RELATIONSHIP BETWEEN SUSTAINABILITY AND PROFITABILITY IN THE OIL AND GAS INDUSTRY IN THE EUROPEAN UNION

Bachelor's Project

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Executive Summary

As we are living in a fast-paced world where every aspect of our lives is somehow affected by sustainability and issues related to sustainability, it is certainly an up-to-date topic to study the sustainability of firms and its relationship to other factors of businesses, such as the profitability. Therefore, this research aims to explore the relationship between sustainability and profitability in an industry that is traditionally not considered to be sustainable, which is the oil-and-gas industry with a regional scope in the European Union.

This research paper is meant to study whether the sustainability efforts of the companies are having a positive effect on their profitability and takes into account whether profitability can affect sustainability.

The base for the analysis is a 14-company sample that shows sustainability and financial data for each company for a 7-year period, which results in 98 observations.

Theory showed that the countries' approach to sustainability can be interpreted from their renewable energy share in their total electricity output. Overall, this can have a positive effect on the sustainability of the companies as well.

To see if there is a correlation between the companies' headquarter countries' renewable energy share and the companies sustainability, that is measured by the Refinitiv Eikon's Environment, Social and Governance (ESG) scores, a Spearman correlation was concluded. The result of the analysis showed that the two variables are moderately correlated.

Legitimacy theory showed that, in general, if companies are making sure that they are meeting the needs of society, it can reinforce their financial performance. However there are certain factors, such as greenwashing and the nature of the industry, that can have a diminishing effect profitability.

This theory was tested with a fixed effects panel data regression model, for which the net profit margin (NPM) was used as the dependent variable, and the ESG scores and the

countries' renewable energy shares as the independent variables; however the analysis of this research did not find the sustainability to affect the profitability positively.
A certain interpretation of the institutional theory says that profitability has a reinforcing effect on the sustainability, which was also tested with a fixed effects panel data regression model that confirmed this view.

Even though this research could not specifically explore how can sustainability-focused companies can also achieve financial profitability, it was able to conclude that the countries' level of renewable energy use is positively affecting the companies' sustainability and to confirm that the financially strong years are positively influencing the sustainability efforts of the companies.

With the described findings, this research is contributing to the already existing but limited number of literature that is exploring the relationship between sustainability and profitability in the oil-and-gas industry in the region.

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Introduction

"*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth.*" (UN, 1987, p. 16)

In today's modern era, we face many environmental, social and economic challenges such as global warming, air pollution, fresh and seawater pollution, slow energy transition, food chain problems, water scarcity, poverty, unemployment just to mention a few and the effects can be experienced in one way or another by everyone. (MIT Enterprise Forum CEE)
Sustainability issues therefore not simply related to the environment, even though the biggest focus lays on the environment, as it should be preserved for future generations, but it has effects on countries' and businesses' economic state as well (Ibid.), therefore it is important to research how do certain sectors and the actors in them manage the challenges connected to sustainability in their day-to-day lives.

As the air- and water pollution is one of the biggest issues today along with the slow energy transition and small amount of available renewable energy in general (Ibid.), therefore it is important to study the gas and oil sector in this context as it has a significant effect on the above-mentioned issues. In the industry, oil is causing the bigger environmental pollution, as the management of it in all upstream, midstream and downstream stages releases approximately 2000 tons of chemicals to the air and more than 70 million tons of wastewater into fresh and seawaters yearly, while gas industry releases only ten times less polluted water. (Gossen and Velichkina, 2006, p. 1)

Sustainability and profitability traditionally might seem to be opposite approaches when it comes to "doing business": sustainability is "*based on a holistic perspective, multi-dimensional goals and a long-term view, accepting the impacts of business activities on people*

and the planet" (Bedenik, 2018, p. 4), while profitability "*encompasses a mono-dimensional perspective, monetary goals and a short term view, ignoring the consequences for society and the environment*". (Bedenik, 2018, p. 4)

Because of the above-mentioned challenges, there is a growing effort on the side of companies' – including companies in the oil-and-gas industry as well – to increase the social and environmental sustainability in their businesses, however it is not always evident whether it has an impact on the business itself or no. (Turletti, 2022) Also, because of the traditional opposing view on profitability versus sustainability, some businesses have a hard time acknowledging that sustainable production and operations can be more cost-effective and more profitable, than a classic arrangement. (Haanaes et al., 2013)

Besides the above-mentioned problems and reasons, it is further important to study this topic because of its current relevance, since the European Union is implementing its new European Sustainability Reporting Standards, which means that from 2024 and 2025 large companies, depending on their employee size or financial performance and from 2026 small and medium sized companies will all have to report their ESG sustainability scores. (Worldfavor)

1.1 Problem statement

Many studies were made around the globe in different industries trying to research the connection between financial profitability and sustainability, however not many of these were made with a focus on the oil-and-gas industry, moreover there is no unanimous result that these studies could agree on. (Bodhanwala and Bodhanwala, 2018) In today's revenue-driven world when humanity is facing a growing number of sustainability challenges, it is inevitable to study whether sustainability efforts could bring a possible benefit or moreover an advantage to the companies in an industry that has a significant effect on several sustainability issues related to the environment.

1.2 Questions

Research question: How can companies in the European Union's oil-and-gas industry with a high emphasis on sustainability also ensure long-term financial profits?

The below working questions were created with the aim that they are helping to answer the research question and they are helping to explore the relationship between profitability and sustainability in the industry.

Working question I: Are the companies' ESG scores and the companies' headquarter countries' renewable energy shares correlated?

With working question I, I aim to explore whether the countries' renewable energy shares in their total electricity output can positively affect the ESG scores, therefore it might be an indicator for the sustainability approach of the whole country where the company is. (Kaupke and Knyphausen-Auseß, 2022)

Working question II: Does the ESG results along with the headquarter countries' renewable energy share have a significant effect on the profitability of the companies?

Working question II was designed to be the main analysis question that helps to answer the research question, as it focuses on whether the ESG scores combined with the renewable energy share percentages are affecting the profitability of the companies.

Working question III: Does the profitability of the companies have a significant effect on their ESG scores?

Working question III is designed to explore the reverse relationship to see whether the profitability of the companies can have effect on the sustainability efforts of the companies.

I aim to answer the research question based on the statistical analyses that were created for the working questions, for which I used sustainability scores and financial data from the Refinitiv Eikon Datastream database.

1.3 Limitations and delimitations

1.3.1 Limitations

The bachelor's project has some set limitations in its time and length: I had a three-month timespan from 1st of February 2023, until 1st of May 2023, to finish the project and the length could not reach 110 000 characters as described in the course description.

I used the Refinitiv Eikon ESG Database for my quantitative analysis, which although listed 193 companies in the oil-and-gas industry in the European region, however this had to be reduced to companies that have headquarters in the European Union and to companies that have ESG and financial data available for the whole observation period, which resulted in 14 companies with data for 7 years, that makes the sample size 98, which - due to the lack of available ESG scores - might not be a representative sample size.

Another limitation of the study is that there was not many preceding research in this topic in the studied industry and region before, therefore I had to rely on researches that were studying different sectors.

1.3.2 Delimitations

First of all, I decided to study the relation between the oil-and-gas industry companies' sustainability and profitability in the European Union as there were not much preliminary research on the topic in this region before.

I chose to do quantitative research, due to the fact that the analysis of the research is based on statistical data and analyses.

For the time spam of the data collection, I decided to collect data from 2015 until 2021 as at the United Nations General Assembly in 2015 September the 2030 Agenda for Sustainable Development was signed by many countries worldwide. (European Commission)

1.4 Disposition

The below disposition table helps the reader by providing a visual overview of the whole structure of the research paper:

Introduction (1)	Problem statement
	Questions
	Limitations and delimitations
	Disposition
Literature review (2)	Corporate social responsibility and profitability
	Corporate environmental performance and profitability
Methodology (3)	Research philosophy
	Research approach
	Research design and strategy
	Data collection and analysis
	Validity, reliability and representativity
Theory (4)	Legitimacy theory
	Institutional theory
	Renewable energy share
Empricial chapter (5)	The data and sample selection
	The variables
	Table of variables
	Descriptives and visual presentations
	The hypotheses
Analysis and discussion (6)	Analysis
	Discussion
Conclusion (7)	Conclusion
	Future research

Table 1: Disposition

2 Literature review

In this section I am presenting several peer-reviewed articles that are evaluating the relationship between corporate social responsibility and profitability, and corporate environmental performance and profitability to have an overview of the discussions in the studied topic.

2.1 Corporate social responsibility and profitability

An important thing when it comes to evaluating the sustainability efforts and actions of a company is studying the company's corporate social responsibility (CSR) agenda – as it contributes to the social factor of sustainability – and also its relationship with the company's financial performance.

A traditional-view question regarding social corporate responsibility is that is it necessary and worthy for organizations to take into consideration different demands regarding social matters? (van Beurden and Gössling, 2008) While there was a debate on this issue, today it is not a question that companies and organizations are under a pressure to correspond to demands from activists and society in ethical issues (Waddock, 2004), according to Wu (2002) some companies are already very considerate about corporate business ethics and put efforts into issues such as corporate management and vision or democratic behaviour. (p. 174) According to Friedman (2007) firms originally were only liable for financial performance development to increase profits.

There are several interpretations of what is corporate social responsibility and what are companies and managers obligated to do, such as accountability beyond the organization's financial performance (Gössling and Vocht, 2007), either a company's commitment to *"behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large"* (Holme and Watts, 2000, p. 8), or *'the social responsibility of business encompasses the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time.''* (Carroll, 1979, p. 500).

CSR has three different levels that all have different fundamentals: on the institutional level, legitimacy; on the organizational level public responsibility and on the individual level managerial discretion. (Wood, 1991, p. 694) According to Beurden and Gössling (2008) while CSR is not a measurable variable, corporate social performance (CSP) is used to apply CSR in real life and Waddock and Graves (1997) are stating that through different approaches, it can be measured. At the same time, a firm's economic achievements can be also measured through the corporate financial performance (CFP) (Orlitzky et al., 2003), which also shows a difference "*between market-based measures of CFP and accounting-based measures of CFP*" (Beurden and Gössling, 2008, p. 411). Based on van Beurden and Gössling's meta-analysis that reviews the literature found on the relationship between CSP and CFP, mostly there is a positive relationship between CFP and CSP at companies, however the industry itself, research and development, and risk have a significant influence on the actual relationship. (van Beurden and Gössling, 2008)

According to Malik (2015) corporate social responsibility "*plays a significant role in enhancing firm value by promoting employee productivity, ensuring better operating performance, expanding the product market, improving capital market benefits, building a corporate reputation, and strengthening a firm's relationship with the society, regulators and other stakeholders.*" (p. 15) CSR can play a strategic role and can be mobilized as a strategic tool to boost the firm value by aligning corporate targets with social targets. (Malik, 2015)

2.2 Corporate environmental performance and profitability

It is further important to study the corporate environmental performance (CEP) in itself and also its connection to profitability, as CEP helps to understand the environmental factor of sustainability.

Hang et al. (2019) states that several previous studies showed that there is a quick-growing relationship between corporate financial performance and corporate environmental performance, however there are several aspects of this relationship that can and should be

studied, such as whether the environmental performance affects the financial performance or vice versa or whether there is a bidirectional relationship.

