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The Effect of Sustainability Commitment

Does joining a voluntary program change the behavior of a company?

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Abstract

This thesis explores the effect of joining a voluntary sustainability commitment, the UN Global Compact, on companies financial and emissions outcomes. To analyze our research questions, we have assembled an unbalanced data set and implemented a difference-in-differences analysis. The data in our thesis is collected from Thomson Reuters Eikon database, the CO_2 emissions data from the Norwegian Environment Agency, and administrative information from the UN Global compact. A total of 410 Norwegian companies had joined the UN Global Compact from its inception in 2000 and until the end of 2022. From the financial performance data set from Eikon we have 13.558 observations, and from the emissions data set we have 5.370 observations.

The interest in investigations of sustainability commitments and the effect on financial performance has seen an enormous growth in the last decade. Our study finds results evidence that sustainability commitment has a positive impact on stock price returns. This suggests that financial performance improves when joining the UNGC. We also find similar findings when we control for a balanced panel.

The results from our analysis on emissions data gives us a contradictional effect compared to our original hypothesis. When we separated into two industries, however, this did not give any indication of reducing emissions after joining the UNGC. Rather the indications that some companies might have good intention when they commit but fail to implement new operation methods to reduce the emission levels of CO_2.

To understand the relationship between financial performance and social responsibility, we estimated a third analysis. From this analysis we see poor financial performance in the years before the company joins the UNGC. However, one year post treatment, we see a slightly positive effect on net income, which also increases in magnitude two years post treatment. For the third year after the company joined the UNGC we still see a positive effect on net income, but smaller in magnitude.

Acknowledgments

This master thesis has been completed as a part of the required education for a masters' degree in the spring of 2023 in business administration at Oslo Metropolitan University. This master's thesis accounts for 30 credits and marks the end of our degree.

The purpose of this master thesis has been to better understand the effect of sustainability commitment, and the effect this has on Norwegian companies. The motivation behind our thesis was to shed light on both the financial and emission aspect of joining a voluntary program. We have enjoyed working on and learning about sustainability, ESG and blue washing as they are important factors in the society.

We want to show our appreciation to our supervisor, Fenella Carpena. Her knowledge and insights in addition to discussions has absolutely improved our thesis. We would also like to thank her for being very interested in our work and for being enthusiastic.

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1. Introduction

Sustainability has become a significant concern in the world, societies demanding companies to incorporate and adopt sustainable practices. A result of this is that more companies have implemented strategies within the field and made commitments to become more sustainable. One of the sustainability commitments include joining the United Nations Global Compact (UNGC). The purpose of this thesis is to analyze how UNGC commitments by Norwegian companies changes their financial outcomes and environmental behavior. We have chosen to look at several aspects of this.

The question remains whether such a commitment to sustainability changes has any effect on the company. First, we want to study the effects of joining a voluntary program on the development in stock prices. To see if a company has any financial gain from operating sustainably or not. Secondly, we also want to investigate if such initiatives lead to changes in practice. To do this we will look at development in emissions of CO_2 before and after joining a voluntary program. Lastly, we want to see if there are a curvilinear relationship between social responsibility and financial performance. If companies first must invest in suitability before it pays off.

An important terminology when we look at sustainability is ESG, with its focus within the three dimensions Environmental, Social and Governance. We see a huge increase of interest in the field of ESG in the society. Consumers demand more information about the products they buy, and we see investors prioritizing green companies when creating portfolios. Because of this increasing interest, a lot of companies want to be perceived as more sustainable. Voluntary programs such as UNGC have emerged and is meant to be a tool for companies to develop strategies when it comes to ESG.

The term ESG was mentioned for the first time in the report “Who Cares Wins”. The report was an initiative where the UN invited a group of eighteen financial institutions from nine countries to develop guidelines on how to better integrate environmental, social, and

corporate governance issues in corporate finance. (UN Environment Programme – Finance Initiative, 2004).

We start this thesis by presenting the basics of what ESG and sustainability in fact are. Further, we present the related literature that have inspired our analysis. The related literature will give good insights that we will use for analyzing and discussing the results we find. The next part is a data section where we describe how we collected and prepared our data. This is followed by a chapter for our methodology and a description of our regressions. From there we present our results and discuss the findings. Finally, the conclusion and further research are presented.

2. Theoretical Framework

In this section we present relevant literature on the topic ESG. We will present other empirical studies that are similar to our thesis and discuss relevant theory to later on discuss the analysis we will proceed. Lastly, we present the design of our hypothesis with the previous literature as a framework.

2.1 Sustainability and ESG

We often hear talk about sustainability and the need to be sustainable. When we talk about sustainability, we refer to the ability to support something in a way that meets the need of the present without compromising the future so that the future generations can meet their own needs. To do this, a company or an organization will have to balance several factors such as economic growth and environmental protection. Some sustainable practices include recycling, reducing waste and emissions, using renewable energy, and promoting social justice and equality. To be able to continue to thrive in the long term without harming the planet, we need to ensure that resources are used in a responsible and efficient way.

When talking about sustainability for companies and organizations, ESG is a relevant factor. ESG or Environmental, Social and Governance as it stands for are three key factors that analysts and investors use to evaluate the sustainability and ethical impact a company or organization has. Factors as energy efficiency, carbon footprint reduction and resource

conservation are included in the environmental consideration. Social factors, on the other hand include labor practices, community engagement and product safety and quality. The last factor, governance, is factors are more focused on issues like ethical leadership, transparency, and board diversity. When incorporating ESG into the investment strategies of companies or organizations, investors can align their investments with both their own values as well as promote positive change, and at the same time generate financial returns (Li, Wang, Sueyoshi, & Wang, 2021).

2.2 United Nations Global Compact (who cares wins)

The background for making "Who cares wins, connecting the financial markets" was to promote a global initiative aimed at sustainable finance and responsible investing. United Nations wanted to bring financial institutions, investors, and businesses together to collaborate and to develop a sustainable strategy for investments and to promote transparency, as well as accountability in the financial markets. This initiative is expected to lead to a more lower carbon footprint and transition into a low carbon economy (United Nations, 2004).

United Nations Environment Program Finance Initiative (UNEP FI) launched the initiative; It was supported by a wide range of organizations from the financial sector. The mission for the initiative was to show that sustainable finance not only is good for the planet but also for investors. They wanted to show investors that investing in the initiative would give long term returns.

United Nations Global Compact is the world's largest corporate sustainability initiative. The compact will help businesses commit to their sustainability strategy and will provide a framework to help implement it.

