 | 4.3.4 | | 4.2. Regression Results | 4 days | Tue 14/04/15 | Fri 17/04/15 | As Soon As Po |



| ID | WBS | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
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| 79 | 4.3.5 | | 4.2.1 ESG Correlation with ROA (operating performance) | 2 days | Tue 14/04/15 | Wed 15/04/15 | As Soon As Possible |
| 80 | 4.3.6 | | 4.2.2 ESG Correlation with Q ratio (firm value) | 2 days | Thu 16/04/15 | Fri 17/04/15 | As Soon As Possible |
| 81 | 4.3.7 | | 4.2.3 Environmental, Social, and Governance correlation with ROA and Q | 2 days | Sat 18/04/15 | Tue 21/04/15 | As Soon As Possible |
| 82 | 4.3.8 | | Meeting with the supervisor | 0 days | Tue 21/04/15 | Tue 21/04/15 | As Soon As Po |
| 83 | 4.4 | | Introduction | 4 days | Tue 21/04/15 | Fri 24/04/15 | As Soon As Po |
| 84 | 4.5 | | Conclusion | 4 days | Sat 25/04/15 | Wed 29/04/15 | As Soon As Po |
| 85 | 4.6 | | Recommendations | 3 days | Wed 29/04/1 | Fri 01/05/15 | As Soon As Po |
| 86 | 5 | | Meeting with the supervisor | 0 days | Fri 01/05/15 | Fri 01/05/15 | Start No Earlie |

3 Oct '14 | 15 | 21 | 27 Oct '14 | 27 | 02 | 10 Nov '14 | 08 | 14

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Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