In the 1950s the effect of corporate environmental performance on corporate financial performance was described as a trade-off relationship by Levitt (1958), meaning that companies' actions focusing on employee welfare and environmental development would require financial investments, however the financial investments would not worth it, as the firms main goal should be profit maximization. (Levitt, 1958)

According to Hang et al. (2019) a few decades back, companies had to choose an approach when it came to the future of their business, which was between investing into a profitable firm or investing into a responsible firm. And *"conversely, the creation of additional value is the single social corporate responsibility"* (Hang et al., 2019, p. 3)

Etsy and Porter (1998) found that a firm level environmental performance has a positive effect on the efficiency and profitability and it can help managers to find profitable future possibilities internally and externally as well and the environmental performance cannot be unseen.

Another important thing to mention is that according to Branco and Rodrigues (2006) companies are seeing a competitive advantage in corporate social responsibility and by investing into CSR they believe to gain internal benefits, just like external benefits that are among others, giving the company a good reputation in the public eye.

Another theory that represents the positive effect CEP has on CFP is the instrumental stakeholder theory. Davis (1973) is arguing in his study about the advantages and disadvantages of social responsibility, that companies have to try putting more effort into a wide range of social goods, because the community demands that. He states that those companies who are most receptive and responsive to the expectations of the community, are contributing to the wellness of the society, hence they are operating in a better community, where everyday tasks will be easier, and issues will be solved. This also leads to the concept

of long-run profit maximization, because through investing into social matters companies can gain a better place and can gain higher profits. (Davis, 1973)

According to the managerial opportunism hypothesis, the CFP has a negative effect on CEP based on that most managers are driven by the goal of reaching their own targets, however it is not necessarily the same target what the different stakeholders have. This can cause inefficiencies in the company. However, a possible solution to this is linking the compensation of the managers to the CEP of the company. (Hang et al, 2019)

"…when a firm performs well, managers tend to increase their own income by reducing environmental investments, which we expect to affect CEP in the long run. Apart from that, managers may expand corporate environmental expenditures to compensate bad corporate performance […]. These effects might especially occur in the short term, if a firm suffers unexpected bad business results." (Hang et al., 2019, p. 4)

According to Preston and O'Bannon (1997) and Hang et al. (2019) investing slack resources to environmental changes and developments could also let the company to gain a long-term financial profitability, however if the slack resources are only available for a short time period, then it is a limitation to the long-term development, even if the company wants a change.

According to Hang et al. (2019) *"in the short term (1 year), financial resources can increase a firm's environmental performance"* (p. 12), however these positive effects are not discoverable in long-term and contrarily, the CFP is not affected by CEP on short-term, so it can be stated that the *"causality between environmental performance and financial performance depends on the time horizon."* (p. 12) They also found that the relation between companies environmental and financial performance is a significantly smaller importance in case of reactive environmental investments. (Hang et al., 2019)

3 Methodology

3.1 Research philosophy

Ontology studies the nature of the reality around us and it is done through raising questions regarding the way the world and things around us are moving and working. (Saunders et al., 2012, p. 130). The ontological approach of this study is objectivism, as the actors – in this case the companies – in the social settings are independent of other social actors and they are existing in reality aside from those other actors. (Saunders et al., 2012, p. 131)

Epistemology is focusing on establishing the acceptable knowledge in a certain field or topic (Saunders et al., 2012, p. 132), this is done through post positivism in this research, which is meant to be questioning the traditionally accepted knowledge and truth and in post positivism the causes are determining the outcomes. (Creswell, 2009, pp. 6-7). Creswell (2009) articulated the essence of post positivism the following way: *"The knowledge that develops through a postpositivist lens is based on careful observation and measurement of the objective reality that exists "out there" in the world. Thus, developing numeric measures of observations and studying the behaviour of individuals becomes paramount for a post-positivist."* (p. 7)

3.2 Research approach

Due to the nature of the quantitative analysis, the research approach of this project is a deductive analysis, as first a relevant theory was researched and explained, then based on the theory a strategy was created and the data was tested. (Saunders et al., 2012)

"It involves the development of a theory that is then subjected to a rigorous test through a series of propositions. As such, it is the dominant research approach in the natural sciences, where laws present the basis of explanation, allow the anticipation of phenomena, predict their occurrence and therefore permit them to be controlled." (Saunders et al., 2012, p. 145)

3.3 Research design and strategy

The characteristic of the research is quantitative study which focuses on the variables and their relationships with each other. For this it is important to have clearly formed working questions that can be answered by the chosen statistical analyses. (Saunders et al., 2012)

Within the quantitative field, it is a cross-sectional and longitudinal study, since it is measuring several variables that might be related to each other over a seven-year time period (Leedy and Ormrod, 2015) and through these variables and the given time period this research aims to explore the relationship between the variables and answer the research question through statistical analyses.

It is also important to mention that Kaupke and Knyphausen-Auseß's "*Sustainability and firm value in the oil and gas industry—A vicious circle?*" article from 2022 served as an inspirational base for this research, since they were studying a similar topic in the same industry with somewhat different variables, in a different region and different time span.

3.4 Data collection, sampling and analysis

3.4.1 Data collection

I used Refinitiv Eikon Datastream database to retrieve sustainability and financial data of companies, which is an open technology platform that provides data from several-hundred sources in many different topics, such as analytics, market data or sustainability indexes. (Refinitiv)

The starting point for retrieving the sample is the companies in the oil-and-gas industry in the chosen region, therefore first, in the Refinitiv Eikon Datastream database the search criteria for the industry was set to "Oil, Gas & Consumable Fuels" and to Europe, which resulted in 61 companies, however it contained companies that were in the "Coal and Consumable Fuels" sub-industry, therefore another selection was done, where the the "Integrated Oil & Gas", "Oil & Gas Storage & Transportation", "Oil & Gas Refining & Marketing" or "Oil & Gas Exploration & Production" sub-industries were chosen to match the industry with the scope

of this research. Furthermore, since the regional scope of the study is the European Union, I further eliminated non-EU countries in the European region.

After the elimination of the non-relevant sub-industry and non-EU countries, the dataset contained 30 companies and the next criteria was that all of these companies had to have available ESG scores for the 2015 – 2021 time period, since the chosen time period for the observation started in 2015, since the United Nations General Assembly's 2030 Agenda for Sustainable Development was signed this year (European Commission), as it was explained in the Delimitations section and ended in 2021 due most data was available until this point.

For some companies ESG measurements started later in time, or some did not have scores for more recent years, therefore these had to be eliminated.
The next step was to compare the companies with available ESG scores for the whole observed period with the companies that has all the available financial data – net operating income and net sales – for net profit margin computation, which resulted in further elimination, which gave the final result of 14 companies.

For all 14 companies there were ESG scores and net profit margin ratios available for 7 years, which resulted in 98 observations.

Another important data was the renewable energy percentage of the headquarter companies' total electricity output. To access these, first, I had to find the headquarter countries of the companies in the dataset. These were available in the retrieved Refinitiv Eikon Datastream dataset, so based on that I could find the renewable energy share of the countries' total electricity output. I used the countries' individual energy information page on Enerdata's website to access the detailed energy share values for each year in the observation's timeframe.

The final dataset can be found in Appendix 1 and the list of the companies with their relevant countries can be found in Appendix 2.

3.4.2 Data sampling

The statistical tests were done on the whole dataset that was reached after the necessary elimination process, therefore there was no actual sampling done before doing the analysis.

For this the reason was that currently it is not mandatory for companies to report their ESG scores in the European Union, but from 2024 there will be changes in the reporting requirements – as explained in the introduction – and in a few years all companies have to report these scores. (Worldfavor) Since it is not mandatory, most probably many companies do not report their ESG scores currently, therefore it is assumed that there are several other companies in the European Union that are operating in the oil-and gas industry. Therefore, the dataset from the Refinitiv Eikon Datastream database is considered to be the result of a simple random sampling, where *"every member of the population has an equal chance of being selected"* (Leedy and Ormrod, 2015, p. 179) and it can be argued that in this case every company had the right to report its ESG scores and to make them available in the used database.

3.4.3 Data analysis

For the analysis I used correlational statistics and inferential statistical procedure – one non-parametric statistics and two parametric statistics, out of which the second means that the computations are working with numerical data and assuming that the dataset is from a normally distributed population. (Leedy and Ormrod, 2015) (Saunders et al, 2012, p. 510) – namely a Spearman correlation test and two Fixed Effects regression models. Furthermore, these were a cross-country firm level analyses on a panel dataset, as this type of analysis is an interesting and important tool that gives insight into a whole industry in a given region. (Bartelsman et al., 2009)

With the chosen tests I aimed to answer Working question I, II and III.

Spearman correlation

With Spearman correlation test I aimed to answer working question I. as it was used to identify whether there is a correlation between two variables: the companies ESG scores and the companies' headquarter countries' renewable energy share.

Spearman rank correlation is the non-parametric and distribution-free alternative of the Pearson correlation, that is measuring the strength of the correlation between two ranked variables between -1 and 1, -1 shows a perfect negative correlation and 1 shows a perfect positive correlation. (Xiao et al, 2015) (Sedgwick, 2018) In theory, *"Spearman's correlation coefficient is simply a special case of Pearson's coefficient under the situation that the samples are converted into ranks before doing the correlation coefficient calculations"* (Xiao et al, 2015, p. 4) Spearman correlation does not have assumptions regarding the distribution and the linear relationship of the observed studied variables, and it is not measured on an interval scale. (Xiao et al, 2015)

The Spearman correlation coefficient formula is (Keller, 2009):

$$r_s = \frac{s_{sb}}{s_a s_b}$$

Equation 1: Spearman correlation coefficient

Where:
a and b are respectively the ranks of x and y
S_{ab} is the covariance of a and b
S_a is the standard deviation of a
S_b is the standard deviation of b
(Keller, 2009, p. 803)

For the Spearman correlation computation, I used the IBM SPSS statistics software.

Fixed Effects regression

With the Fixed Effects model that was used for the panel data regression analysis, I aimed to answer working question II. and working question III.

On the panel data only a few regression analysis models could have been used, Pooled OLS model, however it does not take into account the firms' heterogeneity, therefore I did not choose this model and there was also the Fixed Effects or Random Effects model. To know which one works better for my dataset I ran the Hausman test on EViews statistics software and the result was the Fixed Effects model. (Stock and Watson, 2020) (Verbeek,2004) (Xu et al., 2007)

The Fixed Effects Regression method is used when there are two or more observations for every entity and it takes into account the heterogeneity of the firms in the dataset and it controls for the unobserved variables *"when the omitted variables vary across entities (states) but do not change over time"*. (Stock and Watson, 2020, p. 367) This model has "n" intercepts, one for each entity, in this case, one for each company and the binary variables for these intercepts are containing the effects of all the omitted variables that are differing between entities, but not between time. (Stock and Watson, 2020, p. 367)

With the least square dummy variables approach the Fixed Effects regression model can also be developed, by using dummy variables for the companies, that are the binary variables. The dummy variable equals 1, when i=1, and equals 0 otherwise, so for company 1 dummy variable 1 (D1) = 1 and for all other companies it is zero. There cannot be a dummy variable for all companies plus the common intercept because it would lead to perfect multicollinearity, which is the dummy variable trap, therefore one dummy variable should be eliminated, in this case for the 14 companies 13 dummy variables should be included. (Verbeek, 2004) (Stock and Watson, 2020)

The formula for Fixed Effects Regression model with least square dummy variables approach, written in terms of common intercepts is the following (Stock and Watson, 2020):

$$Y_{it} = \beta_0 + \beta_1 x_{1,it} + \cdots + \beta_k x_{k,it} + \gamma_2 D2_i + \gamma_3 D3_i + \cdots + \gamma_n Dn_i + u_{it}$$

Equation 2: Fixed Effects Least Square Variables regression model

where $\beta_0, \beta_{1,}, \gamma_2, \dots, \gamma_n$ are unknown coefficients to be estimated (Stock and Watson, 2020, p. 368) and u_{it} is the idiosyncratic error.