Companies who want to commit to working towards their sustainability commitments can sign the compact. The initiative is voluntary, however, larger companies are required to make an annual contribution to support their engagement in the UNGC. Companies from any industry sector are eligible for participation, regardless of size or number of employees.

The UNGC is based on ten principles within these categories: human rights, labor, environment, and anti-corruption. The goal is that companies enact the same values and principles. The companies self-report on an annually basis.

2.3 Will a voluntary program design give free riding effect?

When studying the effect of voluntary programs like the UNGC it is also important to look at the institutional design. The UNGC encourage their participants to create strategies to implement socially responsible policies and provide a platform for business leaders to interact and support each other (United Nations, u.d.). As previously mentioned, the companies self-report on their progress, and there are minimal sanctions for those who fail to comply. This leads us to an important discussion on efficiency of the program design.

In a study done by Berliner and Parkash in 2015, they used a panel data of nearly 3,000 U.S. companies from 2000-2010 to look at the efficiency of the UNGC (Berliner & Prakash, 2015). Here efficiency is defined by how effective the UNGC membership were to increase the companies' sustainability ratings after joining the program. They found evidence that could support that the UNGC members shirk their obligations, but in a strategic way. When compared to nonmembers, the UNGC members performed better in more superficial aspects of human rights and environment performance that were less costly. While in more crucial environmental and human rights aspects that are costly to change, the members performed worse. We therefor need to discuss whether a membership in the UNGC can give free riding opportunities.

The free rider problem occurs when one avoids participating in solving a task where everyone knows that if all contributes, we will efficiently get the best possible outcome (Tiljak-Suban, 2018). Free riding refers to the situation where some participants in the program take advantage of the benefits of the program without contributing their fair share. In the case of the UNGC, free riding can occur when companies participate in the program without making a significant effort to improve their sustainability practices. This can create an uneven playing field, where some companies are investing significant resources to

improve their sustainability practices while others simply use the program as a marketing tool.

Blue washing refers to the situation where companies use voluntary sustainability programs to create a positive image or reputation, without making substantial changes to their practices. In the case of the UNGC, this can occur when companies join the program for the sake of public relations, but then fail to implement meaningful sustainability practices within their organizations.

Both free riding and blue washing can undermine the effectiveness of voluntary sustainability programs like the UNGC. To avoid these issues, one suggestion would be to adapt monitoring and reporting mechanisms to ensure that companies are meeting their commitments and making meaningful progress towards sustainability. Additionally, public accountability systems can be utilized to increase transparency and encourage companies to genuinely engage in sustainable practices.

2.4 Voluntary programs and ownership structure

Most of the previous research on corporate social responsibility (CSR) investigate the relationship between CSR and corporate financial performance. The studies examine how engagement in CSR affect financial measurements like profitability, valuation, and risk. There is less research on the effectiveness of CSR engagement when it comes to behavioral changes to reduce negative impact on stakeholders (Li & Wu, 2020).

Jun Li and Di Wu constructed a study to look at social impact of engagement within the field of CSR. In their study they used participation in the UNGC as a proxy. In this study they found a difference between public and private firms. The firms with private ownership reduced their negative ESG incident levels after joining the UNGC, while the public firms did not. The result they found in the study is most consistent with a theory of shareholder-stakeholder conflicts of interest.

In their study they look at two hypotheses on how ownership structure might affect CSR actions. The first hypothesis they look at is that, when the responsibility to maximize

shareholders' interest is constrained, it can make it difficult to pursue actions viewed as diverging from this. For private owned firms, they have less constraints from external shareholders. The second hypothesis that they investigate is that public firms generally have higher profiles and receive more scrutiny from media, activist consumers, and investors. This might obligate these firms to deliver on their CSR actions.

2.5 Does it pay to be good?

Previous research also discusses the relationship between social responsibility and financial performance. Milton Friedman stated in 1970 that the social responsibility of business is to increase its profits. Friedman discussed that the relationship between social responsibility and financial performance were negative (Friedman, 1970). On the other hand, researchers have discussed that the relationship will be positive. When companies increase their investments in social responsibilities, they will also get an improved relation to their stakeholders. This will increase customer loyalty and reduce transaction costs for the company, which then will lead to pricing premiums and increased market opportunities (Barnett & Salomon, 2012).

In a study conducted by Barnett and Salomon from 2006, they find evidence that the relationship between financial and social performance is neither strictly positive nor strictly negative. Instead, they found a curvilinear relation, with the strongest financial returns to low and high levels of social responsibility, while significantly lower returns to moderate levels of social responsibility (Barnett & Salomon, 2006).

It is possible to discuss a curvilinear relationship between social responsibility and financial performance. The curvilinear relationship suggests that there is an optimal point at which social responsibility positively affects financial performance, but beyond that point, further investment in social responsibility can lead to diminishing returns or even negative effects on financial performance.

2.6 Stakeholder capitalism

To further discuss Milton Friedman's argument "The business of business is business", we want to elaborate on an alternative approach such as stakeholder capitalism. Stakeholder capitalism is a form of capitalism in which companies seek long-term value creation by taking into consideration the needs of all their stakeholders, and society at large. (Schwab, 2021).

Schwab discusses that the most important characteristic of the stakeholder model today is that the stakes of our system are now more clearly global. The model he presents puts People and Planet in the center and is global in nature. The first condition of the model outlines that the planet is the center of the global economic system, and its health should be optimized in the decisions made by all other stakeholders. The second condition is that the well-being of people in one society affects that of those in another, and it is incumbent on all of us as global citizens to optimize the well-being of all. (Schwab, 2021).

In an article written by Oliver Hart and Luigi Zingales they discuss that companies should maximize shareholders welfare, not necessarily shareholders value. (Hart & Zingales, 2017). They argue that shareholders have interests beyond just money, more precise that the shareholders are prosocial. If the shareholders care about the society at large, then why should the companies they invest in not behave similarly?

In the article Hart and Zingales propose to facilitate the welfare maximization by letting the shareholders vote on the broad outlines of corporate policy. This also means that if profit-making and damage-generating activities are separable, or if government has internalized externalities, or if the shareholder are not prosocial, then this means that the vote would end up with the Friedman outcome. (Hart & Zingales, 2017).

The stakeholder capitalism model is giving business another dimension and supports companies' relatively big focus on ESG. Companies might believe there are growth opportunities, or a curvilinear relationship between financial performance and social responsibility. A different argument can be that boards and shareholders are prosocial and therefore wants to invest in companies who makes responsible decisions and puts the planet and its people in the center of their strategy.

2.7 Hypothesis

Our hypothesis is based on the theoretical framework above and was inspired by the previous literature that we have presented. Based on this we have created three hypotheses.