| ID | WBS | | Task Mode | Task Name | Duration | Start | Finish | Constraint Type |
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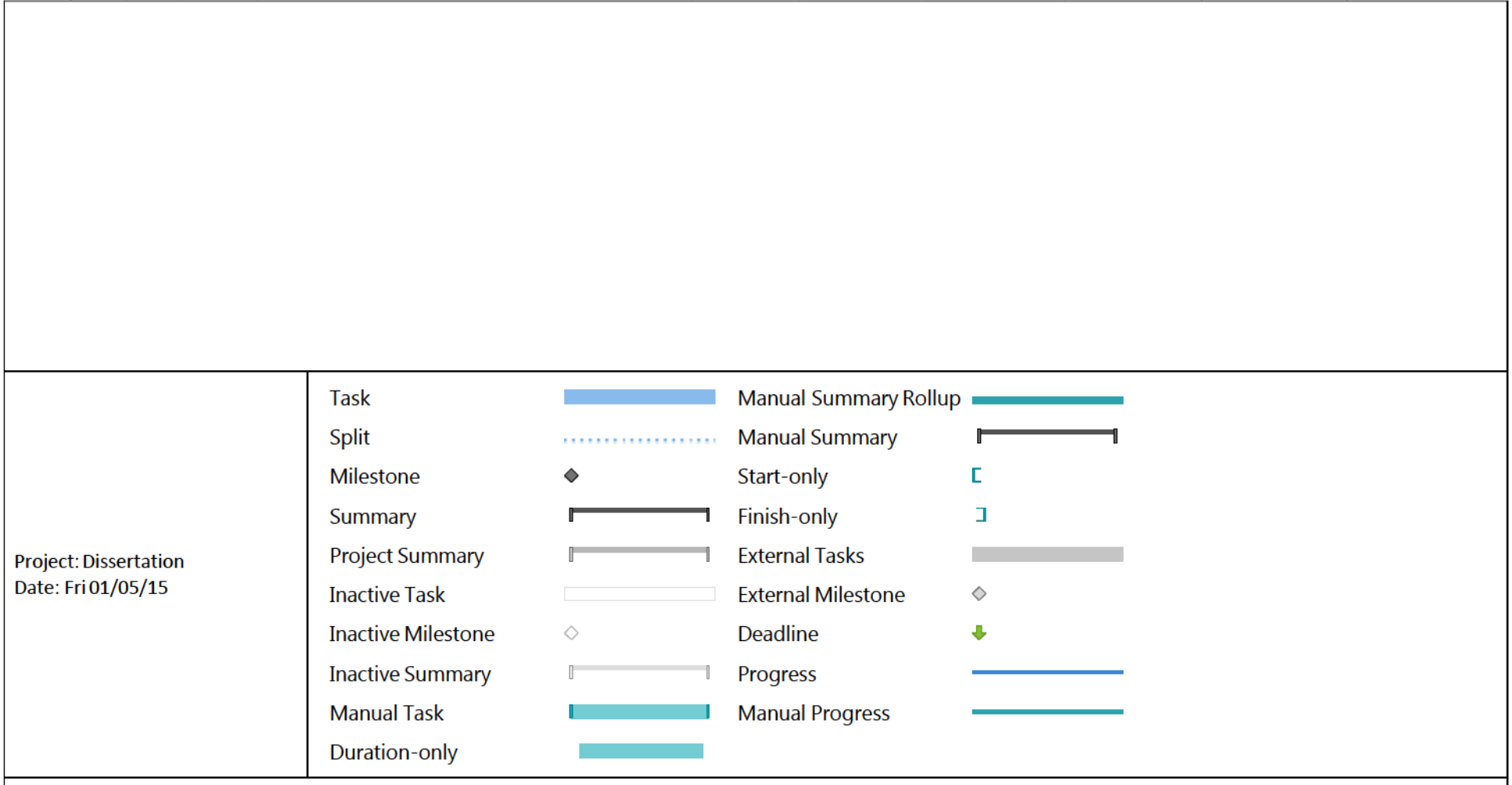
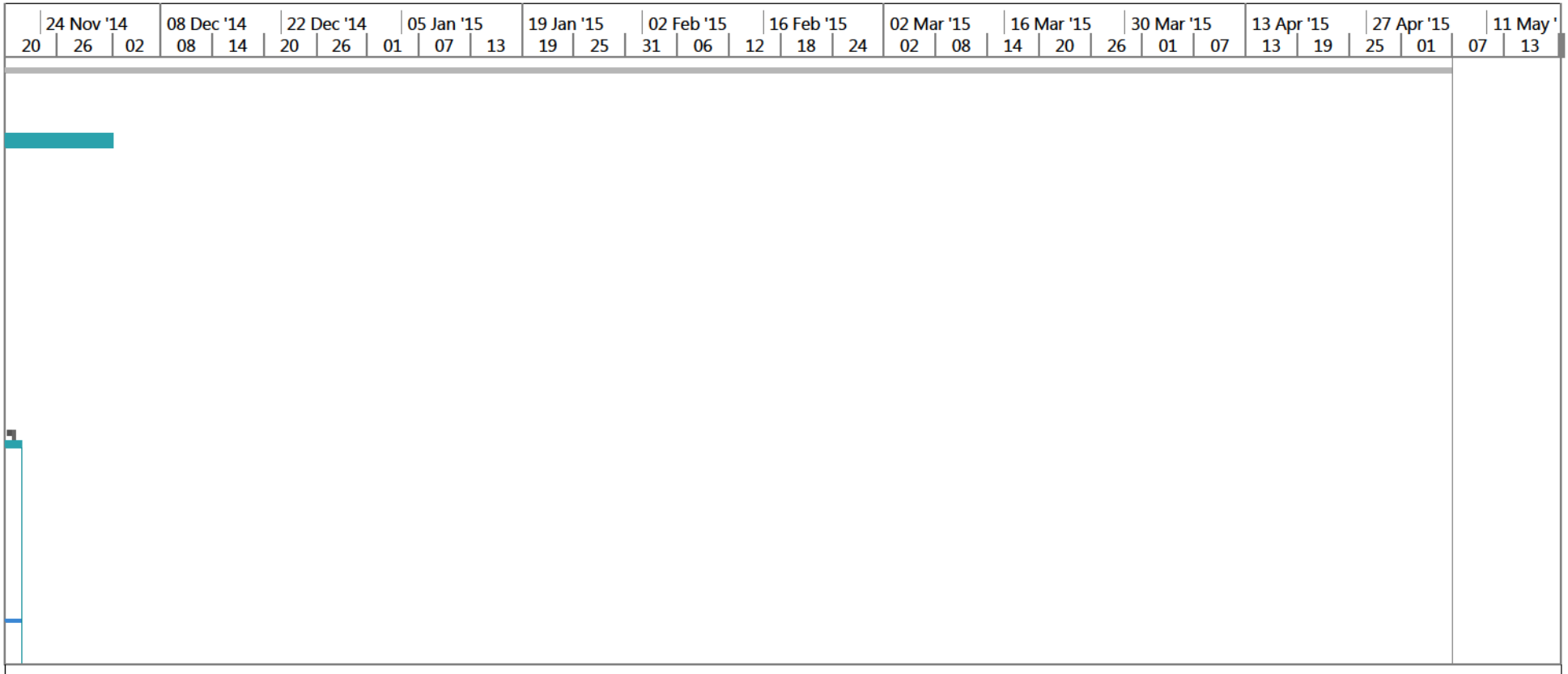
| 87 | **6** | ✓ | | **Phase 5 -Re-examining the Models and Proofreading** | **12 days** | **Tue 21/04/15** | **Wed 06/05/15** | **As Soon As Possible** |
| 88 | 6.1 | ✓ | | Proofread by a friend | 8 days | Tue 21/04/15 | Thu 30/04/15 | As Soon As Po |
| 89 | 6.2 | ✓ | | To contact a professional in the ESG, Corporate Governance, field and to seek feedback | 9 days | Tue 21/04/15 | Fri 01/05/15 | Start No Earlier Than |
| 90 | 6.3 | ✓ | | To proofread the research paper | 2 days | Fri 01/05/15 | Mon 04/05/15 | Finish No Earli |