Assumptions are the following (Stock and Watson, 2020, pp. 374-375):

1. *"error term has conditional mean 0 given all T values of X for that entity"*
2. *"the variables for one entity are distributed identically to, but independently of, the variables for another entity "*
3. *"large outliers are unlikely"*
4. *"there is no perfect multicollinearity"*

One of the standard errors for the fixed effects regression is autocorrelation, that means that error terms correlated over time, and it can be tested with the Durbin-Watson test and the other one is heteroskedasticity, which means that the variance of the error term is not constant and this can be tested with the Breusch-Pagan test. (Stock and Watson, 2020) (Verbeek, 2004) (Keller, 2009)

For the Hausman test I used the EViews statistics software and for the regression analyses, standard errors, and assumptions the RStudio statistics software was used.

Statistical significance level

The statistical significance level is set to 5% (α = 0.05) throughout the whole research, which means that this is the amount of type I (false rejection of H_0) error that the analysis is accepting. (Thiese et al., 2016)

3.5 Validity, reliability and representativity

3.5.1 Validity

Construct validity *"refers to the extent to which your measurement questions actually measure the presence of those constructs you intended them to measure".* (Saunders et al.,

2012, p. 193) This research has construct validity because all working questions were formed in a way to explore the relationship between the measured variables and to be able to confirm or reject the theoretical background.

Internal validity is *"the extent to which the findings can be attributed to the interventions rather than any flaws in your research design".* (Saunders et al., 2012, p. 176) Even though not all assumptions were met for the regression models in the analysis, these models were still the best fit for the dataset based on the lack of certain factors of a different model and based on a test that helps to decide which model is the best for the dataset (explained in section 3.4.3), therefore the results of the models are representing the truth for the sample.

External validity is referring to whether the findings of the research can be relevant in case of a different sample. (Saunders et al., 2012, p. 194) Based on the confliction between the theory findings and the results of the research, I assume that the results of this research can be generalized only to a certain extent. It was geographically located in the European Union, but a previous research that was focusing on a different region had different conclusions, therefore for a larger sample in a different region it cannot be generalized, however it is most probably due to the nature of the industry and to the local regulations.

3.5.2 Reliability

Reliability of a study *"refers to whether your data collection techniques and analytic procedures would produce consistent findings if they were repeated on another occasion or if they were replicated by a different researcher".* (Saunders et al., 2012, p. 192)

Referring to the above quote, the reliability of this research was secured by relying on sourcing data from a database that is available for many researchers, which is the Refinitiv Eikon Datastream database and in case of following the steps of the explanation of the data selection and using the same correlation and regression analysis techniques and models as this study, the same results would be presented in case of a different researcher would like to replicate the study.

3.5.4 Representativity

At this section it is important to mention that one of the bases for the representativeness of the research is the representativeness of sample, because a different sample used for the analysis might bring a different result. (Saunders et al., 2012, p. 281)

The sample used in this research has a very small size due to the availability of the data that was explained in section 3.4.1, as it has a sample size of 98 observation, which is still acceptable for the regression analysis, but a bigger sample size would provide a better representativeness, especially if the aim is to have conclusions for the whole industry worldwide. The representativity of the research is questionable, since its results are not aligned with findings from previous researches, that were done on a larger dataset and in larger region, therefore it leads to questions, whether these differences are based on the differences of the regions or on the differences of the sample size.

4 Theory

In the theory section I aim to present all the relevant knowledge of the relationship between sustainability and firm value that I will later use in the analysis section.
Throughout several peer-reviewed articles I have read about the relationship between sustainability and firm value, all authors went back to the same few numbers of ideas that are essentially the foundations of every current discussion when it comes to sustainability.

4.1 Legitimacy theory

"Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." (Suchman, 1995, p. 574)

Suchman (1995) is arguing that even though companies sometimes do not follow the society's beaten path, they can still maintain their legitimacy because their actions are overlooked or not perceived as outrageous. Also, if a firm is perceived as legitim, their consumers are very likely to return for their goods and services, because they see the company as more trustworthy, and this can bring persistence to the company. (Suchman, 1995)

According to Gavancha and Paiva (2020) the legitimacy theory means that *"companies disclose social responsibility information to present a socially responsible image so that they can legitimize their behaviours to their stakeholder groups"*. (p. 13) The base of the legitimacy theory is that between the company and the community there is a "social contract" and the community lets the company to live and to have rights and for this, as an exchange the community demands the company to achieve their expectations regarding how they conduct their operations. (Gavancha and Paiva, 2020, p. 13) *"In order to survive, a company must ensure that the activities it undertakes are actually in accordance with the values and norms of society or are perceived as such."* (Gavancha and Paiva, 2020, p. 13) Otherwise if the company's actions are not meeting the community's needs and expectations, then the "*company's current or perceived behaviour is not in accordance with social values and norms,*

a breach of contract exists, and a legitimacy gap may develop." (Gavancha and Paiva, 2020, p. 13)

According to the legitimacy theory if the business is not meeting the demands of the society and their operations are not socially accepted, they put their future financial profitability at a high risk. (Martens and Bui, 2023, p. 10) Also, if companies decide to share their social actions in their yearly statements, it can be result in a legitimization by the society. (Martens and Bui, 2023, p. 10) In accordance with that *"corporations would increase their environmental disclosures if they explained or justified environmentally irresponsible conduct".* (Martens and Bui, 2023, p. 10)

"Environmental information included in the annual report may also assist managers in shaping public opinion. The majority of research indicates that when managers believe their legitimacy is threatened to the point of jeopardizing the organization's success, the legitimacy theory will recommend corrective actions basedon the information to be disclosed." (Martens and Bui, 2023, pp. 10-11)

Therefore, an important aspect of the legitimacy theory is the strategic approach of organizational legitimacy. This approach sees the concept of legitimacy as a possible resource that can be used strategically in the companies' operations, many times as a competitive force, to achieve its own goals. (Suchman, 1995) It is assumed that managers have a great influence and control in this legitimation process, which can lead to *"conflicts between managers and constituents over the form of legitimation activities, with managers favoring the flexibility and economy of symbolism, whereas constituents prefer more substantive responses"* (Suchman, 1995, p. 576)

According to Suchman (1995) every company faces challenges, starting by the fact that there are such a wide range of different people in the audience they have to please, it is impossible to completely satisfy everyone. (p. 585) Moreover, *"no manager can completely step outside of the belief system that renders the organization plausible to himself or herself, as well as to others"* (Suchman, 1995, p. 585)

4.1.1 Legitimacy theory and greenwashing

As we could see above the strategic approach of legitimacy gives some type of freedom and control to the managers in terms using it as a resource, therefore it is important to note, that *"social and environmental disclosures are generally made for strategic reasons having little or nothing to do with perceived responsibilities or obligations"*. (Laufer, 2003, p. 255)

According to Laufer (2003) some organizations are trying to use this strategic resource as a tool to repair negative public image, which is considered as greenwashing. (p. 253) *"[a]lthough an increasing number of corporations publish environmental and health and safety reports, many are simply token efforts – greenwashing – and few address the full range of social issues necessary to assess adequately a corporation's behaviour"*. (Lydenberg, 2002 in Laufer, 2003, p. 253)

4.1.2 Legitimacy theory and controversial industries

Companies in the oil-and-gas industry are often perceived as controversial by the public as they have a negative impact on the environment as mentioned in the introduction. Oh et al. (2016) states that "sinful" companies are using CSR advertising and the above-mentioned strategic resource to balance their negative image, however this can negatively influence the performance of the company due to the nature of the company.

"In sinful firms, advertising, especially paying attention to CSR activities, generates misaligned fit between their good deeds and their stigmatized negative image, and reinforces the ambivalence toward sinful firms." (Oh et al., 2016, p. 15)

4.1.3 Conclusion

The legitimacy theory is based on the social contract between the company and the community, where the community allows the company to operate and to have its rights, but in exchange it expects the company to operate within the socially accepted norms and limits and the company's profitability highly relies on the society's acceptance. (Gavancha and Paiva, 2020) (Martens and Bui, 2023) Managers however can strategize legitimacy by

controlling the shown efforts (Suchman, 1995), many times to fix existing problems and negative perceptions from the public and by this they are greenwashing the company, but it has the risk of screening which would also negatively impact the company. (Laufer, 2003) Another issue can be that controversial industries might not be perceived as legitim due to their nature and their CSR activities may also not receive good reaction from the public. (Oh et al., 2016)

4.2 Institutional theory

According to Meyer and Rowan (1977) institutional myths are generated and accepted to make the legitimacy of the institution effective and these are the essence and drivers of institutions. *"But many myths also have official legitimacy based on legal mandates. Societies that, through nation building and state formation, have developed rational-legal orders are especially prone to give collective (legal) authority to institutions which legitimate particular organizational structures."* (Meyer and Rowan, 1977, p. 347)

Kaupke and Knyphausen-Auseß (2022) are arguing that Meyer and Rowan's institutional theory "*can be interpreted as arguing that in times of solid financial performance, companies do not feel the need to invest in sustainability."* (p. 4) They also argue that the reason for this might be that companies are not feeling a pressure from the competitors, because they are not following such actions either, therefore there are no competitive threat or mimetic pressure to do so. (Kaupke and Knyphausen-Auseß, 2022, p. 4)

4.3 Renewable energy share

"Although the sustainability topic more and more seems to be a worldwide concern, promoted, inter alia, by the United Nations' Sustainable Development Goals, there are still considerable differences in how people in different countries and cultures perceive the severity of this topic". (Kaupke and Knyphausen-Auseß, 2022, p. 5)

According to Kaupke and Knyphausen-Auseß (2022) the renewable percentage in the total electricity output of a country can provide not just a substitution possibility for traditional energy sources, like oil and gas, but also can give an insight to the country's overall attitude

towards all kind of energy sources. (p. 5) Also, *"it has been shown at firm level that different attention-related factors moderate or mediate the relationship between sustainability and financial performance"* (Kaupke and Knyphausen-Auseß, 2022, p. 5), therefore it is important to measure not just the of the companies' own sustainability efforts, but also the headquarter countries' attitude towards energy, because it could also imply the countries' view on sustainability in energy as well. (Kaupke and Knyphausen-Auseß, 2022, p. 5)

5 Empirical chapter

In the empirical chapter I am going to present the data and the sample selection process, and the variables that will be used later in the analysis to discover the relationship between sustainability and profitability in the oil-and-gas industry and at the end, the hypotheses that were created to help answering the working questions.