In our first hypothesis we investigate if there is a positive relationship between joining the UNGC and stock prices. First, to see if there is financial gain by committing to sustainability. Friedman discussed that the relationship between social responsibility and financial performance were negative (Friedman, 1970), so we wanted to see if this was true or not. When companies join the UNGC they are hopefully committing to implementing sustainable policies and practices. A motivation that supports our hypothesis is that this can lead to increased investor confidence and support, and as a socially responsible company they may be viewed as a more attractive investment. In addition to this implementing these practices could be cost saving and improve efficiency, which again could impact the financial performance and stock prices positively.

H1. *Stock prices will increase after joining the UNGC.*

The second hypothesis we investigate is if joining the UNGC has a negative impact on emissions. As companies who want to commit to working towards their sustainability commitments can sign the compact. However, if this is not the case, we want to discuss the effect of voluntary programs and if joining the UNGC could give companies free riding opportunities. As the study done by Berliner and Prakash show signs of (Berliner & Prakash, 2015). When companies join the UNGC they also get access to recourses and guidance on how to reduce their emissions, this fact supports our hypothesis. Another evidence that supports our hypothesis is that the UNGC is the largest corporate sustainability initiative in the world, with over 12.000 signatory companies. The fact that the initiative is this large should show that they actually make a difference when it comes to sustainability and emissions. The likelihood that they have become this large without being able to show for any results is unlikely.

H2. *Companies will reduce their emissions after joining UNGC.*

The third hypothesis this study wants to investigate is if the relationship between financial performance and social responsibility is curvilinear. When companies commit to a more sustainable practice, this requires upfront investments and can be very costly. The interesting question is if the investments pay off. Barnett and Salamon discuss this in their study published in 2006, and they found support that the strongest financial returns came from the companies with low and high levels of social responsibility. While significantly lower returns to moderate levels of social responsibility. (Barnett & Salomon, 2006).

H3: *There is a curvilinear relationship between social responsibility and financial performance*

3.Data Sources

The previous sections provide existing research and outline the three hypothesis we want to test in the analysis. The following section will describe how the data is collected and elaborate on the variables that have been used.

3.1 Data collection

In this section we will describe how we collected the data from three different sources.

3.1.1 United Nations Global Compact

In 2000 the United Nations launched a voluntary initiative named the UN Global Compact, with the intention of encouraging companies and organizations to support and adopt sustainable and socially responsible practice and policies. They created ten principals based on the areas of environmental stability, labor rights, human rights, and anti- corruption. These principals are meant to serve as a framework for companies to take action that advance sustainable goals and to align their operations with universal principals.

The companies and organizations that participate commits to reporting (annually) on their progress towards meeting the ten principals of the UN Global Compact. As well, they are encouraged to engage in partnerships and collaborations to further the impact. In addition to contribute to the broader goals of the United Nations, the UN Global Compact promotes responsible corporate citizenship and sustainable development. (United Nations, u.d.)

In our study we needed to create a dataset consisting of observations on financial performance and emission levels over time. As a starting point we gathered information on which Norwegian companies joined the UN Global Compact. We found that 410 Norwegian companies had joined the compact from 2000 and until 2022. That included 73 companies listed at the Oslo Stock Exchange, and 337 companies not publicly listed. We extracted a list over the Norwegian companies who had joined the UNGC from United Nations website (United Nations, u.d.). The information available consisted of company name, company type, industry of operation and what year the company joined the UNGC. The different company types were Company, Small or Medium-sized Enterprise, Foundation, Business Association

and Public Sector Organization. 33 different industries were represented in the list of companies. The industries varied from banking and financial services to electricity, food producers and other industrial industries.

3.1.2 Eikon

To test the first hypothesis, we used the 73 companies who were publicly listed because we wanted to investigate their stock price development over time to investigate their financial performance. When we had the list of companies, we then found their RIC (Reuters Instrumental Codes) which is used to identify financial instruments. This information is available through Thomas Reuters Eikon.

Thomas Reuters Eikon is a financial data platform. The platform provides real time market data, analysis, news, and other trading tools for financial analyzing. Eikon includes analytic tools for evaluating market trends and risk management, in addition it includes financial data and news sources. The platform has a comprehensive assortment of reference data and pricing, for example fixed income and global equities. In addition to current data, users can access historical time series data.

The RICs we extracted was then used to gather information on Monthly Stock Prices, Nr. of employees, Revenue, Capital, and Net Income (Refinitive, u.d.). The first outcome variable on monthly stock prices were of interest to look at the development in the value of the company. To take the analysis further, we wanted to see if we could find the same effects with other financial measures. We decided that number of employees, revenues and capital also indicates financial performance.

The last variable we extracted from Eikon was Net Income. This variable indicate the company's bottom line result, and will be the variable we want to use to test our third hypothesis to investigate if we find support for a curvilinear relationship between financial performance and social responsibility. Here we wanted to look at the development before and after treatment. The dataset therefore consists of the public companies who have joined the UNGC, where we look at the natural log of their net income for a period before and after treatment.

3.1.3 Norske Utslipp

For our second hypothesis, we gathered information on annual emissions. From the Norwegian Environment Agency platform “Norske Utslipp” we extracted information on companies with a reporting obligation on emissions data, and then mapped out if any of these companies had joined the UNGC. There were 19 out of the 410 UNGC companies who had reported emissions data. From the platform we exported a list over the emissions per year on company level. The 19 companies in our treatment group operated within land-based industry and petroleum industry at sea. We choose to look at emissions of CO_2 (Miljødirektoratet, u.d.) since this was the most relevant type of emitter and it was comparable across both industries.

The list we exported from this data source contained emissions on facility level. This means that the companies reported emissions from their different facilities individually. Since we wanted to look at development in emissions per company we aggregated the emissions from all facilities per company, and hence created a panel of company-level emissions over time.

Norske Utslipp is a platform provided by the Norwegian Environment Agency. The platform includes data on emission from various sources such as industry, transportation, petroleum, agriculture, and waste management. The database was created to provide easily accessible information on emission in Norway and transparency on emissions in the different sectors, and to further support policy decision making in environmental management.

The data is collected from various sources such as monitoring programs, national statistics and mostly industry reports. Reports and updates of information takes place annually. The data can be used to track progress towards environmental goals, identify trends, and evaluate emissions reductions efforts. The database is an essential tool for research and policy. In addition, the public to assess the environmental impact of different sectors and to develop effective strategies to reduce emissions in Norway. (Miljødirektoratet, u.d.)