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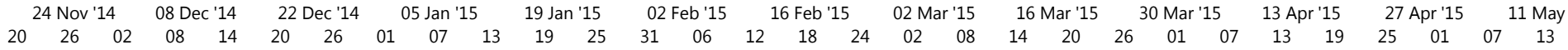


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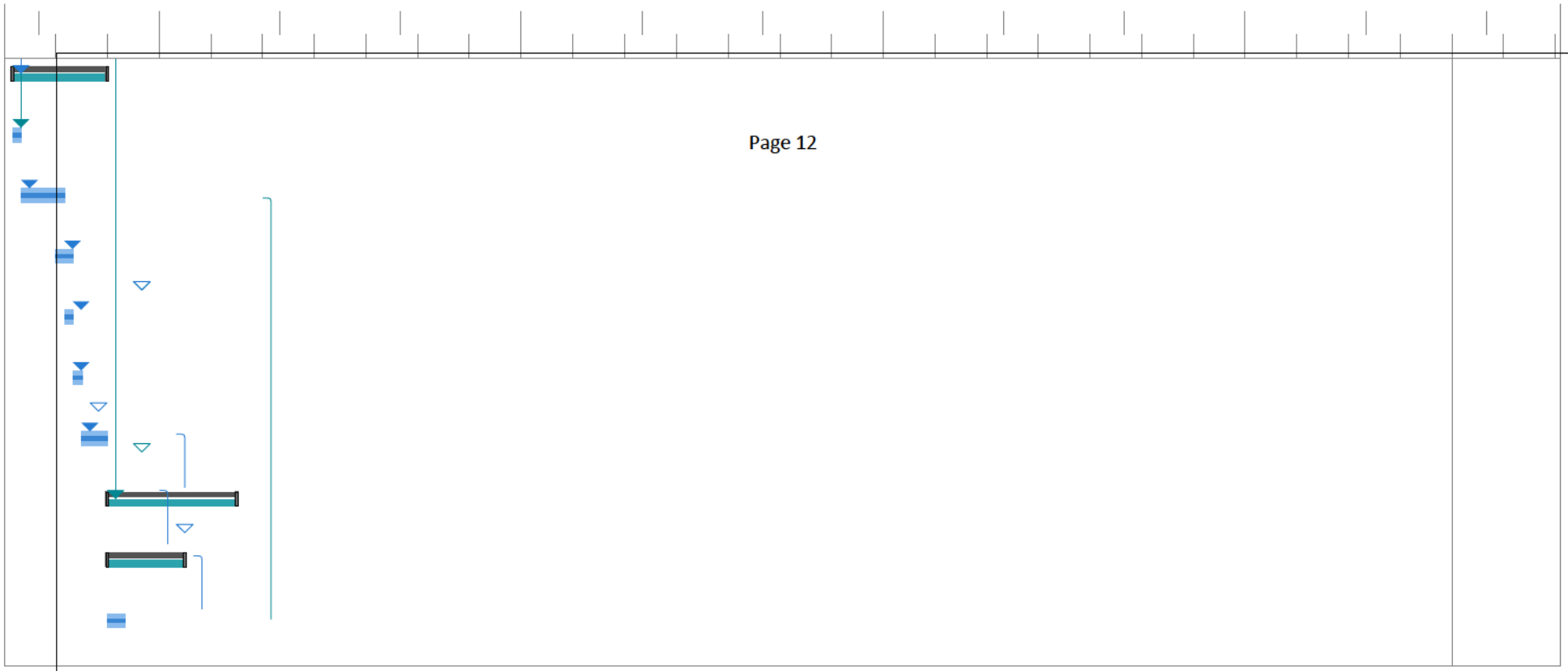

