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ESG Ratings and Stock performance in the Oil & Gas industry

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Abstract:

This paper studies the relationship between ESG Ratings and stock performance for US Oil & Gas companies in the ten year period between 2013 and 2023. The main focus of the analysis is to investigate whether high ESG ratings are associated with better stock performance in a sector that has historically been less sustainable, in light of the increased emphasis on sustainability throughout the world. Two sets of companies—classified by high and poor ESG scores from Bloomberg—were compared against benchmarks such as the S&P 500 and the Energy Select Sector SPDR Fund (XLE) using a portfolio-based methodology.

The study concludes that, when it comes to stock returns, firms with better ESG ratings often beat those with lower ratings, even in times of market turbulence like the COVID-19 epidemic. This implies that ESG considerations in the oil and gas industry may both reduce risks and increase investor profits. The results support a shift to sustainability, highlighting the possibility of increased returns for investors who give priority to businesses with strong environmental, social, and governance (ESG) standards. This thesis offers methods for combining sustainability and financial performance in investment strategies and advances knowledge of the effects of ESG in high-pollution businesses.

Key Words:

ESG, Oil & Gas, Stock performance, portfolio analysis, sustainability, investment returns, Energy market

Resumen:

Este TFG estudia la relación entre los ratings ESG y el valor en bolsa de las empresas energéticas americanas centradas en servicios de petróleo y gas, analizando su trayectoria en bolsa entre los años 2013 y 2023. El principal foco del estudio es entender si las empresas con mejor rating de ESG se desmarcan en bolsa comparado con las empresas del mismo sector con menor valor de ESG, ya que este es un tema de interés actual y social para los inversores del presente. En este trabajo, se han creado dos portafolios, diferenciados por la media de puntuación en ESG de la terminal de Bloomberg, comparándolos con el mercado energético americano y el mercado a través del S&P 500 y el XLE.

El estudio concluye con que, cuando se trata de el performance en bolsa, las empresas con mejor rating de ESG muestran mejores resultados que aquellas con peores métricas de ESG, aun en momentos de incertidumbre como ha sido la pandemia del COVID-19. Los resultados de este estudio muestran que invertir en sostenibilidad, medio ambiente y gobernanza tienen el potencial de mejorar los resultados en bolsa de una empresa, tomando como case study el caso del sector petrolífero de Estados Unidos. Por último, este estudio ofrece una combinación de estrategias para la inversión en empresas sostenibles pese a operar en mercados altamente contaminantes.

Palabras clave:

ESG, Petróleo y gas, Performance en bolsa, análisis de carteras, sostenibilidad, retorno de inversión, mercados energéticos.

Glossary:

ESG: Environment, social and governance.

O&G: Oil and gas

Portfolio Analysis: Analyzing a number of stocks as if they were one, usually used to compare a group of companies with another.

Stock performance: the performance of a company's shares in the market.

Hedge funds: an investment fund involving a group of people who take high risks with their investments in order to try and make a lot of money¹

Carbon Footprint: a measure of the amount of carbon dioxide that is produced by the activities of a person or company²

Bloomberg ESG ratings: The ESG value associated to a company by the Bloomberg terminal

XLE Fund: A listed portfolio that combines the main US oil and gas companies, serves as the benchmark for the industry.

NYSE: New York Stock Exchange

ETF: Exchange Traded Funds, are a type of index funds that track a basket of securities.³

Mutual Fund: A mutual fund is a portfolio of stocks, bonds, or other securities purchased with the pooled capital of investors.⁴

¹ Oxford dictionary: <https://www.oxfordlearnersdictionaries.com/definition/english/hedge-fund?q=hedge+funds>

² Oxford dictionary: <https://www.oxfordlearnersdictionaries.com/definition/english/carbon-footprint?q=Carbon+footprint>

³ Investopedia: <https://www.investopedia.com/terms/e/etf.asp>

⁴ Investopedia: <https://www.investopedia.com/terms/m/mutualfund.asp>

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1. Introduction

There is a need to create a better tomorrow, a society where firms are socially responsible and invest in sustainable development of the economy and society. Thus it could be said that today more than ever, the pursuit of sustainability is the cornerstone of our generation's goals. It involves more than merely dreaming of a better future—it involves actively creating a world in which environmental preservation, poverty eradication, and the promotion of cohesive, sustainable growth become attainable goals. For instance, as highlighted by the UN in their 2030 agenda, “[w]e are determined to ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature”⁵

It is for this reason that Environment, Social and Governance (ESG) metrics were created, as highlighted by Forbes magazine, “ESG issues were first mentioned in the 2006 United Nations Principles for Responsible Investment (PRI) report consisting of the Freshfield Report and “Who Cares Wins.”⁶ In other words, these metrics came about as a way to praise those companies that do take it into their own hands to make tomorrow better than today. Lately, ESG ratings have been gaining more and more importance as companies and society transition into a green future and aim to achieve the 2050 agenda.

Given its trending popularity and its disruptive nature, due to the fact that these metrics go beyond a traditional approach of merely analyzing financials, it wouldn't be surprising to find a number of studies covering this topic in finance, and indeed there are. Most of these studies address emerging markets, financial institutions or even the transportation industry. However, why is the non-renewable energy industry traditionally excluded from this debate, don't we need them to participate in the discussion in order to fully transition our power source structure into tomorrow's society?

Therefore, the purpose of this research paper is to study what role, if any, do the ESG metrics play in the Oil and gas energy sector. In order to do this, the study will focus on the US Oil and gas market. Studying the performance of stocks in the market between 2013 and 2023. Any findings this paper could reach can help better understand the correlation between ESG scores and energy companies value which is crucial to determine investment decisions. Hence, this paper

⁵ UN website : <https://sdgs.un.org/2030agenda>

⁶ Forbes Magazine, about ESG: <https://www.forbes.com/sites/betsyatkins/2020/06/08/demystifying-esgits-history--current-status/?sh=e04162a2cdd3>

develops a deep analysis of past research as well as build a primary analysis of the industry, to explore a possible relationship between ESG scores and Stock value of non-renewable energy companies. In other words, this paper focuses on the relationship between having a high ESG score vs a low one in stock performance, for Oil and gas companies.

1.1. Value added

In order to study the relationship of ESG scores and Stock performance, this paper brings together a number of essays with diverse backgrounds and study focus that analyze the relationship described above. The research examined include qualitative and quantitative studies, from diverse locations and geographies and each add a new perspective to the primary question (Q1) “does a correlation exist between ESG ratings and the stock value of a company in the Oil and Gas industry?”

Analysis of past research is not the only value added by this paper to the broader conversation, as this thesis, includes a factor of primary research. This form of research brings a new perspective with the end goal of adding to the conversation and helping further explain, from a different point of view, what the current market trend is and how it implements ESG ratings. The approach includes a historical analysis of the stock performance of a number of companies in the oil and gas industry.

Even though conventional investment theories suggest that when accounting for corporate social responsibility, research using regressions or correlation analysis to examine long-term stock performance usually produces equivocal results (Darwall et al.2005). In their paper Darwall et al. highlight that “we presented [in their paper] evidence that a stock portfolio consisting of large-cap companies labeled "most eco-efficient" sizably outperformed a less eco- efficient portfolio over the 1995 - 2003 period.” Following this narrative, their research indicates that there may be significant advantages to taking environmental factors into account when making investment decisions. Therefore it is interesting to conduct a similar study that studies stock performance in a portfolio setting. Hence the potential value creation throughout this paper.

2. Literature review

2.1. ESG - Definition

The Environmental, Social, and Governance (ESG) metrics have become the compass for investors seeking to find companies and industries that aim to better society and our communities, investors that want to not only generate a return but generate an impact to the world. Using this approach, one may evaluate an organization's readiness to handle opportunities and hazards related to environmental, social, and governance challenges. It explores the fundamental sustainability practices that impact long-term value generation and moral operation, going beyond the basic analysis of balance sheets and income statements.

The environmental component of ESG focuses on an organization's environmental responsibilities, which include energy use, waste management, pollution avoidance, and natural resource preservation. This element is crucial since it evaluates an organization's efforts to lessen their influence on the environment and address environmental problems. Strong environmental plans often include investments in renewable energy sources, biodiversity conservation, and carbon emission reduction. By reducing environmental hazards and coordinating the company with international initiatives to combat climate change, these tactics ensure the long-term operational viability of the enterprise.

The social aspect of ESG evaluates how an organization affects people, from its clients and staff to the larger society it serves. This criteria looks at a variety of topics, including community relations, diversity and inclusion, employee health and safety, and labor practices. If a business promotes fair labor laws, encourages community development, and maintains high standards of workplace ethics, it is likely to perform well on social metrics. These businesses show their dedication to improving social well-being by creating a welcoming and inclusive atmosphere. They may also see an increase in consumer satisfaction and brand loyalty.

In the context of ESG, governance refers to a company's management caliber and stakeholder accountability. It includes internal controls, shareholder rights, audits, executive remuneration, and leadership structure. Good governance procedures guarantee that a business runs honestly and transparently, making choices that serve stakeholders' interests while averting conflicts of interest. With responsible leadership and strategic foresight, companies with effective

governance are better able to reduce risks, promote long-term growth, and preserve stakeholder confidence.⁷

ESG is more than simply a trendy term; it's a fundamental shift in how we assess corporate success. Investor decision-making is increasingly weighing environmental, social, and governance (ESG) factors. They are aware that companies with strong ESG strategies have a higher chance of long-term success and resilience. Authority figures, employees, and clients all demand accountability. Companies that employ ESG not only increase the sustainability of the earth but also increase their own competitiveness. As ESG reporting gains traction, businesses should integrate these concepts into their core business plan. Ultimately, the goal of ESG is not to compromise profits but to generate value for all parties involved while safeguarding the environment and society.