5.1 The data and sample selection

In this section I am giving an explanation on where I found the data for my analysis and what was the selection process for both the samples that I am going to use.

The sample for my analysis is based on observational panel data and it covers a 7-year period, between 2015 and 2021.

To measure sustainability, I used the Refinitiv Eikon ESG scores, which stands for Environmental, Social and Governance and it is used as a standardized sustainability criteria that helps professionals with sustainable investment decisions. (Refinitiv) (Kaupke and Knyphausen-Auseß, 2022, p. 6)

To measure profitability, I used net profit margin ratios, since these show a company's profitability. (Mahdi and Khaddafi, 2020) For computing the ratios I used the net income and net sales data from Refinitiv Eikon.

Each company's headquarter country's renewable energy share data is from the Enerdata database, and eventually I used 11 countries' renewable energy share data. (Enerdata)

As previously explained in the Methodology chapter, I arrived to 98 observations after the necessary eliminations, that is presented visually in the below figure:

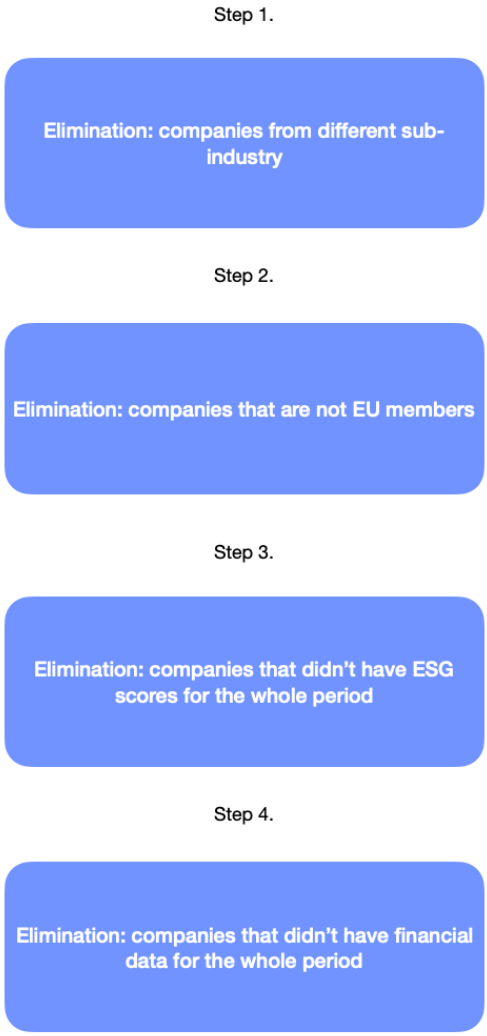

Figure 1: Data elimination process

5.2 The variables

In this section I am going to present all the variables that will be used in the analysis chapter and where it is applicable, I will also present how the variable is calculated.

5.2.1 Net Profit Margin ratios of the companies

Net profit margin measures the profitability which is the main focus of this research in relation with the sustainability. It is shown as “NPM” in the dataset.

The ratio of the net profit margin shows a firm's financial profitability and by this, it helps investors to decide whether it is worth it to invest in a company or not. (Mahdi and Khaddafi, 2020) The ratio of the net profit margin shows "*how much percentage of net profit earned from each sale*". (Mahdi and Khaddafi, 2020, p. 155) A greater net profit margin ratio means that a firm has a higher chance at achieving a greater profit. (Mahdi and Khaddafi, 2020)

The net profit margin ratio is calculated with the below formula (Riyanto, 1999 in Mahdi and Khaddafi, 2020):

$$Net\ Profit\ Margin = \frac{Net\ Operating\ Income}{Net\ Sale} * 100\%$$

Equation 3: Net Profit Margin

For the net profit margin, the net operating income and the net sale values were accessed from Refinitiv Eikon Datastream for the whole 2015-2021 period, and they were calculated in Excel based on the above formula.

5.2.2 ESG scores of the companies

ESG scores are serving as discrete variables and they are measuring companies environmental, social and governance performance in a comparable way (Refinitiv), therefore it is a great measure of sustainability as it shows scores for the pillars of sustainability that can be interpreted as the ecologically, humanly, and economically healthy way of existence. (UCLA Sustainability)

Refinitiv ESG scores are "*designed to transparently and objectively measure a company's relative ESG performance, commitment and effectiveness across 10 main themes (emissions, environmental product innovation, human rights, shareholders, etc.) based on publicly-reported data".* (Refinitiv) The ESG scores *"measures the company's ESG performance based on verifiable reported data in the public domain"*. (Refinitv) ESG scores have three main categories: Environmental, Social and Governance, all main categories have sub-categories, 10 in all, and the overall ESG scores are calculated based on the 10 category weights. (Refinitiv)

ESG scores can be between 0 and 100 and they are interpreted based on the below table:

Score range	Description	
0 - 25	1st quartile	*"Scores within this range indicates poor relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly."*
> 25 - 50	2nd quartile	*"Scores within this range indicates satisfactory relative ESG performance and moderate degree of transparency in reporting material ESG data publicly."*
> 50 - 75	3rd quartile	*"Scores within this range indicates good relative ESG performance and above average degree of transparency in reporting material ESG data publicly."*
> 75 - 100	4th quartile	*"Score within this range indicates excellent relative ESG performance and high degree of transparency in reporting material ESG data publicly."*

Table 2: ESG score range (Refinitiv)

A criticism towards ESG ratings in general is that certain biases are appearing at all agencies, when it comes to data and these are the geography and the company size, and this can result in favoring larger or multi-national companies. (LaBella et al., 2019, p. 4)

The dataset contains the overall ESG scores of 14 companies for the 2015-2021, 7-year period and they are defined as "ESG" in the dataset.

5.2.3 Countries' renewable energy share

After selecting the companies with available ESG scores and net profit margin ratios, it was important to find the renewable share percentage of the countries where the 14 companies are in Europe. The 14 companies are headquartered in 11 countries and for all 11 countries there are available renewable energy share percentages for the whole 7-year period.

The countries' renewable energy share is serving as a discrete variable in the analysis. The data was collected from Enerdata for the whole 2015-2021 period.
The renewable energy share shows the renewable percentage in the countries' total electricity production. (Enerdata)

Using each company's headquarter country's renewable energy percentage as an additional independent variable can give depth and additional control to the analysis and through this the cross-country firm level industry analysis has a control variable.

5.2.4 Dummy variables for random effects model

Dummy variables were created and used for the Fixed Effects Regression analysis with least square dummy variable estimator, which might not be attractive because of the high number of regressors. (Verbeek, 2004, p. 345.)

The dummy variables are binary variables and they are coded to either 1 or to 0. The dummy variables in the analysis are helping to consider the individuality and difference between the companies, because the model accounts for heterogeneity. (Okoroafor et al., 2020, p. 36)
To avoid the dummy variable trap (Baltagi, 2005), 13 dummy variables were made for the 14 companies and company 14 serves as a reference category. The dummy variables are appearing in the dataset as it is shown in the Table of variables (D1-D13).

5.3 Table of variables

name of the variable	name in the dataset	type of the variable	source	description
Net Profit Margin	NPM	ratio	Refinitiv Eikon+own calculation	see section 5.2.1
ESG score	ESG	scale	Refinitiv Eikon	see section 5.2.2
Renewable Share Percentage	REP	ratio	Enerdata	see section 5.2.3
Dummy variables for FEM	D1-D13	nominal	created for regression analysis	see section 5.2.4

Table 3: Variable names and sources

5.5 Descriptive presentation of the variables

In this section I am presenting the exact details of the variables that were found during the data selection and that are going to be used through the analysis.

5.5.1 Net Profit Margin

Net profit margin is calculated based on the equation in the 5.2.1 section. The sample contains 14 companies' financial results for 7 years each, therefore it has 98 values.

Net Profit Margin sample	
Mean	-3,6726531
Standard Error	4,39907311
Median	4,46
Mode	7,6
Standard Deviation	43,548602
Sample Variance	1896,48074
Kurtosis	29,2350477
Skewness	-5,0193128
Range	352,9
Minimum	-307,31
Maximum	45,59
Sum	-359,92
Count	98

Table 4: Descriptives of NPM (NPM value is in %)

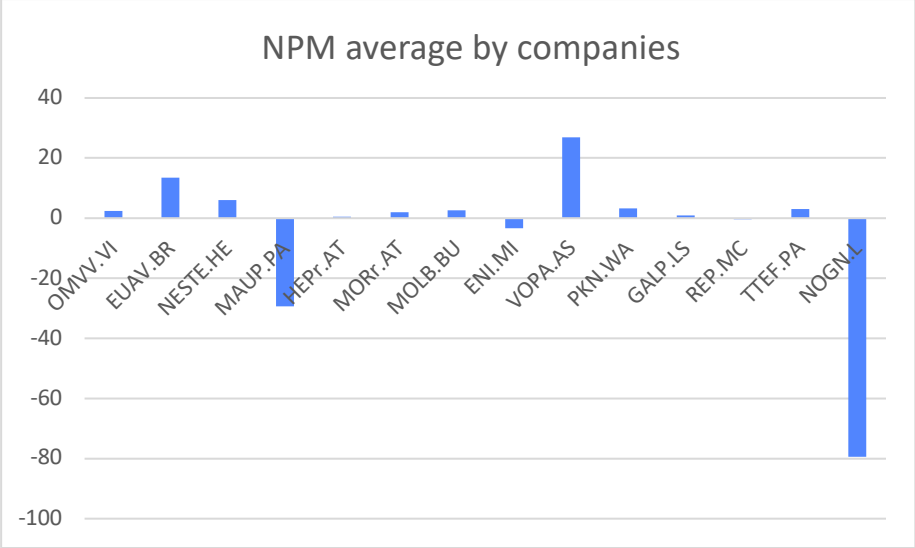

Figure 2: NPM average ratios by companies (NPM value is in %)

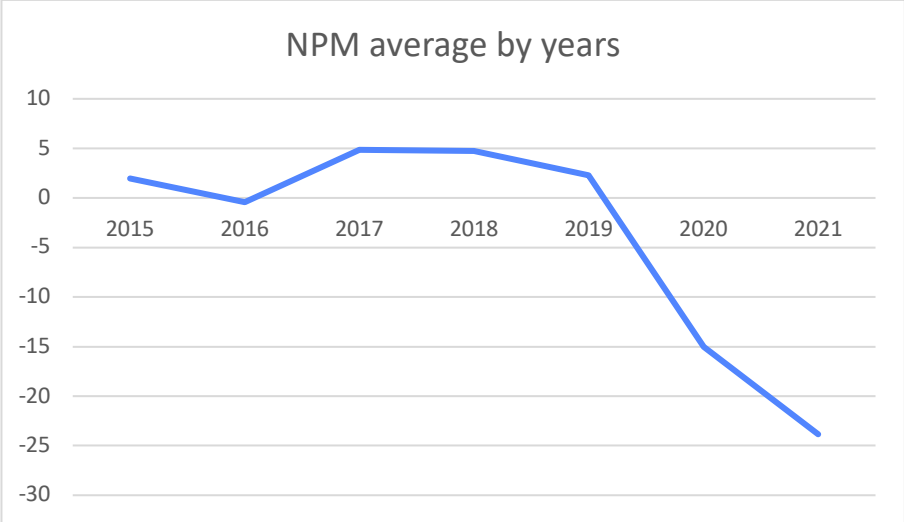

Figure 3: NPM average ratios by years (NPM value is in %)

Since I am working with a large panel dataset, the best visual representation can be achieved if I present the net profit margin by averaging the data, even though the range of the values is very high, as it can be seen in the descriptive statistics of NPM table, it is 352, 9, by having a minimum value of -307,31 and a maximum value of 45,59, but for this reason I decided to break it down to averaging the sample separately by companies and also by years for the graphical presentation. Another reason for this is because during the analysis the whole sample is used, therefore the results might be better explained with an overview of the whole sample, rather than with individual company presentation when it comes to visually performing the data.