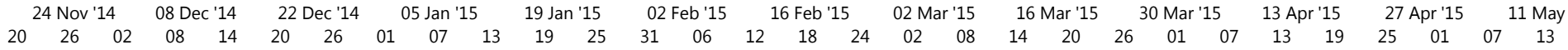


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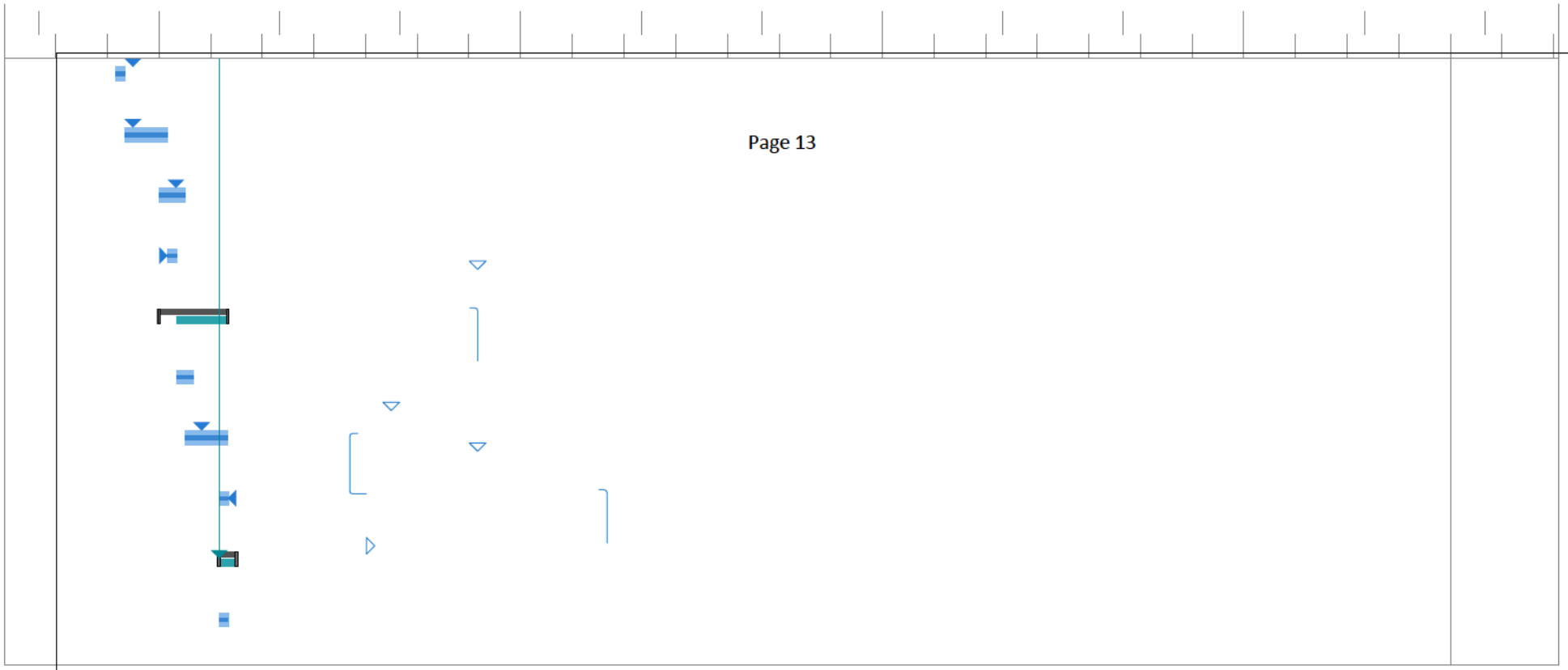