Finally, it is important to highlight that ESG is not all perfect and wonderful. It brings with it a need for substantial investment and constant monitoring of policies, resources and actions. Companies need to allocate money and time to understand how they impact society and the environment through their business activities. Furthermore, a highly rated ESG company also ensures that it has suppliers and supply companies and individuals that are ESG friendly, adding to this idea of cost.

2.2.. ESG Metrics (by Bloomberg)

Bloomberg offers comprehensive and detailed ESG datasets that encompass about 93% of the global equity market value. The Bloomberg terminal has a specialist team to compute the ESG ratings of close to the entirety of the firms in the market. In doing this, they filter the ESG data meticulously, ensuring that at least 80% of a company's workforce and operations are included in their study⁸. Furthermore, they compute standardization of metrics, lowering uncertainty and providing reliable information for decision-making. In addition, all data and models provide detailed information about their sources and methodologies, ensuring users have easy access to the sources directly and the extraction points of the real time data.

⁷ Article by McKinsey - <https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/five-ways-that-esg-creates-value>

⁸ Bloomberg terminal, ESG - <https://bloomberg.com/professional/product/esg-data/>

Amongst the discussed value added by Bloomberg terminal to users, is the Bloomberg's Environmental and Social (ES) Scores. This metric provides an evidence-based benchmark of business performance on important problems including safety, health, and climate change. Investors may rapidly assess a company's social and environmental performance with the use of these ratings. Bloomberg offers a comprehensive perspective on ESG aspects by including these ratings into portfolio construction and business analysis.

Finally, the study done by bloomberg goes beyond the firm's emissions, including scopes 1, 2, and 3 greenhouse gas emissions estimates for more than 130,000 international public and private enterprises, in the Bloomberg dataset. To improve coverage, Bloomberg offers estimates based on industry-implied models or machine-learning models even in cases where company-provided data is not available. Additionally, they evaluate how a company's expected emissions or carbon ambitions translate into an inferred temperature rise using their implied temperature rise criteria. As Bloomberg highlights, with the use of these empirically grounded indicators, investors may assess a company's compliance with certain climate goals and work with them to establish concrete carbon reduction goals.

It is due to these three main centers of value creation to investors using Bloomberg that enables them to generate a holistic view of the company and its operations, all encompassed in their ESG Metric value. Hence, as highlighted by many researchers and academics, it could be concluded that Bloomberg outperforms other rating agencies due to its full reporting, transparency, and trustworthy reputation. Bloomberg's ESG data is reliable and robust since it covers the most of the Equity Market. Their trust-inspiring description of the methodology and data sources is extensive. Their focus on carbon emissions, recommended temperature rise measures, and simplicity of integration into investment research make them particularly noteworthy. Overall, it can be said that it is because of the faith the financial sector has had in Bloomberg for more than 40 years, it is a great choice for sustainable financing.

However, the absence of uniformity across rating agencies is a noteworthy obstacle in the realm of Environmental, Social, and Governance (ESG) investment. Inconsistencies in ratings arise from the fact that different organizations, such as Moodys, Ecovadis or Sustainalytics, frequently evaluate firms' ESG performances using disparate criteria and techniques. Because various agencies may assign a firm quite varied ESG scores, investors who rely on these ratings to help them make educated decisions may become confused as a result of this variety. Investors find

it difficult to effectively evaluate firms or assess genuine ESG risks and possibilities as a result of this inconsistency, which makes it more difficult to incorporate ESG aspects into investing strategies. It is imperative that this lack of standards be addressed in order to improve the comparability and credibility of ESG evaluations throughout the financial sector. Despite the lack of consistency and homogeneity between agencies, for the purpose of the paper and having in mind the previously highlighted advantages of using the bloomber terminal, it has been this te agency used to extract the company ratings.

2.3. ESG and stock performance

Over time, hundreds of researchers, academics and financial professionals have devoted their research to study the relationship between environmental, social and governance factors (that make up the ESG ratings) and financial performance and risk (Fried et al., 2015). Even though, Fried and most researchers have not found compelling evidence that concludes that using ESG criteria for investment decisions would generate abnormal negative returns or reduce the financial performance of their investments, there seems to not be a clear stand in whether or not ESG has in fact improven results and stock performance.

For the most part, studies focus on the empirical analysis of mutual funds, looking into the social financial performance of these. Their analysis maily examines the historical performance of these funds compared to conventional funds or market indexes (Derwall et al., 2005). However, there seems to be a number of different approaches with the purpose of studying this relationship. For instance, in her paper Arsein (2020) highlights that, “Wagner (2001) identifies three categories of studies using stock return as a financial performance measure, that is portfolio studies, event studies and (multivariate) regression studies. It is found that studies using regressions or correlation analysis looking at a long-term stock performance produce usually results that cannot be conclusive while including CSR.” This approach might not be the most accurate one as traditional asset pricing models, used for the creation of optimal portfolios aiming to mitigate risk while generating positive abnormal returns, most of the time do not account for ethical criteria (Derwall et al., 2005).

Ibikulen & Steffen (2017) decided to challenge the traditional fund approach and focus their study on different types of mutual funds. In their paper, they study whether the expected returns on green mutual funds, when compared to conventional funds, proved to have any

statistical difference. Not being able to disregard their null hypothesis (H_0 : green mutual funds do not show statistical difference in returns when compared to Conventional funds) leads to the belief that the stocks with higher ESG ratings, being the ones that form the Green funds, do not cash a premium for this purpose (Ibikulen & Steffen, 2017). A second hypothesis is then added to this paper that focuses on comparing the previous study with the performance of carbon intensive equities in “black funds”. Even though they argue that the results could be polluted by the macroeconomic and political scenario during the time of the study (1991 - 2014), the black fund was the only one of the three that did not produce a statistically negative performance. As Arsein mentions in her paper, Ibikunle and Steffen “report that the green, black and conventional mutual funds expose significant negative risk-adjusted abnormal returns when compared with a global market index. The black fund class is the only one not showing a significant negative single-factor alpha estimate compared to the overall equity indices.” Till the point that “When comparing the funds classes, the black fund portfolio is significantly outperforming the conventional and green ones. When green and conventional ones are compared, the conventional reveal a significant superior performance (Ibikunle & Steffen, 2017).”

However, Ibikulen & Steffen (2017) studies concluded that when taking time into consideration, green funds returns shift from statistically underperforming both fund classes to not showing a statistical difference in adjusted returns. As for their performance, the funds focused on higher ESG ratings (or green funds) seem to mostly underperform conventional funds for a period of 15 years since their creation, performance that is statistically equaled over the last five years, where green funds and conventional funds significantly outperformed black funds. In this sense, both papers (Ibikunle & Steffen, 2017 and Derwall et al., 2005) seem to agree that investors believe that when analyzing performance in the short term all three, environmental, social and governance factors, seem to be mispriced. In this way, concluding that in the long run these factors show signs of market outperformance.

Adding to this idea, and examining the current market trends, Haan et al. (2012) bring to the table the fact that unethical companies pay a premium to investors for holding their stock. Eventually, this premium should be considered as a cost for the company, reverting the overpriced stock, following the idea of market efficiencies (Haan et al., 2012). Therefore, it could be said that, in the long run, investors that hold companies with low ESG ratings are putting themselves at risk of facing abnormal negative returns.

Expanding on the idea of time series, most researchers come to the realization that the ESG metrics are relatively new, and thus the fact that research can not statistically determine a correlation between ESG Metrics and positive abnormal returns makes sense. Moreover, the approach of most researchers seems to be wrong (Gise & Lee, 2019). Most of the academic research seems to take a traditional approach that does not focus on the strategies used to achieve financial returns when using ESG metrics, in fact “most of these studies do not focus on strategies that placed an emphasis on financial returns” (Gise & Lee, 2019). In their paper, Gise and Lee bring time series and the misleading approach of past academics, and they conclude with the following idea, “To examine strategies focused on obtaining a financial benefit from ESG ratings, we looked across both the type of economic transmission (idiosyncratic or systematic) and the financial objective (risk or performance). We found that the statistical level of evidence that can be obtained from empirical research was driven by both the strength of the financial characteristics and the available data history. The finding supported with the highest statistical confidence level is the result that ESG characteristics had a positive effect on risk, in particular in mitigating tail risks. There is some evidence that ESG momentum (changes in ESG characteristics) was linked with portfolio performance, but a longer time series is needed to verify the existence of an ESG risk premium.”

Even though it is still uncertain if ESG Scores have a direct impact on stock performance influencing the generation of positive or negative abnormal returns, most recent studies seem to agree on the fact that “there is no cost when environmental or social commitments are undertaken, thus demonstrating a potential for increasing such stock preferences that do not imply any additional costs. Choosing a portfolio with “climate impact disclosure” can pay off.” (Arsein, 2020). Furthermore, “A study by Nofsinger & Varma (2014) finds that RI mutual funds are outperforming during market crises periods. Companies that adopt environment, social and governance practices are manifesting stronger resilience in the face of violent market events, such as polluting disasters events are less to occur in companies following strong environmental programs, high social concerned firms are receiving less employee lawsuits, RI firms are less faced with cases of legal prosecution and fines, having a better stable relation with governments and the communities they pertain to (Nofsinger & Varma, 2014)” (Arsein, 2020). Hence, all things considered, it wouldn't be misleading to assume that even though the research has not found compelling evidence of these metrics directly improving stock performance, the market could

eventually price these factors under the efficient markets theory. Investors should not only hold companies with high ESG scores for the potential returns in the future but as a hedge against uncertainty and market shifts.