3.2 Period of time

The time period in our analysis is the years from 1990 to 2021. One of the reasons for choosing this period is because Norske Utslipp started reporting emissions data from 1990.

The reason why 2022 is excluded from this period is because financial statements often are submitted during the spring. This means that we had a lot of missing data for 2022. For consistency reasons, we therefor gathered the data from this period.

3.3 Variables

In the following section, there will be a presentation of the variables that we have used in the analysis.

Table 1 gives an overview over the variables that we included in the first set of variables to analyze the financial performance of a firm after committing to a voluntary program such as UNGC.

Variables	Description
Company ID	Variable for Company name
Joined UNGC	This variable tells us when the company joined the UNGC
Month	A date variable that indicated the time of the observation on the stock price
Stock Price	This variable gives us stock price end of month
Return	A variable based on stock price to find the monthly returns
ln revenue	The natural log of annual revenue
ln capital	The natural log of annual capital
UNGC	A dummy variable with 1 for observations post treatment
No. Of employees	A variable with number of employees reported anuallty

Table 1: Definitions of variables to analyze financial performance of companies committing to a more sustainable and socially responsible practice

The main dependent variable in this analysis is monthly stock price return. In order to calculate this variable, we extracted the monthly stock price from Eikon and used the following approach:

$$Return_t = \frac{Stock\ Price_t - Stock\ Price_{t-1}}{Stock\ Price_{t-1}}\ x\ 100$$

To investigate further we used revenue as a dependent variable. The variable extracted from Eikon gives us a number of the company's total revenue from operating activities. This is a financial measure that comes from the annual report of the company and is therefore reported annually. For interpretation reasons we used the natural log of this variable. Another variable we wanted to study was capital. This variable represents the company's sum of total equity, total debt and minority interest as of the end of year. This financial measure is therefor also annually reported and we have used the natural log to easier interpret the coefficient. The last variable we included in this analysis was number of employees. This variable contains both full-time and part-time employees, and is self-reported through the company's annual report.

In table 2 we list up the variables that is used to test the second hypothesis, to look at emission levels after companies commit to a more sustainable practice, through a membership in the UNGC.

Variabel	Description
Company ID	Variable for Company name
Joined UNGC	This variable tells us when the company joined the UNGC
Year	A date variable that indicated the time of the observation of emissions
ln sum emissions	This variable is a natural log of emissions for all industries
ln petroleum	This variable is a natural log of emissions for petroleum industry
ln EPF (petroleum)	This variable gives us average emission per facility in the petroleum industry
ln land based	This variable is a natural log of emissions for land based industry
ln EFP (land based)	This variable gives us average emission per facility for land based industry
UNGC	A dummy variable with 1 for observations post treatment

Table 2: Definitions of variables to analyze development in emission levels of companies after joining the UNGC

This analysis consists of multiple dependent variables. The first dependent variable is called ln sum emissions, and is the natural log of CO_2 emissions for both industries. Further on, we have seperated the natural log of CO_2 emissions per industry and included one dependent variable for each industry, ln petroleum and ln land based. Lastly, we have divided the natural log of average CO_2 emissions per facility (for both industries). This provides us with a more in depth understanding of our results.

The third table shows us the variables that is included in the last analysis, to test our third hypothesis and to investigate if there is a curvilinear relationship between financial performance and social responsibility.

Variabel	Description
Company ID	Variable for Company name
Joined UNGC	This variable tells us when the company joined the UNGC
Year	A date variable that indicated the time of the observation of Net Income
ln net income	This variable is a natural log of Net Income
Three years prior to UNGC	Dummy variable with the value 1 for observation of Net Income three years before joining the UNGC
Two years prior to joining UNGC	Dummy variable with the value 1 for observation of Net Income two years before joining the UNGC
One year prior to joining the UNGC	Dummy variable with the value 1 for observation of Net Income one year before joining the UNGC
Treatment year	Dummy variable with the value 1 for observation of Net Income the same year the company joins the UNGC
One year post joining the UNGC	Dummy variable with the value 1 for observation of Net Income one year after joining the UNGC
Two years post joining the UNGC	Dummy variable with the value 1 for observation of Net Income two years after joining the UNGC
Three years post joining the UNGC	Dummy variable with the value 1 for observation of Net Income three years after joining the UNGC

Table 3: Definitions of variables to investigate curvilinear relationship between financial performance and social responsibility

To test this hypothesis, we used the natural log of net income as a dependent variable. We have used dummy variables per year (three years prior until three years post treatment) to look at the development over time.

3.3 Choice of control group

In the first analysis the control group consists of companies that joined the UNGC after 2019. To avoid selection bias, we want the control group to have similar characteristics as the treatment group. Because the companies included in the control group gets treated at a later point in time, it is natural to believe that they will behave in the same way as the group of companies treated in an earlier period.

In our (company level) emissions data, the majority of the companies have not signed the UNGC. In this matter, we found it reasonable to use all companies that had reported emissions to the Norwegian Environment Agency but not signs UNGC as our control group. The control group and the treatment group are part of the same industries, both land based industry and petroleum industry, and it is natural to assume that they have the same characteristics. Therefor we find it natural to compare these two groups.

3.4 Data cleaning

To make our analysis more accurate we choose to focus on publicly listed firms in our first analysis. As mentioned previous in this chapter, this meant going from 410 companies that had joined the UNGC to 73 companies traded on the Oslo Stock Exchange and members of the UNGC. This analysis investigate development in financial performance, and to strengthen the reliability we choose to focus on monthly stock price returns. We extracted reported data on stock prices from 1990 until 2021 from Eikon.

In our second analysis we want to investigate the development in emissions. One concern we wanted to address was that the data was self-reported. This may lead to errors, both typographical errors and incorrectly using different units for different observations. In our emissions data, this could be emissions written in kilos of CO_2 vs in kilotons of CO_2. First, we looked at all emissions data in one dataset, from both industries. Because of big difference in operations, it was difficult to spot outliers. We then decided to look at the industries separately to trim big outliers, which could have resulted in misleading regression results. (Stock & Watson, 2020).

A different concern we had was that the number of companies present in the emissions dataset varied from year to year. To understand this better we made the following tables to better understand what was happening within the raw data.

Year	Number of companies present in the data
1997	6
1998	7
1999	7
2000	6
2001	8
2002	7
2003	7
2004	7
2005	9
2006	8
2007	8
2008	8
2009	10
2010	8
2011	9
2012	10
2013	8
2014	9
2015	8
2016	9
2017	9
2018	9
2019	9
2020	9
2021	10

Table 4:Table of how many companies that are present in our dataset each year for the petroleum sector

This table gives us an indication of the quality in the reported emissions data for the petroleum sector. We see that some companies fail to submit reports annually. There are companies that exists in the data for some years but not all.