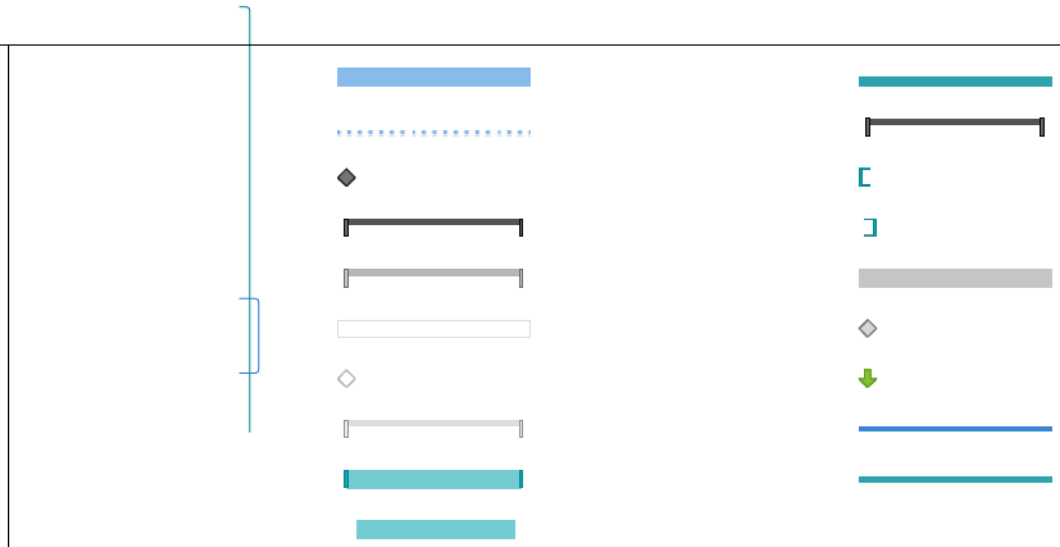

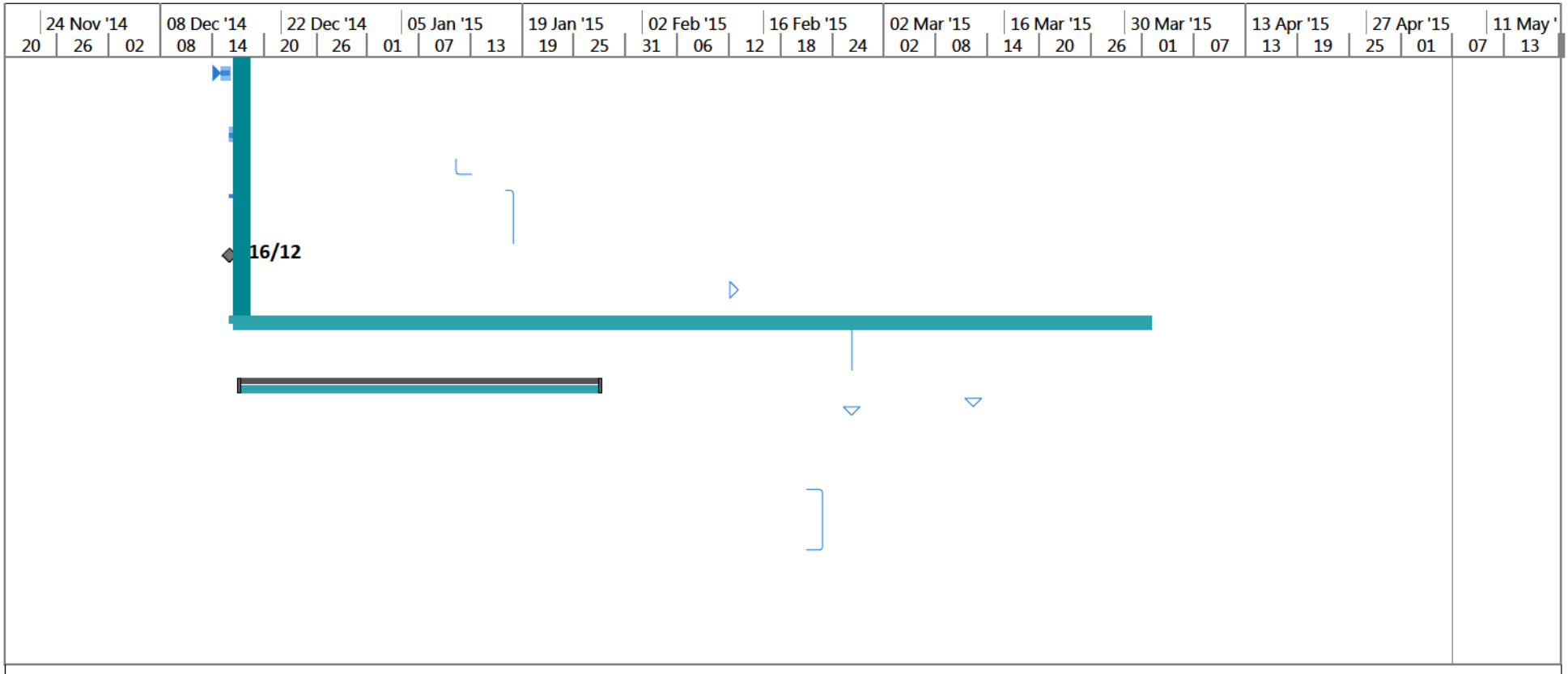


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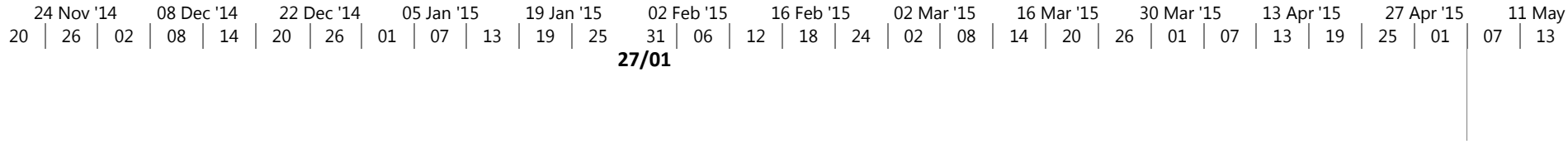


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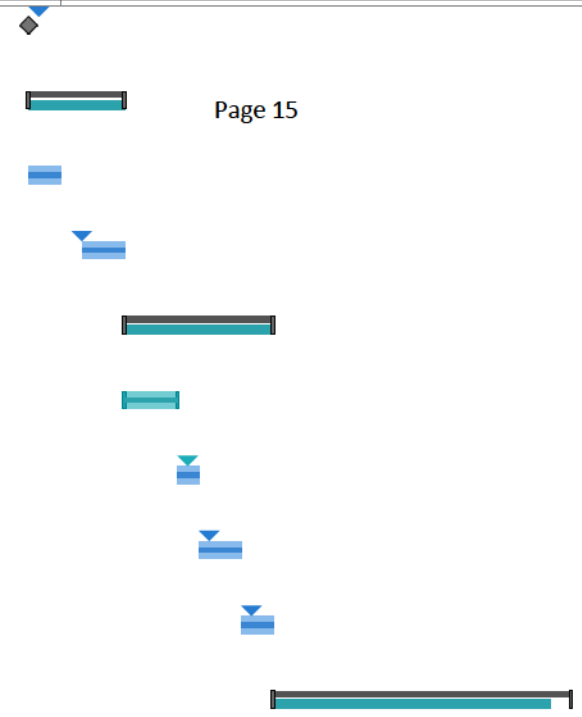