2.4. ESG and Stock performance in the oil and gas industry

The Oil and Gas industry is viewed as one of the main pollutants, due to the nature of their operations and traditionally following carbon intensive operations, releasing greenhouse gasses and harming the environment. However, surprisingly enough for some, this industry is changing. Most researchers point towards changes in investor preferences, environmental policies and market trends, to be the main drivers for firms in this industry to implement ESG factors into their operations (Nasralla & Bouso, 2019).

The Oil and gas industry is not a particularly stable industry. Price fluctuations have historically marked the industry on both sides of the coin, Hecht (2020) points out in his paper from 1983 onwards, the quarterly volatility of crude oil ranged from 12.63% to over 90%, while that of gas ranged from 22.56% to over 80%. To top it all off, the Covid-19 crises shocked the oil and gas industry, adding to the turmoil of prices, storage and production. In this regard, oil prices plunged from the lower \$60's in January 2020 to the \$20's by March (Winston & Strawn, 2020). However, this period was followed by spikes of prices for both commodities throughout 2020 and 2021. Plyakha's (2022)⁹ study finds that despite this price volatility, higher ESG rated firms proved to have more stable returns. But it goes beyond stability in returns, ESG metrics have statistically proven to be a good measure for predicting a low volatility in stock prices (Kumar et al., 2018). Taking both papers into account, it can be implied that businesses with higher ESG ratings could offer superior long-term investment returns despite market drastic shifts, particularly in sectors of the economy that are often linked to greater environmental impact, such as Oil and gas.

Despite the little studies that prove ESG metrics to show a direct impact on stock performance, the ones that do mention that their findings show “stronger results” in sectors where companies' products highly depend upon extracting large amounts of natural resources” (Stutzman, 2020). “For instance, the energy industries” (Arsein, 2020). In this way, it is made evident that firms in the oil and gas industry could potentially generate economic gains by implementing ESG

⁹ Study on ESG's outperformance: <https://www.msci.com/www/blog-posts/despite-oil-gas-s-rebound-esg/02978159476>

policies and practices in their operations, increasing their value and thus eventually increasing their share price. Hence, making the assumption that ESG metrics and policies indirectly positively influence the stock performance (Arsein, 2020). Even though this might be the case in the long-run, adopting ESG factors can seem difficult to materialize and extremely costly in the short term, increasing CAPEX and drawing revenues, however according to Rushton (2021), many businesses, including those in the oil and gas industry, have found success pursuing these initiatives. The article argues that even as renewable energy sources proliferate, there is still a need for fossil fuels, and these companies will have no other option but to comply with environmental and social policies (Rushton, 2021). Furthermore, major investment companies such as BlackRock are advocating for improved ESG practices and disclosures, implying that a company's ability to get financing may be impacted by the absence of an ESG strategy (Rushton, 2021).

3. Methodology

The present study will analyze stock performance of a number of firms in order to draw conclusions on what the effect of an ESG score has on its performance in the stock market. When evaluating the approach to this study, it is important to bring up previous research. In his paper, Wagner (2001) concludes with the idea that there are three main approaches in order to employ stock returns as a metric for financial performance. This paper highlights these three categories of research to be: (multivariate) regression studies, event studies, and portfolio studies.

This paper takes the portfolio approach as it tries to explain if the ESG ratings influence at all in the stock performance of companies in the oil and gas industry. For this purpose I have created two portfolios with equivalent companies. Each portfolio is a combination of firms of the main 4 different specializations within the energy sector. These include, natural gas producer, oil & gas exploration and production, integrated energy company, and oil field services. In addition, an extra company has been added in order to give the portfolios additional exposure to the market. Table 1 shows the firms that have been added to each portfolio, by category.

Table 1: Companies in each portfolio

Sector	Portfolio 1	Portfolio 2
Natural gas production	EQT Corporation	Coterra Energy
Oil and natural gas exploration and production	Eog resources	Comstock resources
Integrated oil and gas company	Suncor Energy	Chevron
Oilfield services	Halliburton co	Nov inc
Extra	ENI SPA	Exxon

The allocation of the firms to each portfolio has been done merely based on ESG scores as outlined by bloomberg. Each category was researched and then the company with the highest score was added to portfolio 1 and the one with the lowest to portfolio 2. In doing this, we ensure no portfolio has been put together with a deliberate intention to outperform the other. No portfolio has been tested of sharpe ratio, volatility, alfa, or any other statistical metric that could induce an overperform of the market or the other portfolio. Table two below shows an extension of table 1 in which the ESG rating for each company has been added. In doing this we can see that the energy company that has the highest ESG score is EQT Corporation with a rating of 78,53, and the lowest is Comstock resources with a score of 41,55. Furthermore, a mean of each portfolio's ESG ratings has been computed. As outlined in the table, the mean for portfolio 1 stands at 73,77 whereas the mean for the second portfolio stands at 52,48, giving them a total difference of 21,28 points.

Table 2: Companies in each portfolio including ESG ratings

Sector	Company			
	Portfolio 1	ESG rating	Portfolio 2	ESG rating
Natural gas production	EQT Corporation	78,53	Coterra Energy	45,96
Oil and natural gas exploration and production	Eog resources	65,1	Comstock resources	41,55
Integrated oil and gas company	Suncor Energy	77,99	Chevron	61,7
Oilfield services	Halliburton co	71,36	Nov inc	46,51
Extra	ENI SPA	75,85	Exxon	66,7
Mean:		73,77		52,48

It is critical to comprehend how, after constructing both portfolios, the current study will use this data to examine the link between the stock performance of non-renewable energy businesses and their ESG ratings. To achieve this goal, each portfolio has been constructed using historical data from the previously named businesses. This information covers the firms' stock performance from 2013 to 2023, a ten-year period. It is important to remember that during this time, important historical events have taken place, including the Covid-19 outbreak, the lockdown, the Russian military invasion of Ukraine, and the ensuing collapse of the economy. For further detail of the portfolios, both portfolios are awarded the same amount of investment and each company is given an equal share. Same investment and weights assigned per section and company also deletes the researcher bias to make one company or portfolio outperform the rest and thus shadow the effect of the ESG score being measured. Finally, the error produced by a mispricing of market or geography is minimized by the fact that all stocks in this study are registered in the NYSE.

3.1. Benchmark

Following the traditional approach to stock performance review, it would be logical to use a benchmark that covers the market studied by the paper. The most quoted benchmark when analysing US stocks tends to be the Standard & Poor's 500, as it is the ETF that tracks the

performance of the 500 biggest companies in the country. In this case, it would be interesting to compare both portfolios to the market as we could extrapolate the idea of ESG stocks compared to the overall New York Stock Exchange (NYSE). However, this would prove to have little to no statistical relevance as the Energy stocks (those that make 100% of the portfolios in the study) represent around an 8% of the total S&P 500. Thus this would not reveal any relevant information.

On the other hand, another interesting benchmark, given the focus of this paper on the oil and gas industry, would be in fact the oil and gas market. The main issue when studying the relationship between the portfolios created in this paper and the overall market through the S&P 500 is that, despite the historical presence of oil and gas companies in this index, today it only accounts for 5.3%. Thus finding the correlation between the portfolios and the oil and gas market seems to make more sense and actually produce meaningful results. Therefore, the Energy Select Sector SPDR Fund (NYSEARCA: XLE) seems to be the most appropriate index to use as a benchmark.

3.2. Data Collection

For the purpose of this study and as highlighted above, the time series will include the monthly returns for the 10 companies being studied in this thesis. The historical data is extracted from the Yahoo finance website. Despite the availability of sources, Yahoo finance was chosen for its convenient access, easy manipulation and overall streamline data manipulation and extraction. The filters used for the extraction included, time series, monthly returns and historical prices.

It is no coincidence that monthly returns have been chosen over weekly or daily returns, for this study. This strategic choice gains statistical validity when put into context and how, it is this option that best approximates to a normal distribution of returns. Furthermore, it is this return that provides the best representation of the trend the stocks follow in the stock market for a number of reasons. The main one being that monthly returns help smooth out the volatility a stock experiences in the short-term as well as market trends that last for one or several days. It is precisely this smoothing of returns that makes the returns more symmetrically distributed and bell-shaped, making the statistical logic of a normal distribution applicable to the performance of the stock.

Another factor taken into account when collecting the data was the exclusion of dividends from the return generated by the stocks in the portfolios, which is a common approach by most

researchers when studying the performance of a company in the stock exchange. The main reasons for excluding dividends in this particular study are the focus on capital appreciation, consistency across assets and market comparison. In this specific approach to stock performance, I am focusing on the capital gains of stocks compared to the ESG rating allocated to them rather than the total return. Hence, in this case, taking only the stock performance based on price appreciations aligns with the objective of this paper. As for consistency across assets, it is worth mentioning that not all the stocks chosen to create the portfolios issue dividends. Even though this does not affect their ESG rating by rating agencies, it does affect the return generated by the firm, and in this way can alter the purpose of the study and produce misleading conclusions. Finally, market comparison, in this regard, the portfolios are not only going to be related to the other, but to the energy market in the U.S. and the overall market (by making a comparison to the S&P 500). As the indices that track both markets do not include dividends in their performance, it would once again be misleading to include these in my study.