The table shows signs of unbalanced data. When we investigate the raw data, we have four companies that does not report yearly, and therefore we can see some changes in the number of companies from year to year. One company for instance only reports in 2012 and 2021, another company only reports every other year.

Year	Number of companies present in the data
1990	7
1991	5
1992	56
1993	68
1994	92
1995	95
1996	99
1997	110
1998	108
1999	114
2000	126
2001	199
2002	186
2003	180
2004	177
2005	181
2006	166
2007	158
2008	175
2009	163
2010	175
2011	163
2012	165
2013	167
2014	170
2015	165
2016	167
2017	164
2018	165
2019	156
2020	159
2021	164

Table 5:Table of how many companies that are present in our dataset each year for land-based industry

This table gives us an indication of the quality in the reported emissions data for the land-based industry. We see that some companies fail to submit reports annually. There are companies that exists in the data for some years but not all.

The table shows a clear sign of unbalanced data. A panel that has some missing data for at least one time period for at least one entity can be classified as an unbalanced panel (Stock & Watson, 2020, p. 362).

The table has a steady increase of companies until 2001, after this we can see that the number of companies that report their emissions varies from 156 to 186.

4. Empirical Method

In this chapter we will present the methodology used to investigate the hypothesis. Further on, we will elaborate around the statistical and robustness tests which will be used to secure valid and trustworthy results in the analysis.

4.1 Choice of Empirical Method

The choice of empirical method needs to fit the hypothesis we are testing. We want to compare the companies' financial development after joining the UNGC with nonmember companies. We use an econometric method when comparing a treatment and a control group and look at the difference after the treatment. In this case the treatment is joining the UNGC. The estimator is the difference between the groups over time, and therefore we have used a difference-in-difference estimator.

4.2 The Difference-in-Difference Estimator

The difference-in-difference method requires observation before and after treatment.

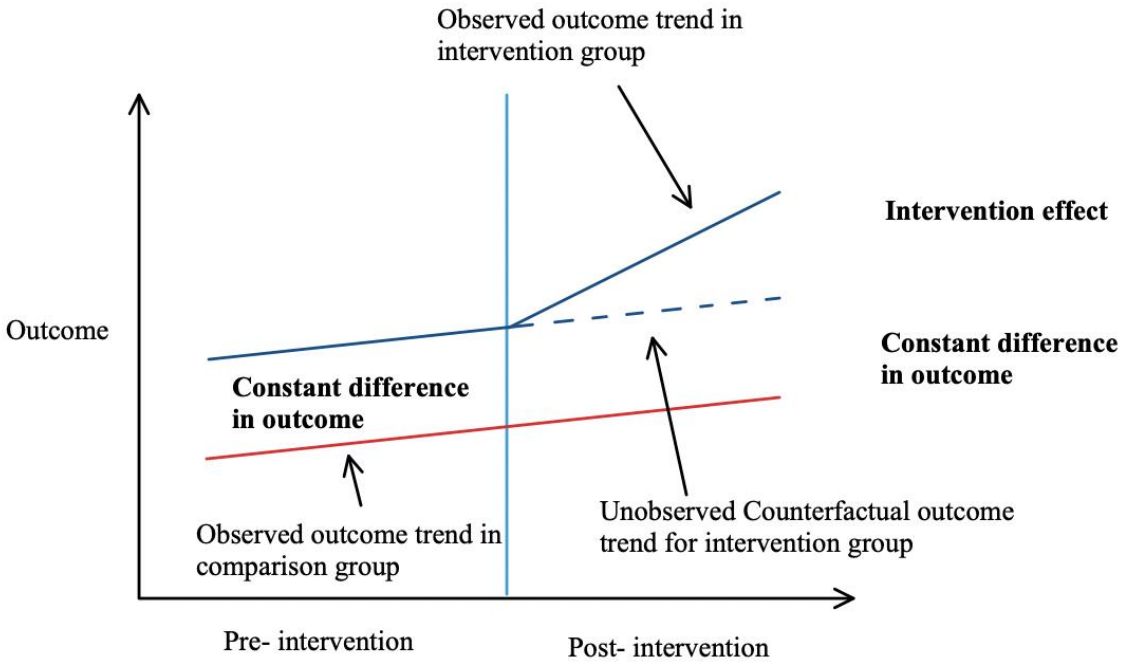

Figure 1: Visualization of the diff-in-diff method

As we can see from Figure 1, we have pre- and postintervention for both the treatment and the control group. The control group is not exposed to the treatment, and therefore we can predict an unobserved counterfactual outcome trend for the treatment group. When we have this predicted outcome, we can find the effect that is caused by the treatment. The actual difference-in-difference is this treatment effect. (Stock & Watson, 2020).

When using a diff-in-diff estimator in econometrics the parallel trend assumption is crucial. This assumption states that the treatment and control group share a common trend prior to the treatment, this means that the difference in their outcomes should remain constant over time if there is an absence of the treatment. This means that the only difference between the treatment and control group is the treatment itself. Unlike other analysis where other factors might affect the outcomes. If the parallel trend assumption is violated, the diff-in-diff estimator could produce biased results. This could result in the estimated effect of the treatment would be inaccurate. The parallel trend assumption is therefore crucial to test for to find any violation of the assumption (Marcus, 2021).

In this thesis we controlled for parallel trends for the treatment and control group by illustrating their trends in different graphs. In the first analysis by comparing stock price returns for the treatment group with the control group before the treatment. While in the second analysis we tested for parallel trends by illustrating the development in emissions of CO_2 for the treatment group and the control group.

In our study we have observations from the same companies over many years. This may lead to correlation not only within a company, but also serially correlated over time, we therefore cluster our standard errors at the company level. By doing this, we will allow for arbitrary serial correlation in errors over time within each company (Cunningham, 2021). Moreover, to avoid biased estimator, we need to include both time fixed and entity fixed effects in our study.

The companies in our study joins the UNGC at different times. This means that the treatment will occur at different point in time. We need to take this into consideration when interpreting our results. (Goodman-Bacon, 2019).

4.2 Regression equations

This study investigates how membership in the UNGC affects the companies' financial performance. The regression models are based on the estimation technique Ordinary Linear Square. The second part of our study looks at what kind of effect joining the UNGC have on emission levels. Lastly, we will investigate if there is a curvilinear relationship between financial performance and social responsibility.