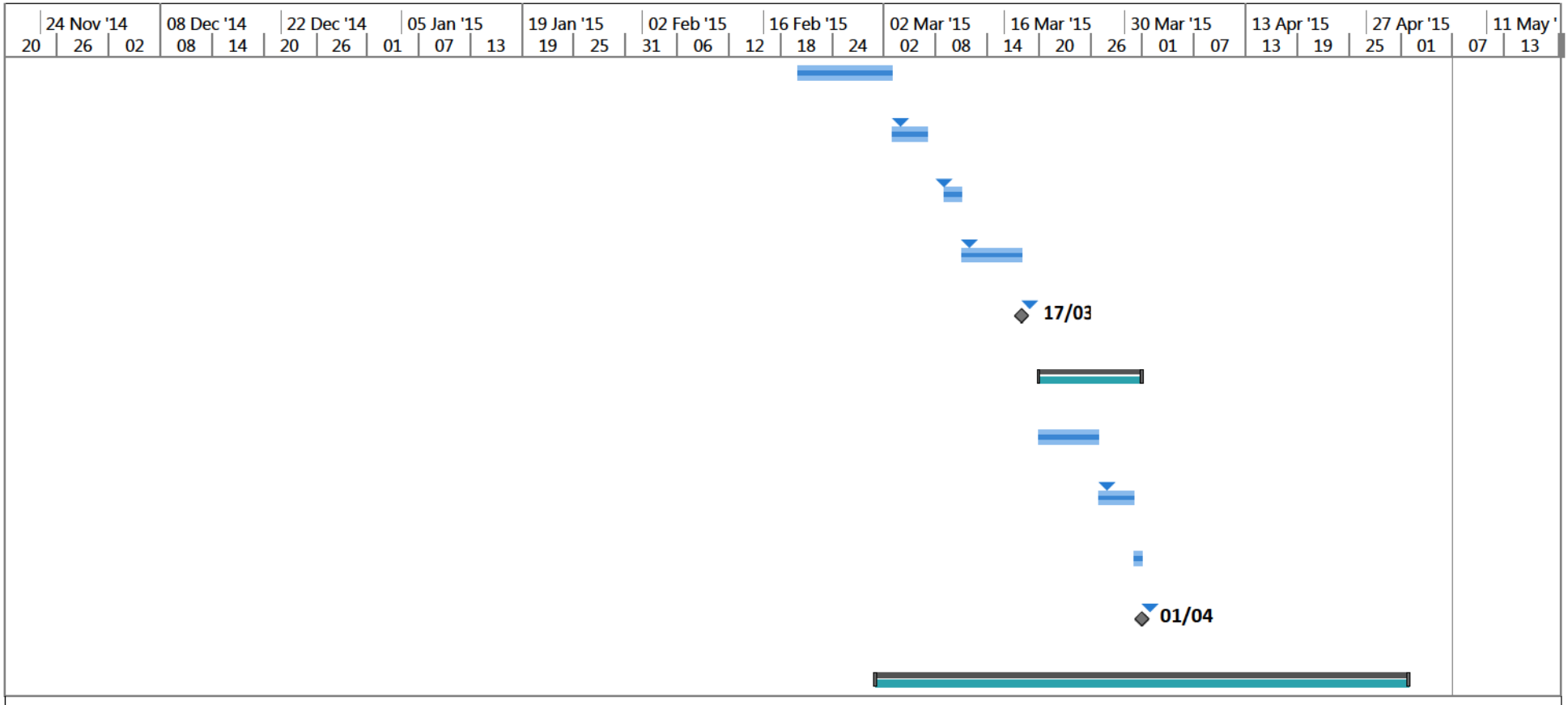


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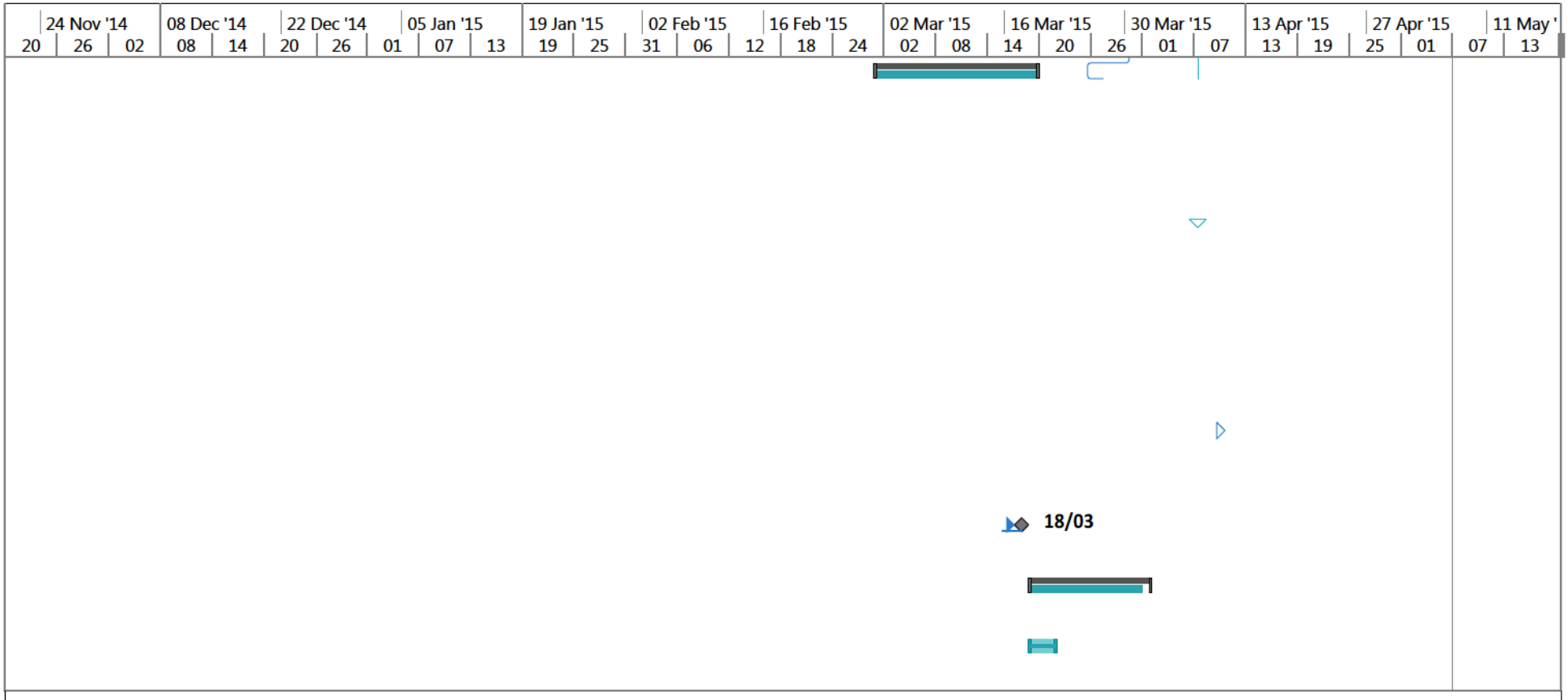