3.3. Hypothesis

Given the present methodology and goals of the paper, it could be said that the aim of this study is to examine the relationship between ESG indicators and stock performance in the oil and gas industry. In order to fully achieve this goal, it is crucial to have a planned strategy and outline of how to conduct the research. Having explained the methodology to be followed throughout the paper, it is now vital to set the expectations prior to commencing the regression and finding results. The current section goes beyond stating and explaining the main hypothesis of the paper. It also aims to highlight some alternate hypotheses brought up through the analysis of past papers, and that could be interesting to devote a section of the study to analyze and understand.

3.3.1 Main hypothesis of the paper

The main hypothesis of this paper pivots around the idea that, in the context of the energy sector (excluding renewable energy sources), companies with higher ESG scores will perform better on the stock market than companies with lower scores. Translated to the present study this could be rephrased to the idea that Portfolio 1 outperforms Portfolio 2. In more statistical terms it could be phrased as:

H0: Portfolio 1 \leq Portfolio 2

H1: Portfolio 1 $>$ Portfolio 2

By phrasing it as a null and alternate hypothesis, it becomes clear what the study is aiming to disregard. In this case the null hypothesis supports the idea that there is no statistical significance to support the idea that indeed higher rated ESG companies outperform lower rated ESG companies in this industry. Diving deeper into this study, it is also crucial to put the findings into context with the overall energy market. An overall view into the performance of the portfolios to the market would be the idea that Portfolio 1 outperforms both the market and portfolio two, being this last one underperforming when compared to the market. In other words we are looking at the idea that:

H0: Portfolio 1 \leq XLE (Energy market) \leq Portfolio 2

H2: Portfolio 1 $>$ XLE (Energy market) $>$ Portfolio 2

Taking this into account, what we really care about is the idea that a higher rated ESG company outperforms the market. In this case we should only really consider the first part of this last test, where we focus if Portfolio 1 outperforms the XLE portfolio, as shown below.

H0: Portfolio 1 \leq XLE

H3: Portfolio 1 $>$ XLE

Having both, the possibility of computing a regression in order to find statistical significance and a line graph that maps regressions, in this case it is highly likely that this last analysis provides a better understanding of the correlation. It is practically certain that all three, Portfolio 1, Portfolio 2 and XLE, show a strong correlation. This is due to several factors which include, the fact that all these companies operate in the same geography, they all trade in the same stock market and have experienced the same market dynamics, having all the same time span.

3.3.2 Alternate hypothesis

After having analyzed papers by scholars, economists and professionals in the industry, it seems like they practically all reach the same core idea. This is that the ESG metrics provides a more robust and deeper analysis of a company's performance, going beyond a purely financial analysis of the income statement and balance sheet. In this regard, it could be said that the metrics

predict what companies are better equipped to navigate uncertainty. A perfect example of market uncertainty in the time span of the study is the Covid-19 pandemic. Both investors and business professionals were shocked by the virus and lock down periods, generating a turmoil of volatility and uncertainty in the market. However, if past research is right, investing in ESG stocks should serve as a hedge against this volatility. In this regard a new hypothesis arises;

(for the time period 03/2020 - 12/2023)

H0: Portfolio 1 \leq Portfolio 2

H4: Portfolio 1 $>$ Portfolio 2

&

H0: Portfolio 1 \leq XLE

H5: Portfolio 1 $>$ XLE

If this hypothesis proves to be right, it would serve as proof that in fact ESG metrics are a good predictor for robust corporations in the oil and gas industry that over perform during uncertainty and market shutdowns. However, would this be true, it would need to be backed by a more broad array of studies, to prove that it is not a one case scenario. Which would also prove to be true in case this hypothesis does not prove to work. In this case, it could be argued that it could be an isolated case. Either way, it is interesting to bring this idea to the table and study what the regressions show.

4. Review of the Study

This section of the paper aims to keep studying the relationship between ESG ratings and stock performance for companies in the oil and gas industry. Shifting from a theoretical research approach into an empirical study, we aim to expand the knowledge on this relationship through a stock performance analysis and bringing a new approach to the discussion.

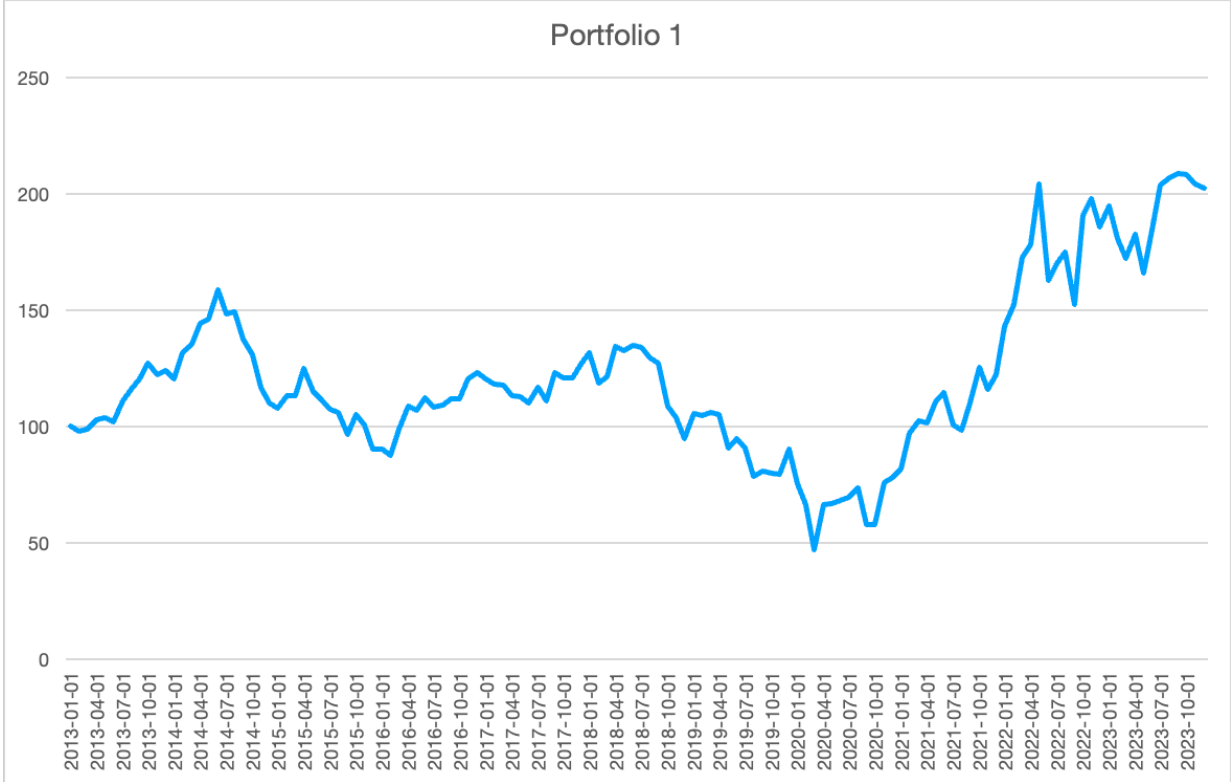
4.1. P1 vs P2

4.1.1. P1

Portfolio 1 in the current paper is the portfolio comprised of the higher ESG rated companies for each category in the oil and gas industry. In this case, having used the available information extracted from bloomberg in December 2023, the companies that form this portfolio

are, as shown in table 1, EQT Corporation, Eog resources, Suncor Energy, Halliburton co. and ENI SPA. Throughout the time span of the study, the portfolio has returned a total 102% return to investors, despite having navigated surges and plunges in this ten year period.

Graph 1: Portfolio 1



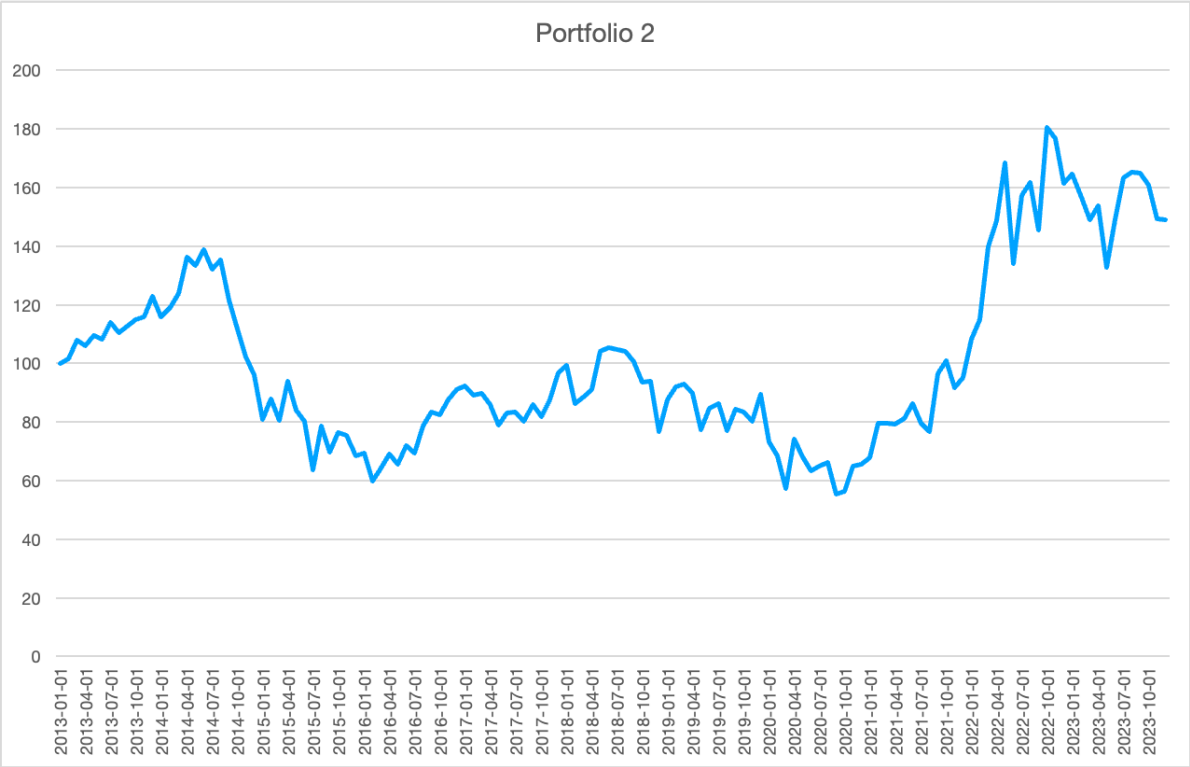
The graph above shows the stock performance of the higher rated ESG portfolio. In this case, if you had invested \$100 at the beginning of 2013, you would have \$202, as mentioned before, a 102% return on investment (ROI). However, the graph also proves that, despite having a great return over the past 10 years, the portfolio has produced negative returns on a total of 31 months of the 131 months in the study, or 23.7% of the time. Another interesting factor to highlight is the fact that when comparing the lowest and highest registered stock value for the portfolio, we can see that there is practically a spread of 3.5 times, with a min of \$47.28 and a max of \$208.51, or in other words a growth of 341%.