4.2.1 Financial performance after joining the UNGC

The first analysis investigates the relationship between different financial measures and commitment to voluntary programs. We see from the four regression equations below (a1-a4) that we have four different dependent variables, which we want to investigate after joining the UNGC which is the independent variable. The dependent variables are stock price return, revenue, capital, and number of employees. As mentioned in the previous section, we have added γ_i which is the company fixed effects and δ_t for the time fixed effects. In the regression equations *i* is company and *t* is month in the first regression (a1), and year in the following (a2-a4). *u* is the error term in the regression equations.

$$(a1)\ Return_{it} = \gamma_i + \delta_t + \beta\ post_{it} + u$$

$$(a2)\ Revenue_{it} = \gamma_i + \delta_t + \beta\ post_{it} + u$$

$$(a3)\ Capital_{it} = \gamma_i + \delta_t + \beta\ post_{it} + u$$

$$(a4)\ employees_{it} = \gamma_i + \delta_t + \beta\ post_{it} + u$$

4.2.2 The level of emissions after joining the UNGC

The first equation (b1) studies the relationship between levels of emissions and joining the UNGC. We use the natural log of sum emissions per year as the dependent variable, while post joining the UNGC is the independent variable. The natural log of sum emissions is the aggregated CO_2 emissions from all facilities on company level from both the petroleum industry and land based industry. This regression equation controls for time fixed, δ_t, and

company fixed effects, γ_i. The regression equation also contains the error term *u*. In this regression equation *i* is the company and *t* is the year.

$$(b1)\ \ln sum\ emissions = \gamma_i + \delta_t + \beta\ post_{it} + u$$

As previously mentioned, there are two different industries in our emissions data. In order to differentiate between these two groups, we have created individual equations for the two industries. (b2) studies the relationship between levels of emissions of CO_2 for companies within the petroleum sector and joining the UNGC. The natural log of annual emissions of CO_2 aggregated on company level for companies in the petroleum sector is used as the dependent variable, while post joining the UNGC is the independent variable. This regression equation controls for time fixed δ_t, and company fixed effects γ_i. In the regression equations *i* is company and *t* is year. *u* is the error term in the regression equations.

$$(b2)\ln petroleum = \gamma_i + \delta_t + \beta\ post_{it} + u$$

To control for increasing facilities per company we created a variable to measure average emissions per facility. The regression equation (b3) investigates the relationship between level of CO_2 emissions per facility within the petroleum sector and joining the UNGC. Time fixed δ_t and company fixed effects γ_i are also included. We still use *i* for company and *t* for year. *u* is the error term in the regression equations.

$$(b3)\ln EPF\ (petroleum) = \gamma_i + \delta_t + \beta\ post_{it} + u$$

Equation (b4) is the second industry in our emissions data. The natural log of annual emissions of CO_2 for companies within land based industry as the dependent variable, and post joining the UNGC as the independent variable. As in (b2) the emissions is aggregated on company level. This regression equation controls for time fixed δ_t, and company fixed effects γ_i. As in the previous regressions *i* is company and *t* is year. *u* is the error term in the regression equations.

$$(b4)\ \ln land\ based = \gamma_i + \delta_t + \beta\ post_{it} + u$$

The last equation (b5) controls for increasing facilities per company within land based industry. This means that this regression equation is the same as (b3), but with the companies within the land based industry. This regression also controls for time fixed, δ_t, and company fixed effects, γ_i. In this regression *i* indicates the company and *t* indicates the year.

The error term *u* is also included in the regression equation.

$$(b5)\ \ln EPF\ (land\ based) = \gamma_i + \delta_t + \beta\ post_{it} + u$$

4.2.3 Curvilinear relationship between financial performance and social responsibility

To study the relationship between financial performance and social responsibility we will look at how the net income will develop over time. We want to look at the three years before joining the UNGC, the treatment year and the three years after joining.

The regression equation in this model (c1) investigates the relation between net income as the dependent variable and the companies at different years both before and after treatment. This way we can look at the development and see if we can find a curvilinear relationship.

$$(c1)\ NetIncome_{it} = \gamma_i + \delta_t + \beta\ pre3_{it} + \beta\ pre2_{it} + \beta\ treatment_{it} + \beta\ post1_{it} + \beta\ post2_{it} + \beta\ post3_{it} + u$$

In this equation we have added one variable per year as the independent variables. These variables are dummies with the value 1 if the observation occurs in that specific year. The dummy variable $pre3$ has the value 1 if the observation on net income was in the third year before the company joined the UNGC. That means that $pre2$ has the value 1 if the observations occurred two years before the company joined the UNGC. The variable $treatment$ has the value 1 if the observation on net income is from the same year as the company joined the UNGC. The variables $post1$, $post2$ and $post3$ follows the same logic.

We have not included the dummy variable for the observations one year before joining the UNGC. This is done to normalize the dummy for 1 year prior to joining the UNGC to zero. This means that the other coefficients are estimated relative to the level of 1 year prior to joining the UNGC.

4.3 R^2 and adjusted R^2 measurement

R^2 is a statistical measure, and it is the fraction of the sample variance Y_i explained by the regressor. In other words, it represents the proportion of the variance in one variable that can be explained by another variable. R^2 is the square of the correlation coefficient between two variables and will range somewhere between 0 and 1. If R^2 is 1 it indicates that all of the variance in one variable can be explained by the other. However, if the value of R^2 is 0 it indicates that there is no relationship between the variables. In multiple regressions R^2 generally increases (never decreases) when a regressor is added (Stock & Watson, 2020).

$$R^2 = \frac{ESS}{TSS}$$

The adjusted R^2 on the other hand is a modified version of R^2. In a regression model the adjusted R^2 takes into consideration the number of predictions (independent variables). As mentioned R^2 generally increases when a regressor is added, however, this might not actually improve the fit of the model. The adjusted R^2 tries to deflate or reduce R^2 to correct this. This therefore results in a lower R^2. As we can see the formula for adjusted R^2 considers the sample size as well as the number of predictions in the model. Adjusted R^2 will range from -1 to 1.

$$\bar{R}^2 = 1 - \frac{n-1}{n-k-1}\frac{SSR}{TSS}$$

When we look at the two formulas the biggest difference is that R^2 is the ratio of the sum of squared residuals to the total sum of squares multiplied by the factor. The adjusted R^2 is 1 minus the ratio of the sample variance of the OLS residuals to the sample of variance of Y (Stock & Watson, 2020).