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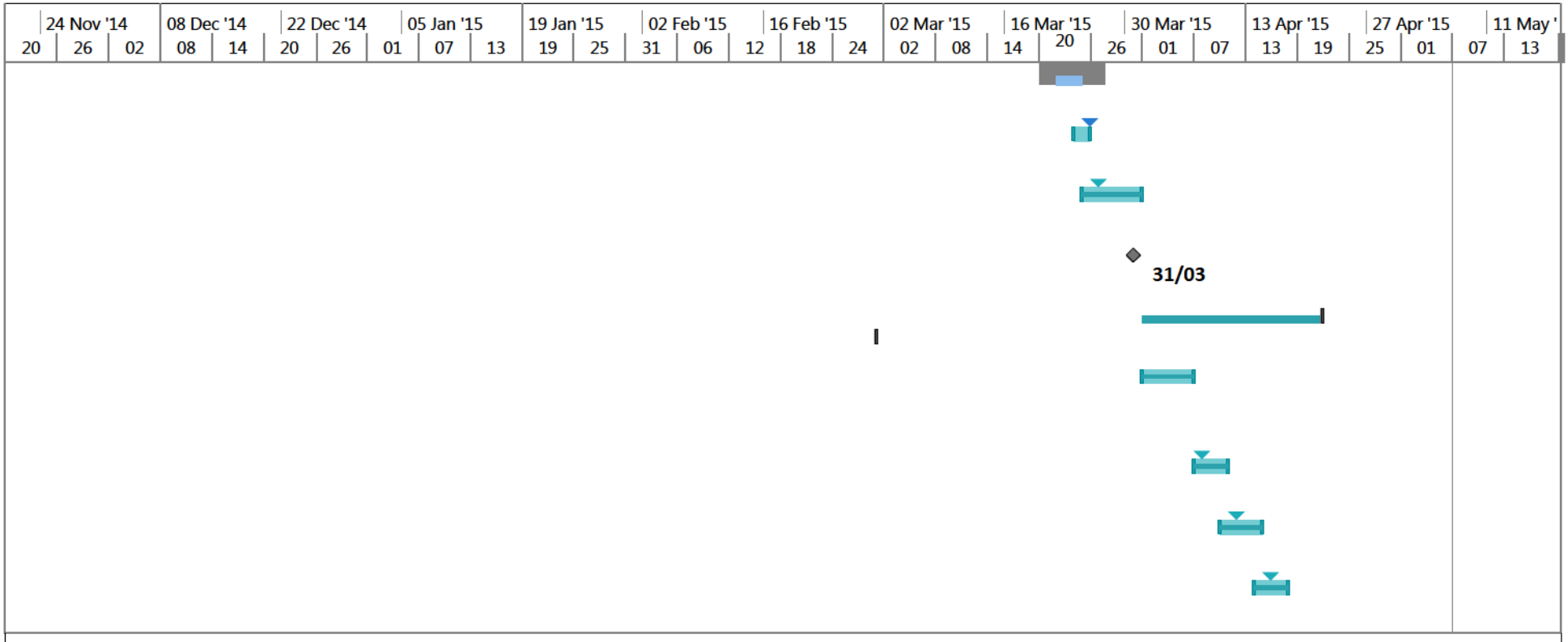