It can be seen in the “NPM average ratios by companies” figure, that some companies have very high profitability ratios, while most of them have much lower values, which along with the extremely high variance, which is 1896,48, with the high standard deviation, which is 43,55 and the negative mean, that is -3,67 might bring insignificance to the model.
The “NPM Average ratios by years” figure also shows a high variance between the years.

5.5.2 ESG scores

The sample of ESG scores contains 14 companies, that has ESG score results for the 2015-2021, 7-year period, therefore the sample contains 98 values.

ESG sample	
Mean	65,345102
Standard Error	1,66230116
Median	67,775
Mode	#N/A
Standard Deviation	16,4559419
Sample Variance	270,798023
Kurtosis	0,33346995
Skewness	-0,7738254
Range	74,9
Minimum	15,11
Maximum	90,01
Sum	6403,82
Count	98

Table 5: Descriptives of ESG scores

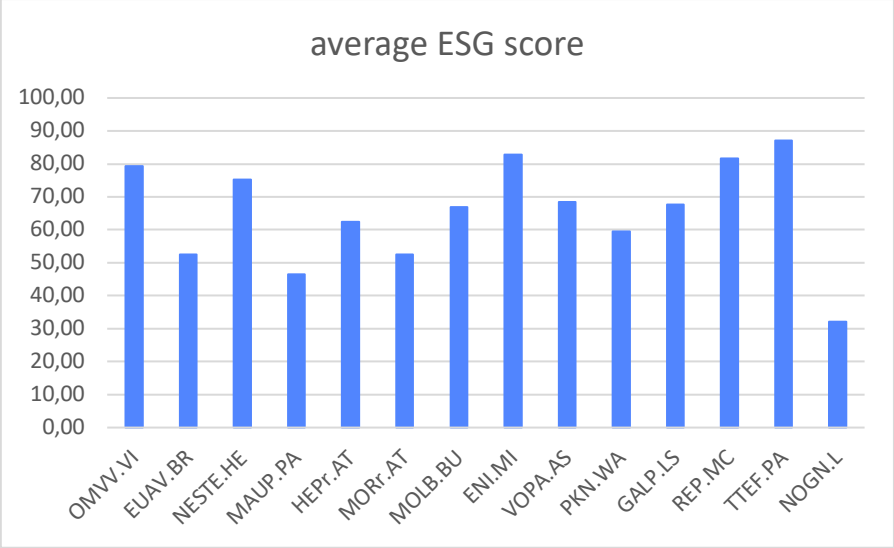

Figure 4: Average ESG scores of companies

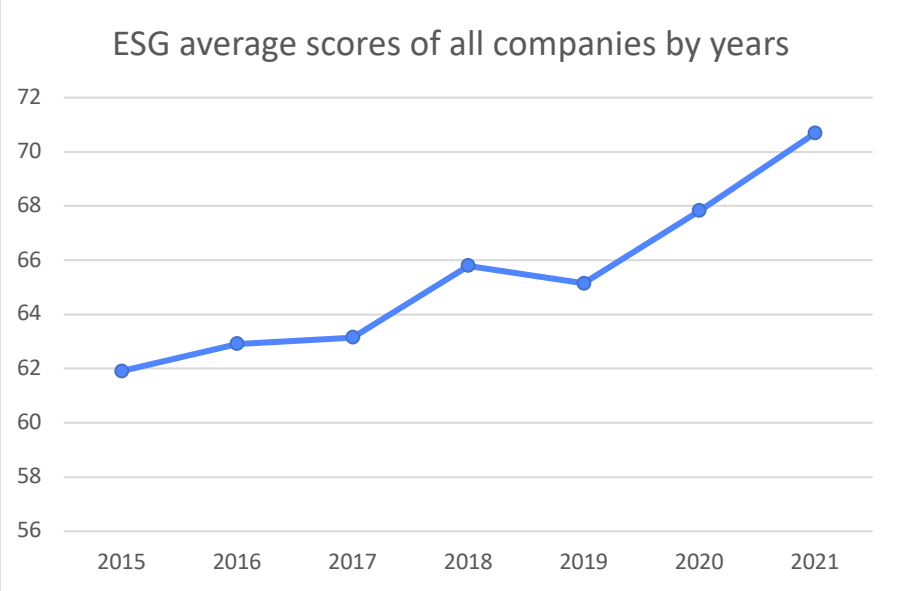

Figure 5: Average ESG scores of all companies by years

For the same reasons as in case of the net profit margin's visual representation, I decided to present the ESG score samples by averaging them by companies and also by years. It can be seen on the "Average ESG scores of companies" figure, that there is a high variance between companies' ESG result averages, so it serves as an interesting base for the analysis, to see whether they are related to the profitability of the same companies.

On the "Average ESG scores by years" figure it can be observed that companies' ESG scores in general are showing a growing tendency in the 2015-2021 period.

The range of the values is 74,9, which is not even close as high as in case of the net profit margin, however the ESG scores can give values between 0 and 100 and after taking that into consideration, it is clearly a high value. The minimum value a company got is 15,11 and the maximum is 90,01, while the mean for the whole sample is 65,35. The ESG score sample also has a high standard deviation, as it is 16,46.

5.5.3 Renewable energy shares

The sample for the companies' headquarter countries' renewable energy share (in their total electricity output) contains data for 11 countries for the whole 2015-2021 period.
In the sample, the results of the companies are the following: 1 in Austria, 1 in Belgium, 1 in Spain, 1 in Finland, 2 in France, 2 in Greece, 1 in Hungary, 1 in Italy, 2 in the Netherlands, 1 in Poland and 1 in Portugal.

Renewable energy share of countries share	
Mean	34,6054545
Standard Error	2,22861401
Median	32,88
Mode	27,4
Standard Deviation	19,5560086
Sample Variance	382,437472
Kurtosis	0,08093205
Skewness	0,88786654
Range	70,79
Minimum	10,21
Maximum	81
Sum	2664,62
Count	77

Table 6: Descriptives of renewable shares of countries (Renewable share values are in %)

On the "Renewable energy shares of headquarter countries (Enerdata)" table the exact percentages of each country's renewable energy share can be seen for every year in the observation. It can be noticed that Austria has relatively high percentages of renewable energy output, while countries like Hungary and Poland have very low percentages of renewables in their total electricity output. It is also an important thing to note, that most countries are showing a growth in their electricity output between 2015 and 2021.

The data sample contains 77 values, with a high range as it is 70,79, between the minimum and maximum values, which are respectively 10,21% and 81%. The renewable electricity of the countries sample also has a high standard deviation, 19,56 and the mean of the sample is 34,61.

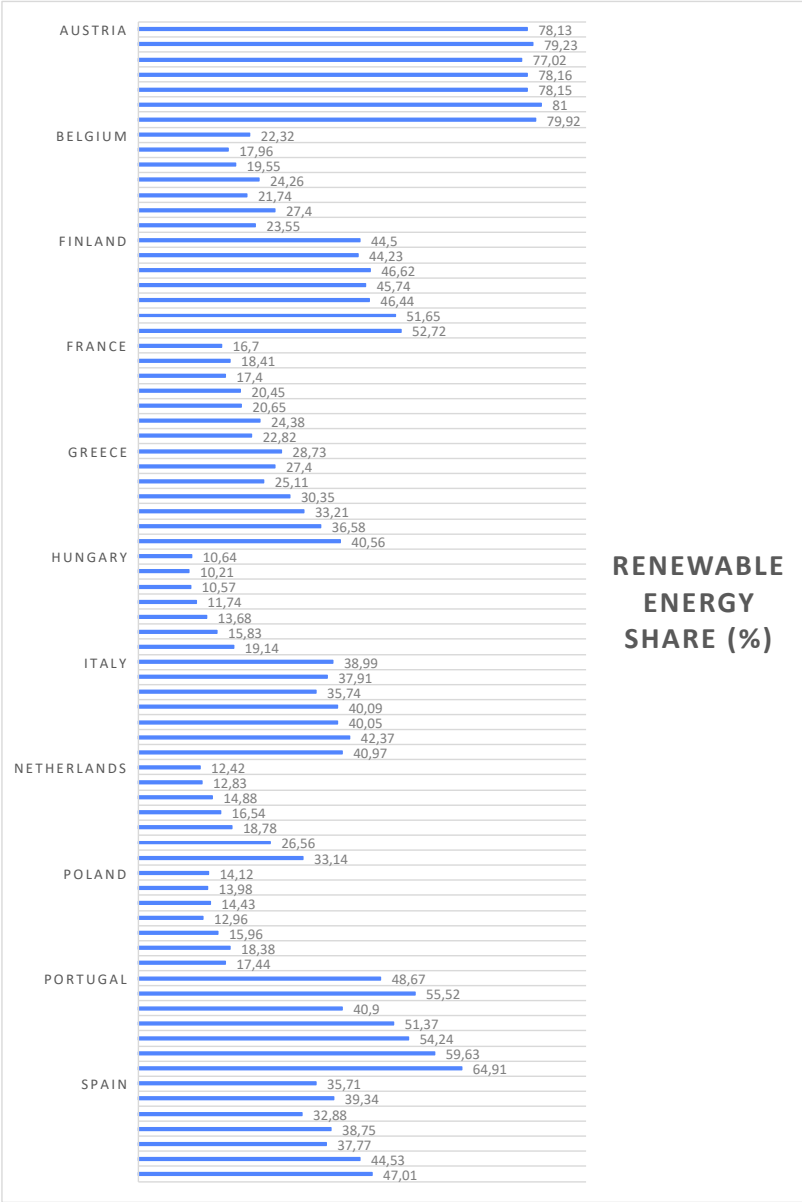

Figure 6: Renewable energy shares of headquarter countries (Enerdata) (values are in %)

5.6 The hypotheses

I aim to answer the working questions with the results of the below hypotheses, therefore they were created in a way to satisfy this purpose.

5.6.1 Hypothesis I

According to theory chapter 4.3 the renewable energy output of each company's headquarter country can have an effect on the ESG score of the companies. (Kaupke and Knyphausen-Auseß, 2022) To see whether there is a correlation between the two variables, the below hypothesis was made that can help answering the first working question.

Working question I: Are the companies' ESG scores and the companies' headquarter countries' renewable energy shares correlated?

H_0: There is no correlation between the ESG scores and the companies' headquarter countries' renewable energy shares.
H_1: There is a correlation between the ESG scores and the companies' headquarter countries' renewable energy shares.