4.1.2. P2

On the other hand, Portfolio 2 in this analysis consists of oil and gas companies with worse ESG scores than those present in Portfolio 1. Following the same procedure as with P1, the

companies that make up this portfolio have been carefully selected using the data available from on Bloomberg as of December 2023. Moreover, the selected companies exhibit a spectrum across the industry that does not prioritize ESG metrics to the same extent as Portfolio 1. Even with the erratic economic climate and the inherent market risks linked to lower ESG scores, the portfolio exhibits a notable performance over the course of the ten-year research period. The investment outcomes, which highlight the complex risk-return profile of funding entities that might not follow the most stringent governance, social, and environmental regulations, are displayed in the portfolio 2 graph.

Graph 2: Portfolio 2



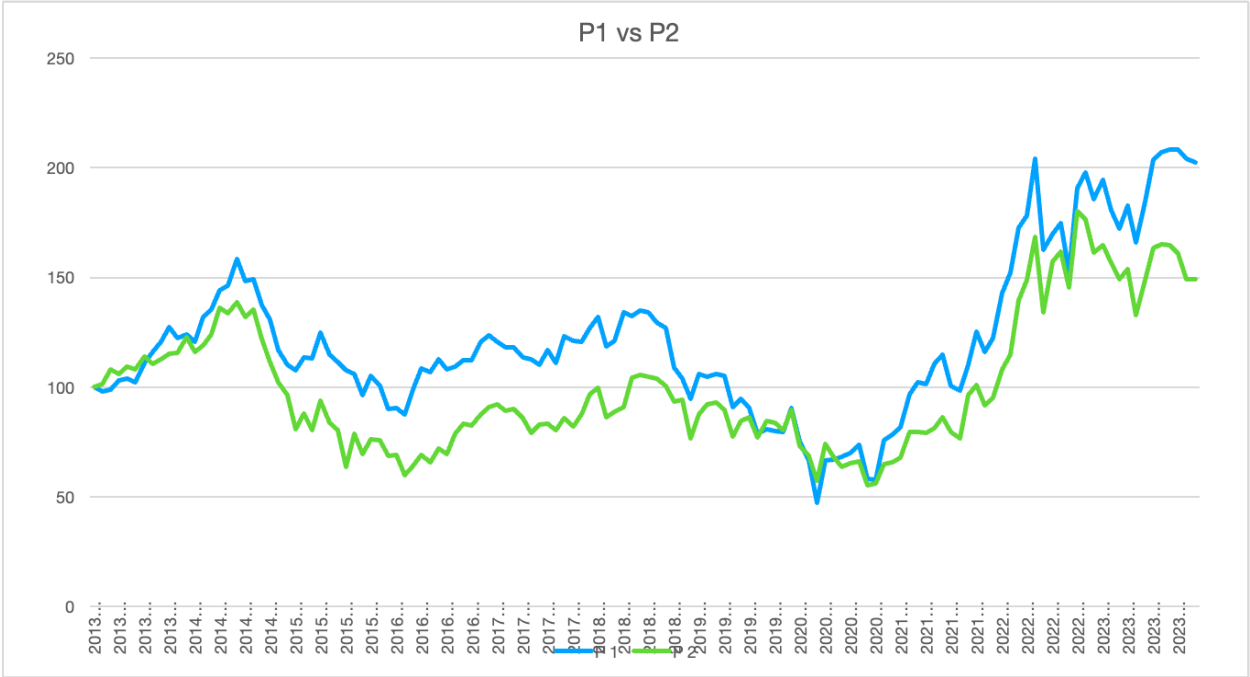
In this case, an investor that had invested \$100 into these companies in January of 2013, would have cashed a total return of \$149,10, or in other words a 49% return on investment (ROI). Taking a deeper look into the performance of this portfolio, it could be said this portfolio has shown positive returns for a total of 52 periods out of 132, or a total of 39% of the time, which means that for over 60% of the time, this portfolio has not managed to break even and generate a positive return. Following this narrative, and focusing on the performance over the last 2 years, it is in these last 24 months that the portfolio breaks even and generates the 49% returns it has.

Finally, if an investor would have known when the max and min were hit by this portfolio, they could have cashed a 226% returns, investing \$55,34 on September 2020, and closing the position on October 2022 at \$180,39.

4.1.3. Comparison between portfolios

Having a deep understanding of what companies build each portfolio, and how they have performed during the study period, the next steps would be to study the comparison of both portfolios, one against the other one. The graph below combines both portfolios into one single graph to make a visual representation of the information easier.

Graph 3: P1 vs P2



With this in mind and a visual representation of both portfolios, there are several takeaways that can be drawn, including performance, market trends and market reaction.

Overall performance: The graph suggests that P1, or the companies with higher ESG ratings, outperforms P2. This may suggest that companies with more stringent ESG standards are more resilient and may eventually provide larger profits. This might be as a result of the more environmentally friendly practices these companies have, their improved risk control, or their closer adherence to the public's growing desire for ethical investing.

Another interesting fact to mention is the financial performance, despite having dived into them separately, in the previous section, we should now dive into it all together. With the same initial investment, an investor in portfolio 1 would have made a return 35% higher than that of an investor in portfolio 2, caching \$53 more.

Market trends and influence of ESG: The fact that the two portfolios occasionally move in tandem suggests that they are both impacted by larger market dynamics, such as changes in the economy, business news, and other variables that have an impact on the market as a whole. For instance, regardless of their ESG ratings, all firms in the oil and gas industry may enjoy a gain in stock prices if there is a global increase in oil prices.

Nevertheless, over time, Portfolio 1, which is composed of businesses with higher ESG ratings, often performs better than Portfolio 2, which is composed of firms with lower ESG ratings, notwithstanding these general patterns. According to this general trend, businesses that score higher on ESG may have innate advantages over their competitors, such as improved management techniques or more effective operations. These advantages may also attract investors, particularly those who are interested in sustainability and corporate responsibility. Because of this, the stock prices of the firms in Portfolio 1 may become more stable and even rise, indicating the increased importance that the market places on robust ESG standards.

Market turmoil recovery: P1 seems to recover from market downturns faster and smoother when compared to the recovery process of P2. This fact would lead one to believe that the stocks held by the first portfolio have a differentiation factor that enables them to retract investment during uncertainty, allowing them to navigate market volatility better. Amongst the factors that could indicate a stronger appeal for investors are facts like cash reserves, debt ratios or better business practices and management, in practice the factors encompassed in the ESG ratings.