4.5 Robustness

To verify the robustness of our thesis we have made several variations to our regression as well as to modify the baseline model to ensure that our statistics are as valid as possible. In addition to this we have included two-way fixed effects as a robustness test in our regression analysis. This can be used when you have a panel data set with N units and T time periods (Imai, 2021). When we discuss our results in the next section, we will also discuss ways to secure robust results. In our analysis we have used an unbalanced panel and we will address how we can solve this issue.

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5. Results

In this chapter of our thesis, we will present results from the analysis and discuss the findings. The following section will include descriptive statistics to further understand the raw data before we present our regression analysis and discuss interesting findings related to our thesis. Lastly, we will conduct and discuss the robustness of our data to ensure and investigate that our regression models present valid and reliable results.

5.1 Descriptive statistics

We present a table of descriptive statistics of our dependent and independent variables in the financial dataset. The descriptive statistics includes the number of observations, mean, standard deviation, minimum value, maximum value, skewness, and kurtosis.

Table 4 shows the descriptive statistics for the variables in the first regression analysis, which investigates the financial performance. We find that the return variable has a mean of 1,05, whereas the median is 0,57. The observations vary from a minimum return of -88,55 to a maximum return of 160,39. For the other financial measures, we find that natural log of revenue has a mean of 500,17, the natural log of capital has a mean of 494,60, and number of employees has a mean of 9671.

Variable	N	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtois
Return	13.558	1,051966	0,5725828	13,70424	-88,55286	160,3383	0	0
Revenue (ln)	1.011	500,1701	505	286,6923	1	998	0,9165	0
Capital (ln)	1.005	494,605	492	286,8349	1	994	0,7773	0
No. Of employees	378	9671,847	5304,5	11109,54	26	49700	0	0,0001
UNGC	13.662	0,3101303	0	0,4625637	0	1	0	0

Table 6: Descriptive statistics of the financial dataset

In table 5 we present the descriptive statistics for the regression analysis that studies the development in emission levels. The natural log of sum emissions from both industries has a

mean of 7,28 and a median of 7,14. The minimum and maximum natural log of emissions differ from 0 to 14,7.

Variable	N	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtois
ln sum emissions	5.370	7,278321	7,13966	3,282817	0	14,71649	0,9287	0
ln petrolium	351	4,388445	4,955259	2,627207	-4,35831	9,094828	0	0,0003
ln EPF (petrolium)	203	4,514322	4,843843	1,228506	-1,88533	6,218135	0	0
ln land based	5.060	7,358783	7,390858	3,426212	-5,599422	14,71556	0	0,0060
ln EPF (land based)	4.305	7,232829		3,329523	-5,599422	14,71556	0	0,5830
UNGC	5.946	0,0038681	7,228578	0,0620792	0	1	0	0

Table 7: Descriptive statistics of the emissions dataset

Table 6 shows the descriptive statistics for the last regression model, where we investigate if the relationship between financial performance and social responsibility. The natural log of net income has a mean of 18,25 and a median of 18,46. We find that the minimum and maximum value varies between 12,9 and 21,8.

Variable	N	Mean	Median	Std. Dev.	Min	Max	Skewness	Kurtois
Net Income (ln)	303	18.25111	18,46105	1,768224	12,91279	21,7648	0,0120	0,9691
Three years prior to UNGC	409	0,1687042	0	0,3749491	0	1	0,0000	0,0008
Two years prior to joining UNGC	409	0,1833741	0	0,3874468	0	1	0,0000	0,0179
One year prior to joining the UNGC	409	0,1858191	0	0,389437	0	1	0,0000	0,0283
Treatment year	409	0,1589242	0	0,3660532	0	1	0,0000	0,0001
One year post joining the UNGC	409	0,1222494	0	0,3279748	0	1	0,0000	0,0000
Two years post joining the UNGC	409	0,0953545	0	0,2940637	0	1	0,0000	0,0000
Three years post joining the UNGC	409	0,0855746	0	0,2800774	0	1	0,0000	0,0000

Table 8: Descriptive statistics of the curvilinear relationship dataset

Skewness measures the lack of symmetry of a distribution. The normal distribution has a skewness of zero. (Stock & Watson, 2020, p. 63). In our data we see that almost all variables

follow the normal distribution. We find a deviation from the normal distribution in two of our variables, *ln sum utslipp* and *ln EPF (petroleum).*

The kurtosis of a distribution measures the mass in tails. This means how much of the variance arises from extreme values. An extreme value is called an outlier. (Stock & Watson, 2020, p. 64). High kurtosis comes from heavy tails, which means that outliers is more likely. Low kurtosis indicates light tails that is closer to the normal distribution. The kurtosis of a normally distributed random variable is 3. A distribution with kurtosis exceeding 3 has more mass in its tails than a normal distribution. In our analysis we do not have any values of kurtosis exceeding 3. This means that we have light tails, and outliers is less likely.

5.2 Development in financial performance after joining UNGC

In this section we will present regression results based on the first hypothesis *"Stock prices will increase after joining the UNGC"*.

	Returns (1)	Revenue (ln) (2)	Capital (ln) (3)	Employees (4)
UNGC	0,1212507 (0,3536862)	13,7834 (25,37154)	17,41967 (20,19662)	3161,191* (1609,721)
Constant	8,465814** (3,461554)	253,143*** (77,63643)	108,3019** (43,85626)	11573,48*** (2344,995)
N	13.558	895	900	376
adj R2	0,3014	0,028	0,0523	0,1084
Nr. of Companies	71	60	62	12
Nr. of treatment	34	29	29	5
Nr. of control	37	31	33	7
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Standard errors reported as robust clustered standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 9: The output from diff-in-diff regression on financial performance after joining UNGC.

The results from the first regression (1) with returns as the dependent variable shows a small but positive effect on stock prices after joining the UNGC with +0,12%. The table explains the sample variation in returns by 30,14%, when controlling for country and year. This effect supports our hypothesis that the value of the company increases after a company commits to a voluntary program like the UNGC. Even though the increase in returns is very small in magnitude, this can be an effect of pricing premiums and increased market opportunities as discussed by Barnett & Salomon (2006). However, we see that this outcome is not significant, and therefore we cannot reject that the effect is different from zero.

Stock price returns is a measure of the value of the company based on activity in the financial markets. The stock price is the net present value of all future dividend payment of the company. When we extend the analysis with the second regression equation (2) where the dependent variable is revenue, we will also see the effect from a more short-term perspective within the company's financial statement. The result from the regression shows a positive effect in revenues of +14% after joining the UNGC. This means that the income from a company's operation increases after joining the UNGC, and there is a positive relationship between joining the UNGC and the development in revenues. This result is consistent with the result from (1). One way to interpret this effect can be that when a company decides to join the UNGC and implement a strategy on ESG, they create a positive reputation, and this may lead to a competitive advantage. The effect we find is not statistically significant, so we cannot reject that the effect is different from zero.