5.6.2 Hypothesis II

In the theory chapter 4.1 the importance of firm legitimacy was introduced, however there are certain sustainability-related issues that can reduce the legitimacy of a company, such as greenwashing (Laufer, 2003) or the nature of the industry (Oh et al, 2016) and these can lead to possible lower profitability (Gavancha and Paiva, 2020). Furthermore, the effect of the firms' headquarter countries' renewable energy output (theory chapter 4.3) also can have an effect on profitability since it can be an indicator to the countries' attitude towards energy sectors (Kaupke and Knyphausen-Auseß, 2022).

To see whether sustainability, for which ESG is used as a measure and the renewable electricity share of the headquarter countries' have a significant effect on the profitability (net profit margin), the below working question and hypothesis were created:

Working question II: Does the ESG results along with the headquarter countries' renewable energy share have a significant effect on the profitability of the companies?

H_0: The ESG scores and the renewable energy shares do not have a significant effect on the net profit margin (profitability).
H_1: The ESG scores and the renewable energy shares have a significant effect on net profit margin (profitability).

5.6.3 Hypothesis III

Regarding the institutional theory in theory chapter 4.2, it was briefly introduced that a possible interpretation of the institutional theory is that in financially strong years, firms do not feel the pressure to invest into profitability (Kaupke and Knyphausen-Auseß, 2022).

To see whether it is true and the profitability can also have an effect on the ESG scores, the below hypothesis is created to help answering Working question III: Does the profitability of the companies have a significant effect on their ESG scores?

H_0: The NPM does not have a significant effect on the ESG scores of the companies.
H_1: The NPM has a significant effect on the ESG scores of the companies.

6 Analysis and discussion

6.1 Analysis

In this section I am going to analyze the data that was presented in the empirical chapter through two types of statistical models which were done with different statistical software.

6.1.1 Spearman correlation

To be able see the possible correlation between the ESG scores of companies and the renewable energy shares of the companies' headquarter countries, Spearman correlation test was used, because the measurable variables – ESG scores and renewable energy shares – in the dataset did not fit with the Pearson correlation's assumptions (Keller, 2009), for example the linear relationship between the variables, that was acknowledged after the visual presentation of the two variables in a q-q plot (Appendix 3).

Due to the large sample size, the test was concluded in the IBM SPSS statistics software and the results are the following:

Correlations				
			ESG	REP
Spearman's rho	ESG	Correlation Coefficient	1,000	.438**
		Sig. (2-tailed)		0,000
		N	98	98
	REP	Correlation Coefficient	.438**	1,000
		Sig. (2-tailed)	0,000	
		N	98	98
****. Correlation is significant at the 0.01 level (2-tailed).**				

Table 7: Spearman correlation output in SPSS (IBM SPSS); p-value < 0.05

In the correlation output "ESG" stands for the ESG score and "REP" stands for the renewable energy share and at the "N" it can be seen that the correlation was tested on 98 pairs of variables.

The correlation coefficient is 1 at the ESG-ESG section and at the REP-REP section, clearly because they are perfectly correlated with themselves. However, what is important for the working question I. and the first hypothesis is whether there is a correlation between the ESG scores and the renewable energy shares. The Spearman's rho in the ESG-REP section gives answer to this, which is 0.438, which shows a moderately positive correlation between the two variables, as it can be between -1 and 1 (Xiao et al, 2015) and since the p-value ("Sig." in the output) is lower, than 5%, the correlation coefficient is statistically significant.

The correlation between the variables is visually presented below:

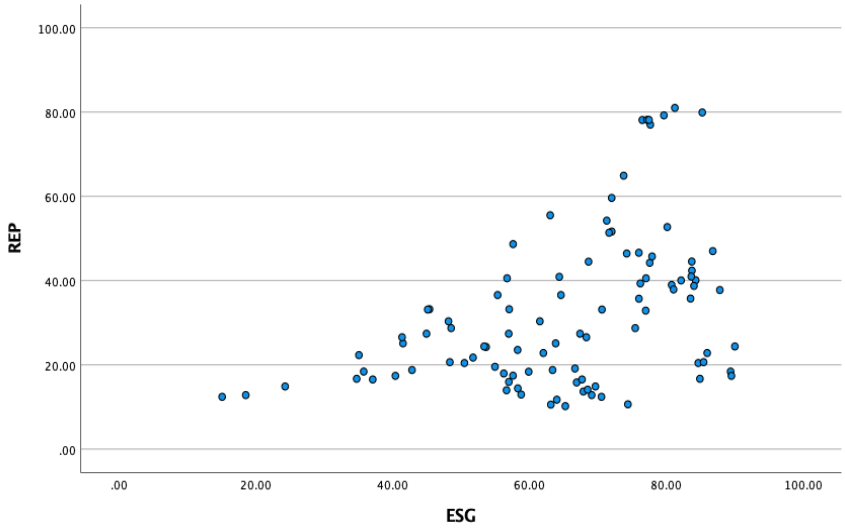

Figure 7: Spearman correlation scatter plot in SPSS (IBM SPSS)

With the above-described results, it is now possible to evaluate Working question I and Hypothesis I.

As it can be seen in the Spearman correlation output table and in the explained results, r = 0,438, which is higher value, than 0, therefore H_1 is being accepted. Therefore, it can be stated that there is a moderately positive correlation between the ESG scores and the headquarter companies' renewable energy shares.

6.1.2 Fixed effects regression I

With the analysis of the fixed effects dummy variables regression, in this section I aim to answer working question II: Does the ESG results along with the headquarter countries' renewable energy of share have a significant effect on the profitability of the companies?

As it was described in the methodology chapter, for the panel dataset that was retrieved from Refinitiv Eikon Datastream database, the fixed effects regression model with dummy variable approach was chosen to be done, as the pooled OLS panel data regression model does not count for the heterogeneity of the variables and based on the Hausman test's result, the fixed effects regression model is a better fit for the dataset, than the random effects regression model.

The Hausman test was done with the Eviews statistics software, and the output can be found below:

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	14.555606	2	0.0007

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
ESG	-0.015166	0.003888	0.000031	0.0006
REP	-0.130728	-0.062893	0.784205	0.9389

Cross-section random effects test equation:
Dependent Variable: NPM
Method: Panel Least Squares
Date: 04/26/23 Time: 16:56
Sample: 2015 2021
Periods included: 7
Cross-sections included: 14
Total panel (balanced) observations: 98

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.996478	0.409712	2.432144	0.0172
ESG	-0.015166	0.006534	-2.321004	0.0228
REP	-0.130728	0.942237	-0.138742	0.8900

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.368938	Mean dependent var	-0.036702
Adjusted R-squared	0.253500	S.D. dependent var	0.435487
S.E. of regression	0.376262	Akaike info criterion	1.031219
Sum squared resid	11.60898	Schwarz criterion	1.453255
Log likelihood	-34.52975	Hannan-Quinn criter.	1.201924
F-statistic	3.195976	Durbin-Watson stat	2.222252
Prob(F-statistic)	0.000371		

Figure 8: Hausman test 1 (Eviews)

It can be seen at the "Effects Specification" section, that the test found the fixed effects dummy variable method better for the dataset, therefore this model was used for the analysis.

Standard errors

The regression model was tested for autocorrelation with the Durbin – Watson test in the RStudio studio software and the output of the test can be seen below:

```
        Durbin-Watson test for serial correlation in panel models

data:  NPM ~ ESG + REP + factor(company)
DW = 2.1332, p-value = 0.2088
alternative hypothesis: serial correlation in idiosyncratic errors
```

Figure 9: Output for Durbin Watson test for regression 1 (RStudio)

Hypothesis for the Durbin – Watson test:

$$H_0: there\ is\ no\ autocorrelation\ in\ the\ model\ (p > 0.05)$$
$$H_{1:}\ there\ is\ autocoreelation\ in\ the\ model\ (p \leq 0.05)$$

The p-value is 0.2088, which it is higher, than the significance level, which is 0.05, there for H_0 is accepted, which means that there is no autocorrelation in the model.

The regression model was also tested with the Breusch-Pagan test for heteroscedasticity in the RStudio software and the output is the following:

```
        Breusch-Pagan test

data:  NPM ~ ESG + REP + factor(company)
BP = 320.07, df = 15, p-value < 2.2e-16
```

Figure 10: Output for Breusch-Pagan test for regression 1 (RStudio)

Hypothesis for the Breusch – Pagan test:

$$H_0: error\ term\ is\ constant, there\ is\ homoscedasticity\ \ (p > 0.05)$$

$$H_{1:}\ error\ term\ is\ no\ constant, there\ is\ heteroscedasticity\ (p \leq 0.05)$$

The p-value is 0.00000000000000022, which is lower, than the significance level, which is 0.05, therefore it is assumed that there is heteroscedasticity in the error term of the model, so H_1 is accepted. However, heteroscedasticity does not cause biased ordinary least squares (OLS) estimators, it still means that the standard errors are incorrect, therefore the White standard errors should be used to control for the standard errors. (Stock and Watson, 2020) (Verbeek, 2004)

Assumptions

Some of the assumptions that were described in the methodology chapter were not met, such as assumption 3, that large outliers are unlikely, since scatter plots were created with RStudio for the relationship of NPM and ESG, and for NPM and REP and both had a few outliers as it can be seen below:

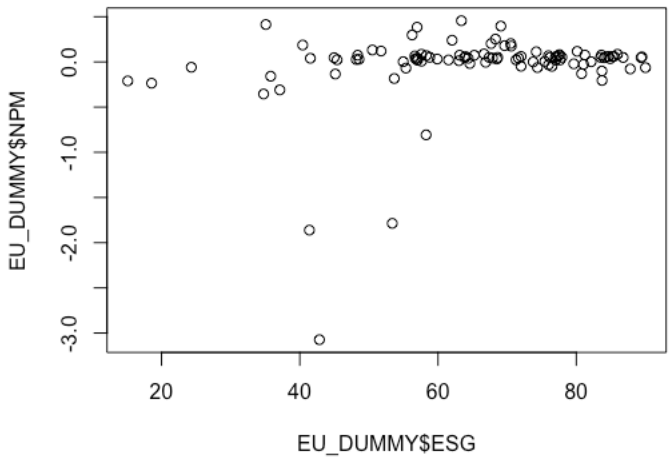

Figure 11: Outliers NPM-ESG (RStudio)

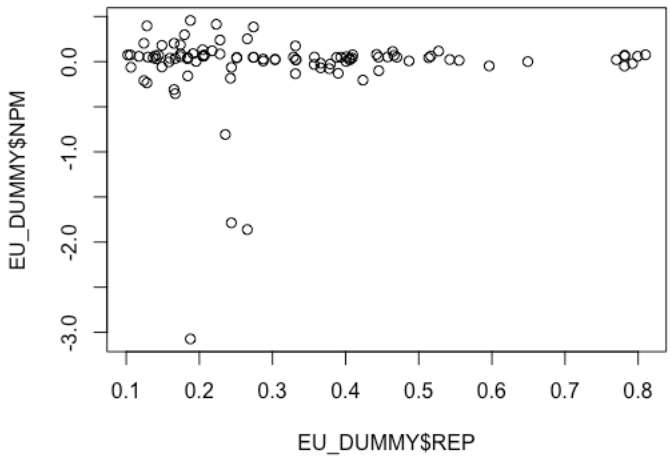

Figure 12: Outliers for REP-NPM (RStudio)

Furthermore, assumption 4 is also not true, because the model showed multicollinearity, which was tested with variance inflation factors (VIF), where the VIF values were higher, than 5, which indicates multicollinearity (Daoud, 2017), the output of the VIF calculation from RStudio can be found in below:

```
                      GVIF Df GVIF^(1/(2*Df))
ESG               7.921365  1        2.814492
REP              20.245222  1        4.499469
factor(company) 107.226516 13        1.196985
```

Figure 13: VIF for multicollinearity 1 (RStudio)

However, assumption 1 is true, as all relevant regressors were used in the model, although there might be underlying regressors that are not obvious at this point or cannot be measured. Assumption 2 is also true, because the dataset used in the model is based on random sampling.