4.2. Setting a benchmark

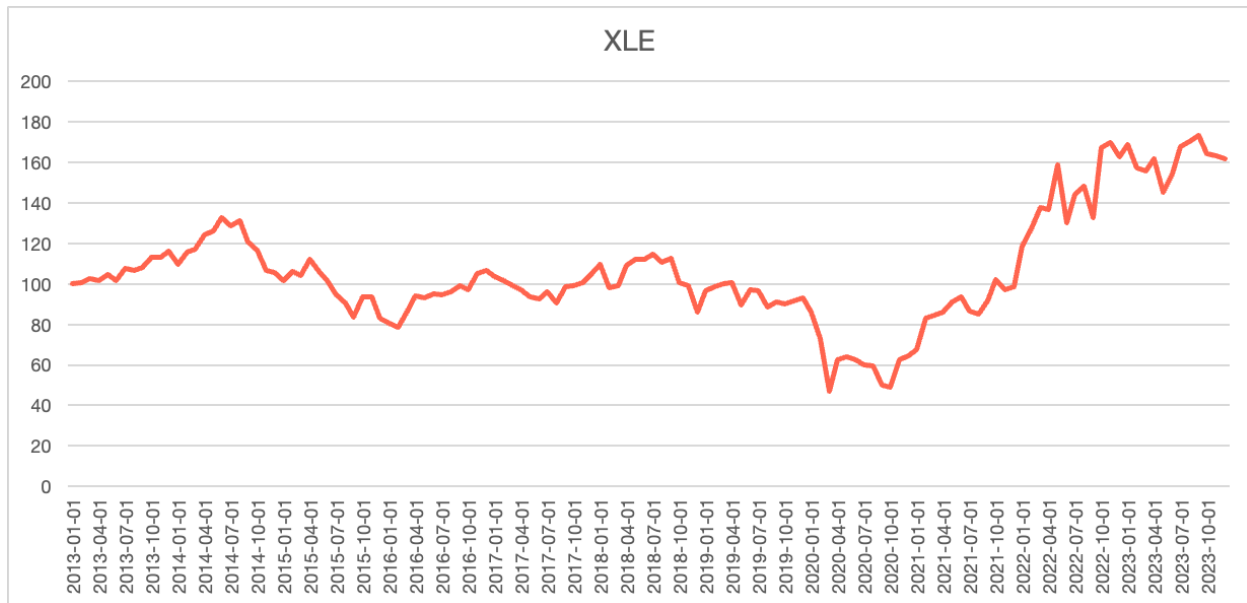
The analysis carried out, shows an overperformance of higher ESG scored companies against those with lower scores. However, this analysis has little to no relevance if there is no relevant benchmark to compare with, as it cannot be concluded if either portfolio beats the market or not. A common benchmark when studying stock performance of companies in the US tends to

be the NASDAQ, which is said to be the index that best tracks the US equity markets as it includes over 5,000 US stocks. Some other popular indexes include S&P 500 for large cap companies, S&P 400 for mid cap, S&P 600 for small cap or NASDAQ-100 for technological companies. In this case, and for the purpose of this study (focusing on oil and gas companies), comparing results to one of the previously mentioned indexes would generate misleading results. For this purpose, as explained previously under the benchmark section, it seems logical to make the comparison with an index that tracks the performance of Oil and Gas companies, in this case the Energy Select Sector SPDR Fund (XLE).

4.2.1. Energy Select Sector SPDR Fund (XLE) performance.

Energy selected sector SPDR Fund (XLE) is a listed fund that serves as the reference in the US O&G industry, as it is a combination of the most important firms in the industry. This fund includes a variety of firms in this niche industry, those that produce, extract, transform or even give service to O&G companies. Large and mid-sized industrial businesses are included in its investment diversification; Exxon Mobil Corporation and Chevron Corporation, which together account for about 23.33% and 16.50% of the fund's weight, are its largest holdings. Schlumberger Limited, ConocoPhillips, and EOG Resources, Inc. are other noteworthy holdings, with weights of around 4.39%, 4.64%, and 9.09%, respectively. A graph showing XLE's stock performance during the course of the study period is shown below, similar to that of P1 and P2.

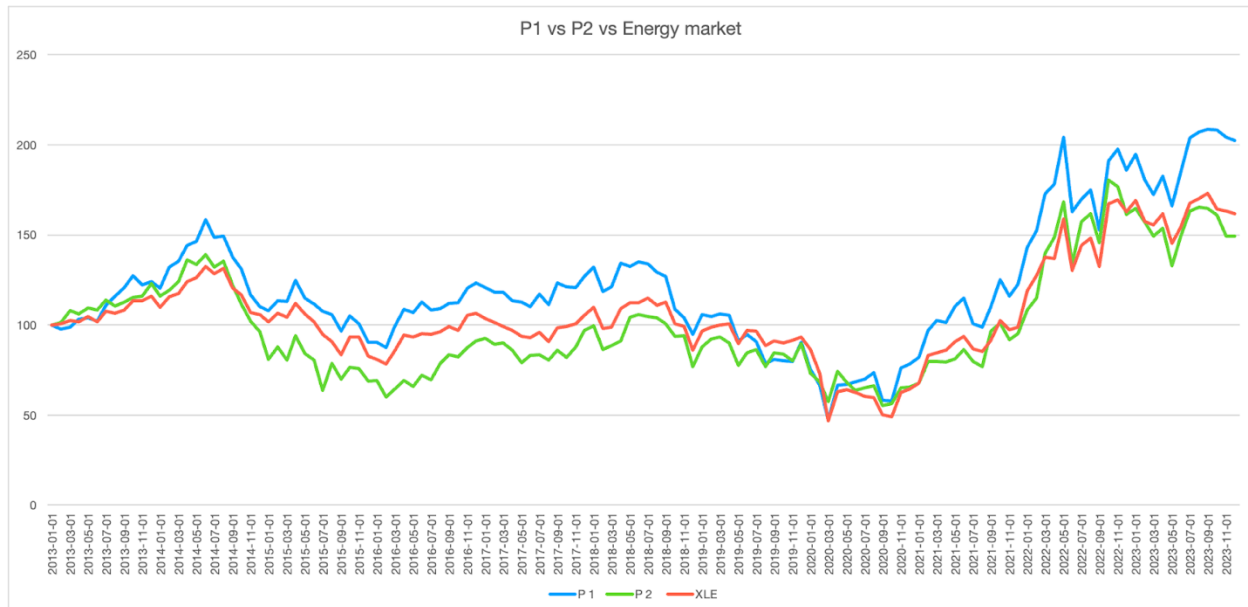
Graph 4: XLE



In the case of an investor that had chosen the XLE ETF as an investment vehicle to expose its portfolio to the energy sector, had he invested \$100 into this ETF in January of 2013, it would have experienced a total return of \$161,74. In other words a 62% return on investment (ROI), or 4.93% Internal Rate of Return (IRR). Taking a deeper look into the performance of this ETF, it could be said that the portfolio has experienced times of positive and negative returns pretty evenly across the board, having broken even for 69 periods, or 52% of the study period time. Finally, if an investor would have known when the max and min were hit by this portfolio, they could have cashed a 269% returns, investing \$46,90 on March 2020, and closing the position on September 2023 at \$173,10.

4.2.2. Benchmark against P1 and P2's performance.

Graph 5: P1, P2 & XLE



The graph shows that Portfolio 1, frequently outperforms the energy market index (XLE). This suggests that higher scoring ESG businesses could be more adept at reducing the risks brought on by the volatility of the sector in addition to outperforming the market as a whole. Nevertheless, based on Portfolio 2's performance it can be said that it frequently performs worse than both XLE and P1. These successes lend support to the idea that ethical ESG practices may boost market stability and financial performance even in environmentally scrutinized industries.

After having understood and put all the graphs into one, we have decided to compute a financial analysis of the results. In this case, three key performance indicators have been computed. On the one hand the golden return for asset management and investors, the buy and hold return (BAH return). These metrics take into account the investment done when a position is opened through the return generated when a position is closed. The Internal Rate of Return (IRR) captures the rate of return generated by an investment, or in other words the annualized rate of return for an investment done in any of these asset classes. Analytically, the higher the IRR the better for an investor. Finally, the excess return captures what extra revenue is generated by an investment compared to the benchmark. Putting things into context, if we were computing a CAPM analysis of an investment, this would be the alpha generated by it. Table 3, shows a summary of the

financial analysis described, showing the results for each calculation for all portfolios, P1, P2 and XLE (Energy market).

Table 3: Financial analysis of performance compared to the energy market

	TOP ESG	LOW ESG	ENERGY MARKET
BAH return	102%	49%	62%
IRR	7,30%	4,08%	4,93%
Excess return	41%	-13%	

The table shows that the TOP ESG (P1) portfolio outperformed the LOW ESG (P2) portfolio and the ENERGY MARKET (XLE) in terms of Buy-And-Hold (BAH) return. P1's higher Internal Rate of Return (IRR) suggests that its sustainable practices, which are reflected in its higher ESG ratings, may contribute to the company's longer-term financial performance. The excess return for P1 illustrates the additional value gathered above and beyond the market benchmark, supporting the idea that investors may achieve superior returns by selecting companies with excellent ESG credentials. However, P2 provides negative excess returns in addition to performing worse than P1, indicating that a disregard for ESG considerations might lead to poor market performance. The energy market's average performance is more consistent with lower ESG ratings, but it still benefits from the contributions of high-ESG companies, as seen by the market's IRR approaching P2.

Putting things into perspective and in the context of the present study of the impact of ESG on stock performance, it could be argued that the data in the table indicates that companies with better ESG ratings (P1) offer stronger long-term returns together with higher risk-adjusted returns (IRR). This lends credence to the theory that morally conscious companies are maybe better at risk management, leading to more stable financial growth. The negative excess return for the low ESG portfolio (P2) suggests that investors may be penalizing companies with poor ESG practices, which might point to a risk premium for these stocks. The Energy Market (XLE) is performing better than P2, but not as well as P1, indicating that ESG factors could be important in determining the financial success of the energy industry. Overall, the data supports the idea that environmental, social, and governance (ESG) aspects are important to investors and that they may have an effect on the value and performance of companies in the energy industry.

4.2.3. Correlation analysis

The final analysis that has been performed with the data is a correlation analysis to study which portfolio is more correlated with the benchmark. In this case, both P1 and P2 have been correlated with the performance of the energy market (XLE). The overall goal of this analysis is to observe which investor undertakes a higher risk return ratio when comparing the financial performance of stocks with that of the industry. In this regard, it is interesting to analyze the Alpha and the Beta generated by both portfolios, as these are the indicators of risk and return according to the financial analysis of stock performance of the widely used and known capital asset pricing model (CAPM).