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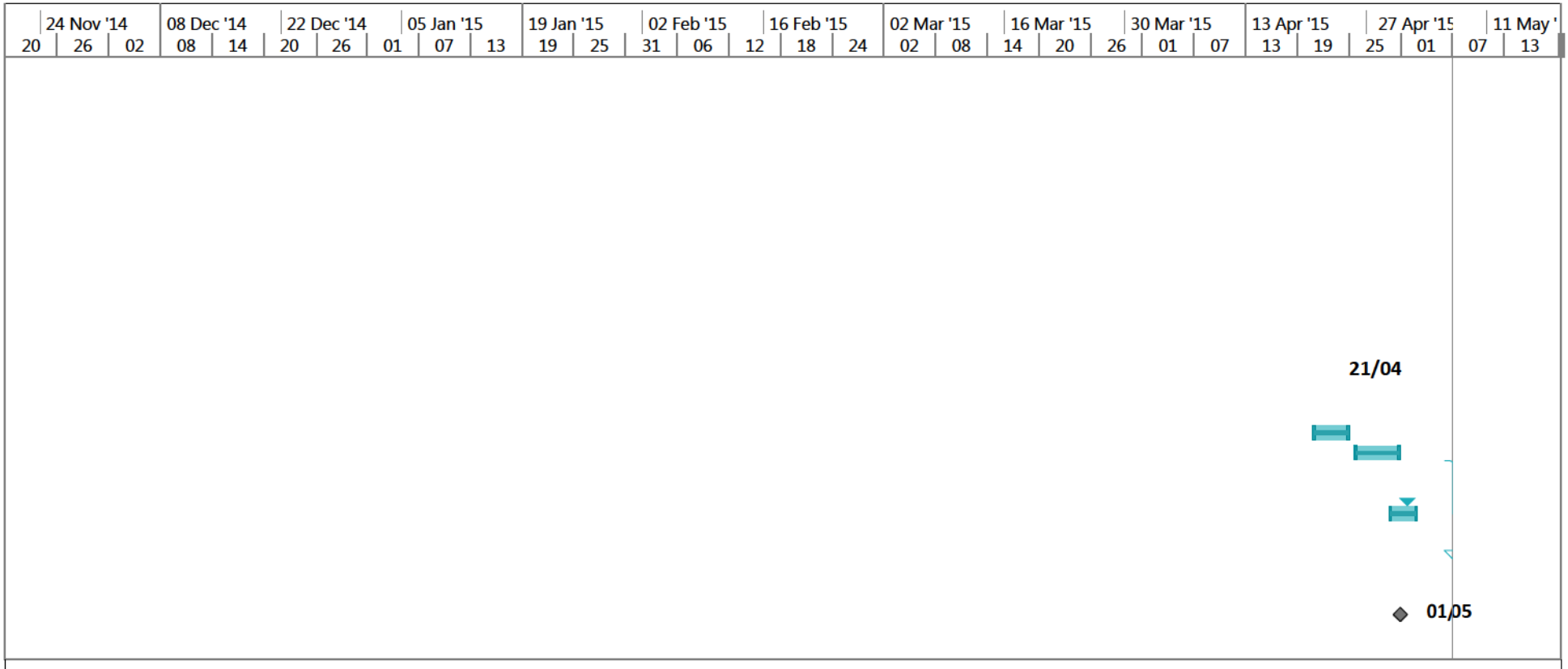


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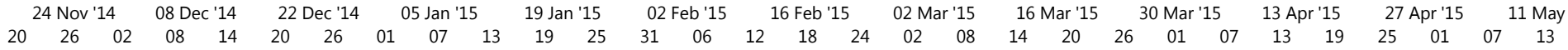


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