Result

```
Residuals:
     Min       1Q   Median       3Q      Max
-2.07011 -0.05831  0.00047  0.09411  0.92288

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             1.280904   0.531923   2.408   0.0183 *
ESG                    -0.015166   0.006534  -2.321   0.0228 *
REP                    -0.130728   0.942237  -0.139   0.8900
factor(company)EUAV.BR -0.423854   0.280946  -1.509   0.1352
factor(company)GALP.LS -0.173170   0.280893  -0.616   0.5393
factor(company)HEPr.AT -0.276107   0.235032  -1.175   0.2435
factor(company)MAUP.PA -0.788047   0.306218  -2.573   0.0119 *
factor(company)MOLB.BU -0.210884   0.302131  -0.698   0.4872
factor(company)MORr.AT -0.413148   0.268192  -1.540   0.1273
factor(company)NESTE.HE -0.001061   0.227132  -0.005   0.9963
factor(company)NOGN.L  -1.609636   0.365574  -4.403 3.19e-05 ***
factor(company)OMVV.VI  0.055814   0.430678   0.130   0.8972
factor(company)PKN.WA  -0.304617   0.293833  -1.037   0.3029
factor(company)REP.MC   0.006654   0.201245   0.033   0.9737
factor(company)TTEF.PA  0.106944   0.280712   0.381   0.7042
factor(company)VOPA.AS  0.049147   0.265305   0.185   0.8535
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.3763 on 82 degrees of freedom
Multiple R-squared:  0.3689,    Adjusted R-squared:  0.2535
F-statistic: 3.196 on 15 and 82 DF,  p-value: 0.0003707
```

Figure 14: Original regression output for Hypothesis II (RStudio), p-value < 0.05

```
t test of coefficients:

                         Estimate Std. Error t value Pr(>|t|)
(Intercept)             1.2809038  0.7252984  1.7660  0.08111 .
ESG                    -0.0151655  0.0089285 -1.6986  0.09319 .
REP                    -0.1307280  0.8804175 -0.1485  0.88233
factor(company)EUAV.BR -0.4238537  0.3200087 -1.3245  0.18901
factor(company)GALP.LS -0.1731701  0.2133435 -0.8117  0.41932
factor(company)HEPr.AT -0.2761066  0.1849128 -1.4932  0.13923
factor(company)MAUP.PA -0.7880466  0.4784626 -1.6470  0.10338
factor(company)MOLB.BU -0.2108836  0.2391193 -0.8819  0.38040
factor(company)MORr.AT -0.4131478  0.2794530 -1.4784  0.14313
factor(company)NESTE.HE -0.0010607  0.1197481 -0.0089  0.99295
factor(company)NOGN.L  -1.6096360  0.7348973 -2.1903  0.03134 *
factor(company)OMVV.VI  0.0558142  0.3601835  0.1550  0.87723
factor(company)PKN.WA  -0.3046175  0.2558673 -1.1905  0.23727
factor(company)REP.MC   0.0066535  0.0509925  0.1305  0.89651
factor(company)TTEF.PA  0.1069441  0.1889355  0.5660  0.57292
factor(company)VOPA.AS  0.0491467  0.1925374  0.2553  0.79916
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Figure 15: Regression after White standard errors (RStudio), p-value < 0.05

The regression was created with NPM as the dependent variable and ESG and REP as the independent variables, furthermore as it was previously described in the methodology and empirical chapters, dummy variables were created and even though these were already part of the dataset (EU_DUMMY with names D1-D13) in RStudio a specific function was used that created the dummy variables for the model, therefore at the coefficients instead of D1-D13, the dummy variables are shown as “factor(company)…”.

In the original regression output (Figure 14) it can be seen that the overall model is significant with its p-value being 0.003707, as it is less than the significant 5% p-value, however for this analysis Figure 15 has to be used, as that is the regression after the White test for standard errors. When looking at the coefficients, only one dummy regressor has a significant p-value. What is important regarding the working question of this section is the effect of the ESG scores and the renewable share of the companies headquarter countries on the net profit margin. Based on the regression output, it can be stated that neither the ESG score, with its p-value being 0.09319, nor the renewable energy share of the companies’ headquarter countries, with a 0.88233 p-value are effecting the net profit margin, because their p-values are higher, than the 5% significance level.

Therefore, based on the regression result, since the two variables do not have significant effect on the profitability, the null hypothesis is accepted.

6.1.3 Fixed effects regression II

By doing a regression analysis with the ESG scores as the dependent variable and the net profit margin as the independent variable, the aim was to give an answer to working question III: Does the profitability of the companies have a significant effect on their ESG scores?

Similarly, as it was described in the previous section, the reasons for choosing the fixed effects dummy variable regression was that the pooled OLS panel data regression does not consider the heterogeneity of the variables and the result of the Hausman-test, for which the output is below:

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

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	11.404482	1	0.0007

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
NPM	-4.960211	-4.076097	0.068539	0.0007

Cross-section random effects test equation:
Dependent Variable: ESG
Method: Panel Least Squares
Date: 04/26/23 Time: 17:07
Sample: 2015 2021
Periods included: 7
Cross-sections included: 14
Total panel (balanced) observations: 98

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	65.16305	0.678476	96.04334	0.0000
NPM	-4.960211	1.883692	-2.633238	0.0101

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.858934	Mean dependent var	65.34510
Adjusted R-squared	0.835140	S.D. dependent var	16.45594
S.E. of regression	6.681605	Akaike info criterion	6.776589
Sum squared resid	3705.439	Schwarz criterion	7.172247
Log likelihood	-317.0529	Hannan-Quinn criter.	6.936625
F-statistic	36.09835	Durbin-Watson stat	0.906316
Prob(F-statistic)	0.000000		

Figure 16: Hausman test 2 (Eviews)

Just like at section 6.1.2, a similar result is shown at the Hausman test, namely that it recommends the fixed effects dummy variable regression analysis for the dataset.

Standard errors

Standard errors were tested for this regression model as well:
For autocorrelation the Durbin – Watson was used again in RStudio and the output is the following:

```
        Durbin-Watson test for serial correlation in panel models

data:  ESG ~ NPM + factor(company)
DW = 1.4449, p-value = 9.78e-06
alternative hypothesis: serial correlation in idiosyncratic errors
```

Figure 17: Durbin-Watson test for regression 2 (RStudio)

Hypothesis for the Durbin – Watson test:

$$H_0: there\ is\ no\ autocorrelation\ in\ the\ model\ (p > 0.05)$$
$$H_{1:}\ there\ is\ autocoreelation\ in\ the\ model\ (p \leq 0.05)$$

In the RStudio output it can be seen that the p-value for the Durbin – Watson test is much smaller, than the significance level, 5%, so H_1 is accepted, therefore it is assumed that there is autocolleration in the model, which can cause biased variables in the time series. (Stock and Watson, 2020)

For heteroskedasticity the Breusch – Pagan test was used in RStudio for this model as well:

```
        Breusch-Pagan test

data:  ESG ~ NPM + factor(company)
BP = 70.932, df = 14, p-value = 1.308e-09
```

Figure 18: Breusch-Pagan test for regression 2 (RStudio)

Hypothesis for the Breusch – Pagan test:

$$H_0: error\ term\ is\ constant, there\ is\ homoscedasticity\ \ (p > 0.05)$$
$$H_{1:}\ error\ term\ is\ no\ constant, there\ is\ heteroscedasticity\ (p \leq 0.05)$$

The p-value of the Breusch – Pagan test is also much smaller, than the 5% significance level as it can be seen in the output for the test, therefore in this case H_1 is accepted, which means, that the model is assumed to be heteroscedastic, that can lead to incorrect standard errors, even if the variables are not based. (Stock and Watson, 2020)

To control for the standard error problems, heteroscedasticity and autocorrelation robust standard errors should be used and in this case the Newey-West standard errors were used. (Stock and Watson, 2020) (Verbeek, 2004)

Assumptions

In case of this regression, assumption 3, the unlikeliness of big outliers is also not true, however it is a factor that cannot be controlled in case of a random sample. The scatter plot for it can be found below:

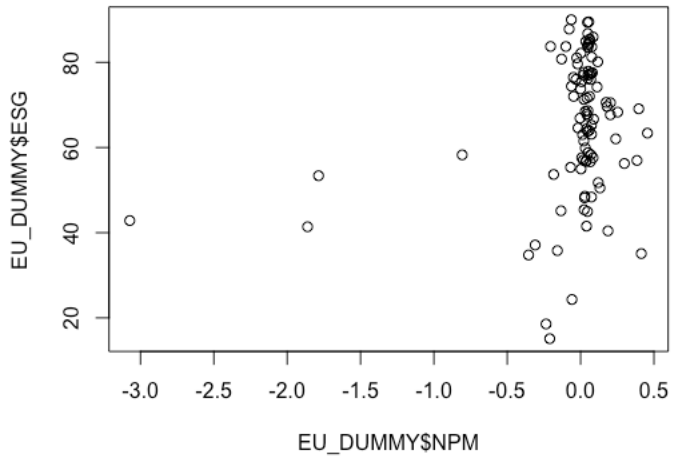

Figure 19: Outliers for NPM-ESG (RStudio)

At the same time, the rest of the assumptions were met, the multicollinearity was tested again with the variance inflation factors and in this case the result is almost 1, therefore they are not correlated, as it can be seen below (Daoud, 2017):

```
                    GVIF Df GVIF^(1/(2*Df))
NPM             1.462111  1        1.209178
factor(company) 1.462111 13        1.014718
```

Figure 20: VIF for multicollinearity 2 (RStudio)

Assumption 1 and 2 are true based on the same argument as in the previous regression model: the dataset is based on random sampling and all seemingly relevant regressors were used, however as mentioned before, there might be regressors that are not obvious.

Result

```
Residuals:
     Min       1Q   Median       3Q      Max
-15.4440  -3.1824  -0.2225   2.4384  24.1061