Table 4: Results table

SUMMARY OUTPUT - P1								
<i>Regression Statistics</i>								
Multiple R	0,970805021							
R Square	0,942462388							
Adjusted R Square	0,942019791							
Standard Error	8,660564803							
Observations	132							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	159715,836	159715,836	2129,391654	1,79337E-82			
Residual	130	9750,699752	75,00538271					
Total	131	169466,5357						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	-13,52984465	3,018132309	-4,482853389	1,59924E-05	-19,50085847	-7,558830828	-19,50085847	-7,558830828
X Variable 1	1,265625176	0,027426938	46,14533188	1,79337E-82	1,211364259	1,319886094	1,211364259	1,319886094
SUMMARY OUTPUT - P2								
<i>Regression Statistics</i>								
Multiple R	0,948121633							
R Square	0,898934632							
Adjusted R Square	0,898157206							
Standard Error	9,787263381							
Observations	132							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	110762,2203	110762,2203	1156,296209	1,46573E-66			
Residual	130	12452,76818	95,7905245					
Total	131	123214,9885						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	-11,69644097	3,410777068	-3,429259882	0,000811358	-18,44425549	-4,948626448	-18,44425549	-4,948626448
X Variable 1	1,053966828	0,030995054	34,00435573	1,46573E-66	0,992646821	1,115286835	0,992646821	1,115286835

Summary Output for P1

The Multiple R value of 0.9708 indicates a particularly significant positive linear link between the portfolio of highly ESG-scored oil and gas businesses and the broader Energy market, as revealed by the regression study. The R Square value of 0.9424, which indicates that a significant 94.24% of the performance variance in the portfolio is explained directly by changes in the market, further supports this link. Since the F-statistic's p-value is getting closer to zero, the model's statistical significance is evident. This high-impact ESG portfolio is very sensitive to market fluctuations; a regression coefficient of 1.2656 indicates that for every unit increase in the market index, the portfolio's returns should rise by 1.2656 units. Finally, when examining the negative intercept, which may falsely imply negative returns when the market index is at zero, it is crucial to take the context into account. Since market indices don't function in such a range, such an interpretation is actually not realistic.

Summary Output for P2

With a Multiple R value of 0.9481, we see a similarly significant positive correlation with the Energy market for the portfolio of low ESG-scored businesses, but slightly less evident than that of its high ESG counterpart. An R Square value of 0.8989, which shows that market trends account for over 90% of the performance variance in this portfolio, clarifies this even further. A very low p-value for the F-statistic confirms the model's relevance once more. With a regression coefficient of 1.0539, the portfolio's susceptibility to market fluctuations is, nonetheless, a little less pronounced. This implies that the returns on the low ESG portfolio should rise by 1.0539 units for every unit upswing in the market, a smaller gain than that seen in the high ESG portfolio. This inconsistent reaction can be a result of the market's propensity to reward strong ESG achievers in this particular industry. Even when the intercept is negative, it usually doesn't represent expected performance and might not be interpretable in a useful way.

Comparative Interpretation

The regression analysis offers interesting insights into the comparison of two oil and gas sector portfolios that are distinguished by their environmental, social, and governance (ESG) ratings. A tendency where investors may be more likely to select firms with strong ESG credentials, especially during market upturns, may be reflected in the high ESG portfolio's

exceptionally sensitive character to market fluctuations. The results of the regression also indicate a somewhat greater connection between the market and the high ESG portfolio, indicating a deeper level of integration between the performance of these firms and the dynamics of the energy sector as a whole.

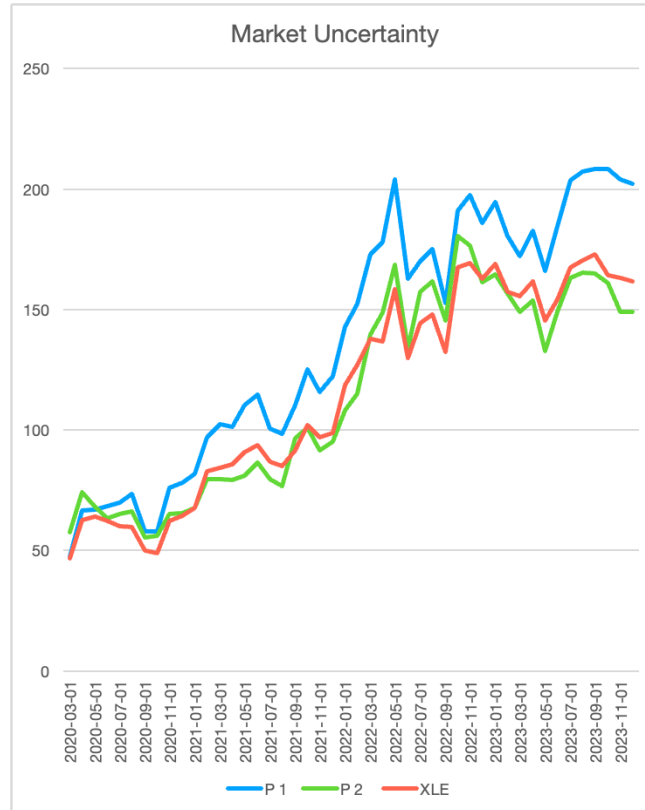
On the other hand, although still showing a strong positive correlation with the market, the low ESG portfolio does not precisely mirror the performance of the market as closely as its high ESG counterpart does. There seems to be a discrepancy in market alignment based on the data. Businesses with better ESG ratings might be perceived as having stronger market performance attributes or as being more aware of current trends. However, it is important to assess these findings with the understanding that they do not always suggest causality. In addition to variables beyond the scope of the model, there can be unanticipated effects and broader market attitudes at play. Furthermore, the negative intercept seen in both models is a normal occurrence in financial modeling and usually does not result in an expected performance metric or a useful forecast.

4.3. Period of market uncertainty (Covid-19)

In order to analyze the performance of ESG ratings on stock performance during market uncertainty, this study has chosen as a case study the effects of the global pandemic of the Covid-19. The purpose of analyzing these effects on stock performance is to use one of the most uncertain months lived by the market to try and understand how stocks in the oil and gas industry performed. Furthermore, being a relatively recent event, it is interesting to use this as a base to shine the spotlight over this concept.

Graph 6: Market Uncertainty

(Performance for the time period 03/2020 - 12/2023)



Graph 6 displays the performance trends of Portfolio 1 (P1), Portfolio 2 (P2), and the Energy Select Sector SPDR Fund (XLE) in the time period between March 2020 and December 2023. Marked by the COVID-19 epidemic and other market volatility periods, this period is crucial to understand market uncertainty.

Portfolio 1, which consistently outperforms both Portfolio 2 and the XLE index, is composed of higher ESG rated companies. The robust performance of this portfolio may be attributed to the persistence of companies that adhere to rigorous environmental, social, and governance standards. These companies are usually better equipped to handle operational challenges and regulatory scrutiny, which can increase investor trust and attract more long-term financing, especially in lean times.

Portfolio 2, on the other hand, has higher volatility and less steady growth due to its lower ESG scores. Numerous variables, such as perhaps increased operational risks and unfavorable public and investor perception, might be to blame for this underperformance. Due to their laxer

governance and greater environmental obligations, companies with lower ESG ratings may find it more difficult to weather market corrections and economic downturns.

Finally, representing a wide spectrum of energy businesses, the XLE index performs moderately, generally moving between the two portfolios. This pattern implies that even while the energy industry is growing generally, the success of individual companies can have a big impact on the index's final result. The modest trajectory of the XLE is also a reflection of the divergent reactions of investors to changes in regulations, varying oil prices, and the trend towards renewable energy sources.

The graph's overall findings indicate that companies with stronger ESG commitments outperform their competitors and may be less susceptible to market downturns; this implies that maintaining high ESG standards might provide a competitive edge.

5. Hypothesis vs results

Having presented and discussed the results drawn by the study, it is time to compare the results to the initial hypothesis drawn in section 3.3. of this paper. The importance of this section is to compare what the qualitative review of previous findings has proven to be true throughout the study.

5.1. Main hypothesis

The paper pivots around the hypothesis proposed that firms in the energy sector (excluding renewables) with higher ESG ratings will likewise outperform their lower-scoring peers on the stock market. The alternative hypothesis (H1) suggested that Portfolio 1 will beat Portfolio 2, contrary to the null hypothesis (H0), which said that Portfolio 1 would perform similarly to or worse than Portfolio 2. The results of the study support H1: Portfolio 1 had a 102% return, which was higher than Portfolio 2's 49% return. This significant variation supports the hypothesis that higher ESG ratings are associated with better stock performance in the non-renewable energy industry.

5.2. Market performance Hypothesis

Using XLE as a benchmark, the second hypothesis investigated Portfolio 1's performance in respect to the larger energy market. According to the null hypothesis, Portfolio 1 should perform

in a sequence where it is equal to or lower than XLE, which should perform similarly or lower than Portfolio 2. On the other hand, the other hypothesis (H2) proposed a ranking in which Portfolio 1 would outperform XLE, which would then outperform Portfolio 2. The findings showed that Portfolio 1 did, in fact, beat XLE, partially supporting H2. Only the first part of H2 was approved since, against expectations, XLE outperformed Portfolio 2.

5.3. Portfolio 1 vs Market performance

The performance of Portfolio 1 in comparison to the XLE was the focus of the third hypothesis. While the alternative hypothesis (H3) predicted that Portfolio 1 would outperform XLE, the null hypothesis (H0) conjectured that Portfolio 1's performance would not surpass XLE's. The findings were favorable to H3, since Portfolio 1 outperformed XLE and demonstrated the market's appreciation of strong ESG standards, indicating that businesses with extensive ESG policies provide more stable and perhaps profitable investment options in the energy industry.

5.4. Market uncertainty Hypothesis

According to the alternative hypotheses (H4) on market uncertainty, Portfolio 1, which consists of companies with higher ESG scores, would perform better during periods of significant market fluctuations, like the COVID-19 pandemic from January 2020 to May 2022, than both Portfolio 2 and the broader energy market represented by XLE. These theories are well supported by the data. The null hypothesis, which said that Portfolio 1 would perform either worse or identically to Portfolio 2, was refuted by the fact that Portfolio 1 continuously beat Portfolio 2, supporting H4. Additionally, Portfolio 1 outperformed XLE in terms of performance, confirming H5 and disproving the null hypothesis that Portfolio 1 wouldn't outperform XLE. These results highlight the tenacity and strong performance of firms with higher ESG ratings in uncertain markets, suggesting that ESG considerations may in fact be crucial in stabilizing returns in unstable environments.

The hypothesis (H5) that firms with better ESG ratings outperform the general market is supported by the examination of Portfolio 1 in comparison to the broader energy market index (XLE) during periods of substantial market volatility. When compared to XLE, Portfolio 1 performed much better over the investigated timeframe, particularly amid significant market volatility. In addition to supporting H5, this continuous outperformance disproves the null

hypothesis (H0), which predicted that Portfolio 1 would perform either less or equally well than XLE. Strong ESG practices may improve stability and performance in times of market volatility, as demonstrated by Portfolio 1's greater returns and resilience.

Overall, the data shown in the study support both H4 and H5, showing that during the period of increased market uncertainty brought on by the COVID-19 outbreak, firms with better ESG scores not only outperformed those with lower scores but also exceeded the performance of the broader market. This validates the initial alternative hypothesis about market uncertainty and implies that higher ESG ratings may contribute to improved resilience and performance in unpredictable market situations.

5.5. Hypothesis results Overview

Overall, and for simplicity reasons, the study findings have been summarized into the following table. The table includes what the initial hypothesis, the main objectives of the posed hypothesis and whether or not the null was rejected or not. As with all statistical analysis, in case that the null has been rejected, the alternate is accepted as real.

Table 5: Hypothesis result summary

Hypothesis	Summary	Result
<p><i>H0: Portfolio 1 ≤ Portfolio 2</i> <i>H1: Portfolio 1 > Portfolio 2</i></p>	<p>Main hypothesis of the study. It analyzes if the high ESG selected stocks outperform the lower ESG scored ones.</p>	Null hypothesis rejected
<p><i>H0: Portfolio 1 ≤ XLE ≤ Portfolio 2</i> <i>H2: Portfolio 1 > XLE > Portfolio 2</i></p>	<p>Study what portfolio outperforms the market. Null suggests that P2 outperforms both the market and the Higher rated ESG companies.</p>	Null hypothesis rejected
<p><i>H0: Portfolio 1 ≤ XLE</i> <i>H3: Portfolio 1 > XLE</i></p>	<p>Analyzing whether or not the higher rated ESG stocks outperform the energy market or not</p>	Null hypothesis rejected
<p>**During market uncertainty (for the time period 03/2020 - 12/2023)**</p>		
<p><i>H0: Portfolio 1 ≤ Portfolio 2</i> <i>H4: Portfolio 1 > Portfolio 2</i></p>	<p>During uncertainty, it is interesting to see if the higher scored ESG stocks outperform those that are ranked lower.</p>	Null hypothesis rejected
<p><i>H0: Portfolio 1 ≤ XLE</i> <i>H5: Portfolio 1 > XLE</i></p>	<p>During uncertainty, it is interesting to observe the performance of highly ESG ranked companies with the market. Do higher ranked companies outperform the market?</p>	Null hypothesis rejected

6. Conclusions

After having completed the literature review, the methodology of the study, the review of the study and having analyzed the study results with the initial hypothesis motivated by the literature review, it is time to draw the main conclusions of the paper. The conclusion of this study, on the relationship between ESG ratings and stock performance in the oil and gas sector, can be that indeed there seems to be a relationship between ESG ratings and the stock performance of oil and gas companies in the stock market. Most probably, this conclusion is relatable to other industries in a greater or smaller measure. Some of the main conclusions that can be drawn from this research paper are explained in this section.

First off, the idea that companies with better ESG ratings often outperform their stock value is supported by a large body of evidence, but there's not much research when it comes to either stock prices over time or the oil and gas industry. However, this was analyzed in this paper, where the tendency was evident throughout the research period, as Portfolio 1 consistently outperformed Portfolio 2. This outcome aligns with the growing comprehension within the financial sector that sustainable practices not only provide ethical outcomes but also carry the possibility of augmenting shareholder profit.

Additionally, the analysis suggests that high ESG rankings might serve as a buffer against market swings. As a branch from the main study, we decided to take advantage of the fact that our selected time included a major economic downturn to analyze how the stocks in the study performed through it. Our findings show that Portfolio 1 had more resilience and stability in periods of economic uncertainty, such as the COVID-19 pandemic, in comparison to Portfolio 2, which had a lower ESG score. This could be an indicator that robust environmental, social, and governance (ESG) procedures may bolster a firm's risk management strategy by boosting investor trust and perhaps increasing consistent long-term returns.

The study also highlights how important ESG considerations are in the oil and gas industry, which is generally perceived as being less environmentally friendly. Despite its negative image, the research suggests that companies may still beat rivals in this industry by improving their ESG performance. Given the tightening laws and continued emphasis on sustainability in the global economy, this is especially crucial at this time. Businesses that proactively adopt and enhance their ESG practices not only fit with global environmental goals, but they also put themselves in a better position to handle new regulations at a time when regulatory restraints are expanding on a

worldwide scale. Compliance with environmental regulations can reduce the risk of financial penalties and operational issues by adopting a proactive approach. Finally, as highlighted by most researchers, better ESG practices may help increase operational efficiency, reduce waste, pollution, energy consumption, and emissions. These upgrades not only help the environment but also the company's bottom line by reducing costs and enhancing the reputation of the brand among stakeholders and consumers.

7. Future research

All in all, this paper brings together a literature review, a methodology study and a case study to explain the relationship between ESG ratings and the performance of oil and gas stocks in the market. Despite having found compelling evidence that this relation does indeed exist and that the findings are backed by scholar's past research and analysis, this might just be a one in case, and may not be applicable to other stocks or industries.

As guidance for future studies trying to find a relationship in this field, we believe it should take a similar approach to test the same methodologies in other sectors to determine whether there is a general association between improved stock performance and higher ESG ratings. Comparative studies would benefit greatly from examining the various environmental impacts and societal expectations of various businesses, such as manufacturing, utilities, and technology. The long-term impacts of ESG ratings on stock performance may also be better understood by employing longitudinal research approaches, especially if more companies and regulatory bodies adopt these standards.

Another line of study could examine the impact of cultural, economic, and regulatory variations on the correlation between ESG ratings and stock performance through the inclusion of firms from several geographic areas that may provide noteworthy discoveries. Furthermore, it may become increasingly important to comprehend how changes in environmental protection, social justice, and corporate governance affect stock performance as governments across the world step up their laws in these areas. Scenario analysis based on legislation proposals may be part of this.

Finally, shifting the focus of the study into the individual aspects that make up the ESG ratings would bring a new idea to the table that can help determine which ESG factors—environmental, social, and governance—have the most impact on stock performance in the oil and gas sector. These results can be expanded upon by additional study on the relationship between

sustainability and financial performance, providing investors and regulators with more detailed instructions. In the end, this could aid in the growth of a more secure and financially viable world economy.

Declaración de Uso de Herramientas de Inteligencia Artificial Generativa en Trabajos Fin de Grado

ADVERTENCIA: Desde la Universidad consideramos que ChatGPT u otras herramientas similares son herramientas muy útiles en la vida académica, aunque su uso queda siempre bajo la responsabilidad del alumno, puesto que las respuestas que proporciona pueden no ser veraces. En este sentido, NO está permitido su uso en la elaboración del Trabajo fin de Grado para generar código porque estas herramientas no son fiables en esa tarea. Aunque el código funcione, no hay garantías de que metodológicamente sea correcto, y es altamente probable que no lo sea.

Por la presente, yo, Pablo Malpartida Lorenzo, estudiante de E2 Bilingüe de la Universidad Pontificia Comillas al presentar mi Trabajo Fin de Grado titulado ESG Ratings and Stock performance in the Oil & Gas industry, declaro que he utilizado la herramienta de Inteligencia Artificial Generativa ChatGPT u otras similares de IAG de código sólo en el contexto de las actividades descritas a continuación:

1. **Brainstorming de ideas de investigación:** Utilizado para idear y esbozar posibles áreas de investigación.
2. **Crítico:** Para encontrar contra-argumentos a una tesis específica que pretendo defender.
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Afirmo que toda la información y contenido presentados en este trabajo son producto de mi investigación y esfuerzo individual, excepto donde se ha indicado lo contrario y se han dado los créditos correspondientes (he incluido las referencias adecuadas en el TFG y he explicitado para que se ha usado ChatGPT u otras herramientas similares). Soy consciente de las implicaciones académicas y éticas de presentar un trabajo no original y acepto las consecuencias de cualquier violación a esta declaración.

Fecha: miércoles 5 de Junio del 2024

Firma: Pablo Malpartida Lorenzo.

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