Coefficients:
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)               82.6098     2.5259  32.706  < 2e-16 ***
NPM                       -4.9602     1.8837  -2.633 0.010085 *
factor(company)EUAV.BR   -30.0231     3.5731  -8.402 1.02e-12 ***
factor(company)GALP.LS   -14.8832     3.5721  -4.166 7.54e-05 ***
factor(company)HEPr.AT   -20.0580     3.5723  -5.615 2.55e-07 ***
factor(company)MAUP.PA   -37.3265     3.5939 -10.386  < 2e-16 ***
factor(company)MOLB.BU   -15.5396     3.5735  -4.349 3.87e-05 ***
factor(company)MORr.AT   -29.5984     3.5727  -8.285 1.76e-12 ***
factor(company)NESTE.HE   -7.0192     3.5767  -1.962 0.053058 .
factor(company)NOGN.L    -54.7119     3.8874 -14.074  < 2e-16 ***
factor(company)OMVV.VI    -3.1847     3.5731  -0.891 0.375346
factor(company)PKN.WA    -22.8133     3.5746  -6.382 9.47e-09 ***
factor(company)REP.MC     -0.9775     3.5717  -0.274 0.785008
factor(company)TTEF.PA     4.7116     3.5736   1.318 0.190981
factor(company)VOPA.AS   -12.8301     3.6136  -3.551 0.000636 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 6.682 on 83 degrees of freedom
Multiple R-squared:  0.8589,    Adjusted R-squared:  0.8351
F-statistic:  36.1 on 14 and 83 DF,  p-value: < 2.2e-16
```

Figure 21: Original regression output for Hypothesis III (RStudio), p-value < 0.05

```
t test of coefficients:

                          Estimate Std. Error  t value  Pr(>|t|)
(Intercept)               82.60976    0.58829 140.4224 < 2.2e-16 ***
NPM                       -4.96021    2.10224  -2.3595   0.02065 *
factor(company)EUAV.BR   -30.02313    2.35234 -12.7631 < 2.2e-16 ***
factor(company)GALP.LS   -14.88319    3.63881  -4.0901 9.929e-05 ***
factor(company)HEPr.AT   -20.05796    4.83514  -4.1484 8.051e-05 ***
factor(company)MAUP.PA   -37.32647    4.83894  -7.7138 2.410e-11 ***
factor(company)MOLB.BU   -15.53960    1.61603  -9.6159 3.833e-15 ***
factor(company)MORr.AT   -29.59838    6.65644  -4.4466 2.683e-05 ***
factor(company)NESTE.HE   -7.01917    0.99565  -7.0499 4.883e-10 ***
factor(company)NOGN.L    -54.71194    7.65249  -7.1496 3.118e-10 ***
factor(company)OMVV.VI    -3.18468    1.31045  -2.4302   0.01725 *
factor(company)PKN.WA    -22.81332    1.37314 -16.6139 < 2.2e-16 ***
factor(company)REP.MC     -0.97752    3.08273  -0.3171   0.75197
factor(company)TTEF.PA     4.71161    0.68456   6.8827 1.033e-09 ***
factor(company)VOPA.AS   -12.83011    1.08121 -11.8664 < 2.2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Figure 22: Regression after Newey-West standard errors (RStudio), p-value < 0.05

In this regression model, the ESG scores (ESG) was the dependent variable and the profitability (NPM) the independent variable. Just as in the previous regression model, dummy variables were used again that are starting with “factor(company…)” in the regression output.

In the original output before the standard error control (Figure 21) the p-value for the whole regression can be found, which is less than the significant 5%, therefore, the model is significant, but for the rest of the analysis Figure 22 is used, as this output contains the updated p-values after the Newey-West standard error control. It can be seen that almost all regressors have a significant effect on the dependent variable, but what’s important is that the NPM is 0.02, which is less, than 5%, therefore it has a significant effect on the ESG.

Based on the regression result, H_1 is accepted, because the net profit margin has a significant effect on the ESG scores of the companies.

6.2 Discussion

In this section I aim to compare the results in the analysis with the theory findings and see whether the theory can be proven with the dataset and the computations.

6.2.1 Working question I

According to Kaupke and Knyphausen-Auseß (2022), the countries' renewable energy shares in their whole electricity ouput can be used as an indicator to the society's approach towards all kind of energy sources and also it can be further interpreted to how do people in the given country think about sustainability and how the companies' headquarter countries' attitude towards sustainability – for which a base can lay in the legal system or as mentioned earlier, in the society – can have an effect on the companies' beliefs and goals as well.

Based on this theory and to be able to measure it in the EU scene, the first working question was created: Are the companies' ESG scores and the companies' headquarter countries' renewable energy shares correlated?

As mentioned before, the ESG score is a great overall measure for sustainability and this was studied together with the renewable share of the relevant headquarter countries, to see if there is a correlation between the two variables.

Spearman correlation was used on the two variables and the analysis showed a moderate correlation between the ESG scores of the companies and the renewable energy shares of the countries where the headquarters are.

Although, the direction of the correlation was not measured by the Spearman correlation, only the strength of the relationship, it is still clear that there is a moderately positive relationship between how companies' headquarter countries approach sustainability and renewables, and how high ESG scores companies get in those countries in general, therefore the theory of Kaupke and Knyphausen-Auseß (2022) can be confirmed with this analysis.

6.2.2 Working question II

As it was explained by Gavancha and Paiva (2020), companies' success and survival are based on their legitimacy, therefore companies have to make sure that their actions are meeting social standards and demands set by the society. According to Martens and Bui (2023), even though firms can utilize their annual statements to strategically shape the general view of themselves, they can still fail to meet the society's demands especially in case of these strategical actions are perceived as greenwashing (Laufer, 2003) or if their CSR advertising strategies are shadowed by the controversial nature of the industry due to their negative impact on the environment (Oh et al., 2016). All of these factors are putting companies' legitimacy at a high risk, which also leads to the endangerment of their profitability as these are highly connected. (Martens and Bui, 2023)

To see whether the sustainability efforts – that can be seen as the efforts to meet society's needs – have actually effect on the profitability, along with the renewable share of the companies' headquarter countries, which in this scenario can be looked at as a control variable, a regression analysis was done with the net profitability margin as the dependent variable and as a measure of profitability, and the ESG scores as a measure of sustainability, and renewable energy shares as the independent variables.

The regression model was significant statistically, however, since the ESG scores and the renewable energy shares of the companies' headquarter countries both had higher p-values, than the significant 5%.

Based on the result of the regression analysis and the answer to the working question, the legitimacy theory could not be confirmed by this research, as based on the dataset and the analysis, the sustainability and the renewable energy shares of the headquarter countries do not have an effect on the companies' profitability.

6.2.3 Working question III

According to Meyer and Brown (1977), the legitimacy is based on legal grounds and legal authority is given to actors that fit into legitimate structures. This institutional theory was interpreted by Kaupke and Knyphausen-Auseß (2022) in a way that they were arguing that in times of good financial performance, companies feel less urge to invest into sustainability, due to the lack of pressure from competitors or perhaps because it is interpreted by the companies in a way that they served the needs of the society for which the solid financial performance was a feedback, therefore they do not have to perform on such a high level.

To test this theory, working question III was created: Does the profitability of the companies have a significant effect on their ESG scores? To answer this question, a regression analysis was done, with the ESG scores as the dependent variable and the net profit margin, as the independent variable, to see whether the financial performance really affecting the sustainability efforts of a company.

The regression analysis was overall statistically significant, with its p-value being much less, than the significant 5% level. Furthermore, the net profit margin also showed a significance with a 0.006418 value, which means that the profitability has a positive effect on the sustainability of the companies.

With the results of this regression analysis Kaupke and Knyphausen-Auseß' (2022) interpretation of the institutional theory should be rejected, because profitability has a positive effect on the sustainability of the companies, therefore it is not true that in financially strong times companies investing less to sustainability.

6.2.4 Research question

As it can be seen in the previous sections of the discussion, most theory parts cannot be confirmed or have to be rejected based on this study's scope's dataset and results of the

analyses, however I still aim to try to find an explanation to the research question of this paper or to why it is not possible to answer it:

How can companies in the European Union's oil-and-gas industry with a high emphasis on sustainability also ensure long-term financial profits?

Unfortunately, the result of the main regression analysis that was focusing on the effect of sustainability on profitability failed to confirm the legitimacy theory, which served as the theoretical base for the relationship of profitability and sustainability in the direction where sustainability is affecting profitability, therefore with this result it is nearly impossible to create an explanation to the research question, on how can companies ensure long-term financial profits with a high emphasis on sustainability, because although the theory states that sustainability has a positive effect on profitability and the lack of sustainability efforts can cause weak financial years (Martens and Bui, 2023), the dataset that was available for this research in the given industry and region did not show a significant relationship between the variables in the regression analysis.

However, during the testing of theories that are related to the relationship between sustainability and profitability in the industry, the reverse direction of the two was also studied in relation to the institutional theory and it was discovered that although the theory states that financially profitable years can cause less efforts in sustainability related issues (Kaupke and Knyphausen-Auseß, 2022), the actual result was that better financial years are leading to higher ESG scores, which could mean that in more profitable years companies invest more into sustainability.

7 Conclusion

7.1 Conclusion

With this research I aimed to discover the relationship between sustainability and profitability in the oil-and-gas industry in the European Union and to see what factors can have and actually have effect on others.

In the theory section a few important base theories, such as the legitimacy theory and the institutional theory were introduced along with certain factors that might add further details to these theories, such as the controversial industries and greenwashing regarding legitimacy.

To see whether these theories are true in case of the scope of this research, several statistical analyses were done: Spearman correlation analysis to test whether there is a relation between the sustainability of the companies and the renewables energy share of the companies' headquarter countries, which showed a positive moderate relationship.

Furthermore, a regression analysis was done to see how the sustainability efforts and the renewable energy shares of the companies' headquarter countries are affecting the profitability of the companies, however, these variables did not show a significance on affecting the profitability, therefore in this research the conclusion is that these variables do not have effect on the profitability, even though theories say otherwise and with this result the research question remained unanswered in terms of it cannot be explained based on the analysis how can companies with high emphasis on sustainability also achieve long-term financial profits.

Lastly, another regression analysis was done to see whether profitability affects sustainability, and it showed a positive relationship, that can lead to the assumption that better financial results lead to more efforts into sustainability.

Therefore, it can be stated that even though theory states that sustainability leads to better profitability (Martens and Bui, 2023) and that in good financial years firms are less likely to

feel the pressure to invest into sustainability (Kaupke and Knyphausen-Auseß), the result of this research shows the opposite in both cases, as the sustainability scores did not show to have an effect on the financial performance of the companies, while the profitability showed that it has a positive effect on the sustainability scores.

7.2 Future research

There are still a lot of discoverable aspects left in the relationship of sustainability and profitability in the oil-and-gas industry and through those, researchers could get a better overview and depth for a more precise understanding of the factors that might be going on between the actors in the industry.

A possible future research could be taking into consideration qualitative data as well, such as companies' annual statements to study their corporate social responsibility reports to see their actual efforts and improvements in sustainability topics over a chosen time period, which could give a much larger depth into understanding the issues these companies are dealing with, furthermore, it could possibly help with discovering industry-wide patterns, moreover it would give a better understanding to the ESG scores and what efforts lead to certain scores.

Another promising future research idea is to repeat the research in approximately 5 to 10 years, since as it was explained in the introduction, in a few years more and more companies in the European Union will have to report their ESG scores mandatorily (Worldfavor), therefore in the above-mentioned time there would be a much larger dataset available with companies' ESG scores in the European Union, which could possibly bring different results in the analysis.

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