To extend the analysis further the next regression (3) includes capital as a dependent variable. The result from the regression also shows an increase in a company's capital after joining the UNGC. This effect also supports a positive relationship between financial performance and ESG. The company needs to invest in new technology or other initiatives to become more sustainable in their operations, and will therefore increase the company's assets. However, we see that the effect is not statistically significant, and therefore we cannot reject that the effect is different than zero.

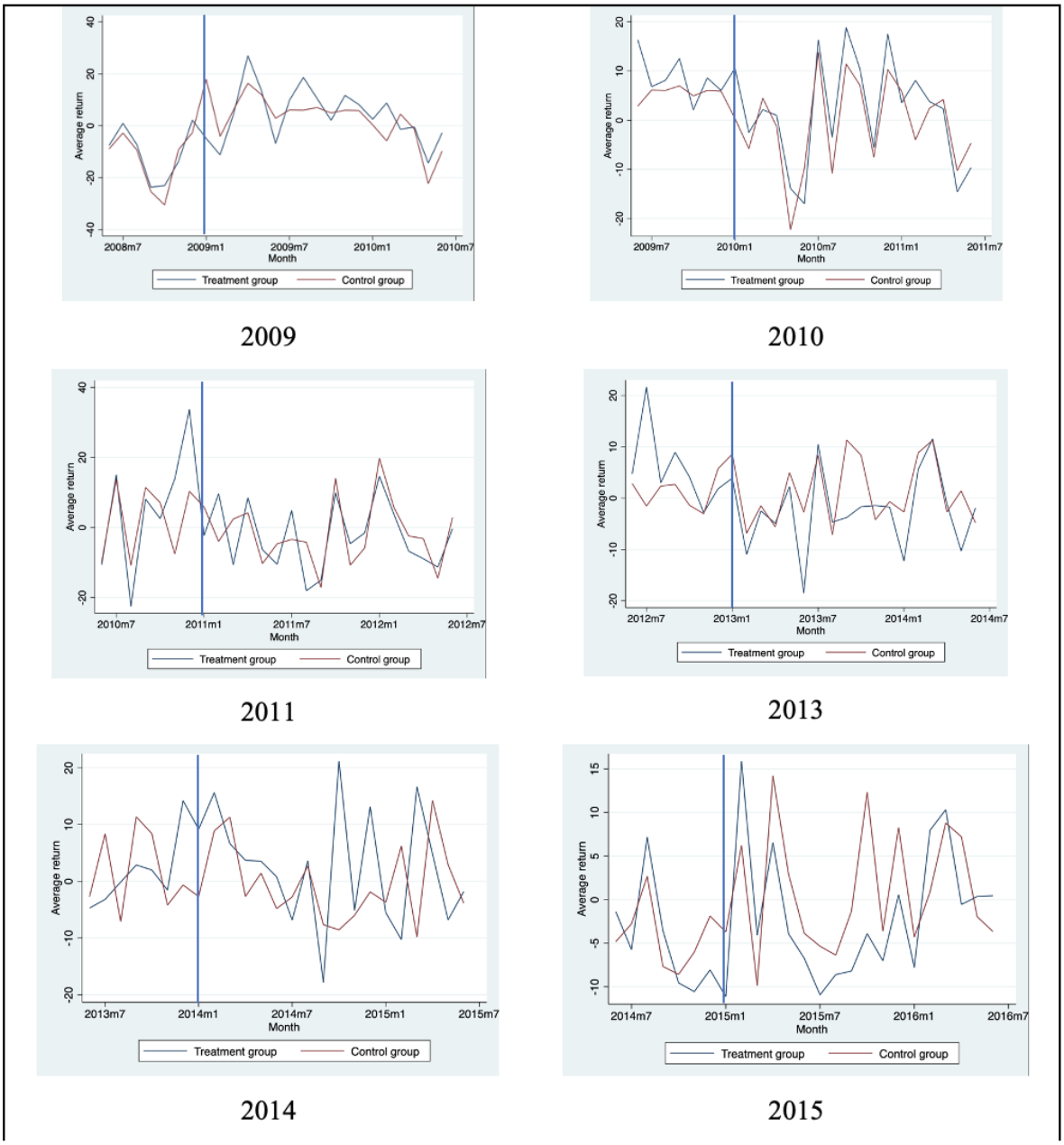
In the last regression in column 4, the dependent variable is the number of employees. This is also a variable that measures growth within the company. When a company increase their

number of employees, they are in a growth phase. They either have already an increased revenue and need to increase the level of staffing to keep up the pace, or the company has identified potential growth opportunities. The result from this regression shows a positive effect of joining UNGC on the number of employees. This effect is significant at the 10% level. This may indicate that when a company commits to a program like the UNGC, they need to implement sustainability as a part of their strategy and therefore needs to increase their number of employees. It may also indicate that when a company commits to a sustainability focus, they see a growth opportunity and forecast higher future revenues.

Further on, we need to investigate if the main assumption of parallel trends before treatment holds for the two groups. The most common way to test for this is by illustrating the trends in a graph and compare the trends before the treatment. We choose to compare stock price returns for the treatment group with the control group. In this analysis the treatment group will include the companies who joined the UNGC in the specific year we are testing for. While the control group is companies who joined the UNGC after 2019. The graphical illustration will disclose if the two groups follow similar trends before the treatment group is treated. The graphical illustration will only give us a picture on how the trends are developing and will not give a result of statistical significance.

In Figure 2 we present the graphs where we have the biggest populated treatment groups. We can see that the two groups are following a relatively similar pattern throughout all graphs, but with some deviations. We see that for the companies who joined the UNGC in 2009, the movements in the stock price return were very similar to the control group. For the companies being treated in 2010 they follow a similar pattern from July 2009, with increases and decreases at relatively the same time as the control group. The next graph shows the companies who joined the UNGC in 2011. Before treatment we see that the two graphs move in the same way, until we see a quite big deviation in October 2010, where the stock price of the treatment group increases quite a lot, while we see a decrease in the stock price of the control group. Further on, we see that the companies who joined the UNGC in 2013 had an opposite effect in stock price return from June 2012 until August 2012. After this the two groups moved in a more similar way until treatment in January 2013. In the graph that shows the companies treated in 2014 we see deviations between the two groups

before treatment, which indicates that the two groups do not have parallel trends. In the following graphs we also find deviating trends between the two groups before treatment.



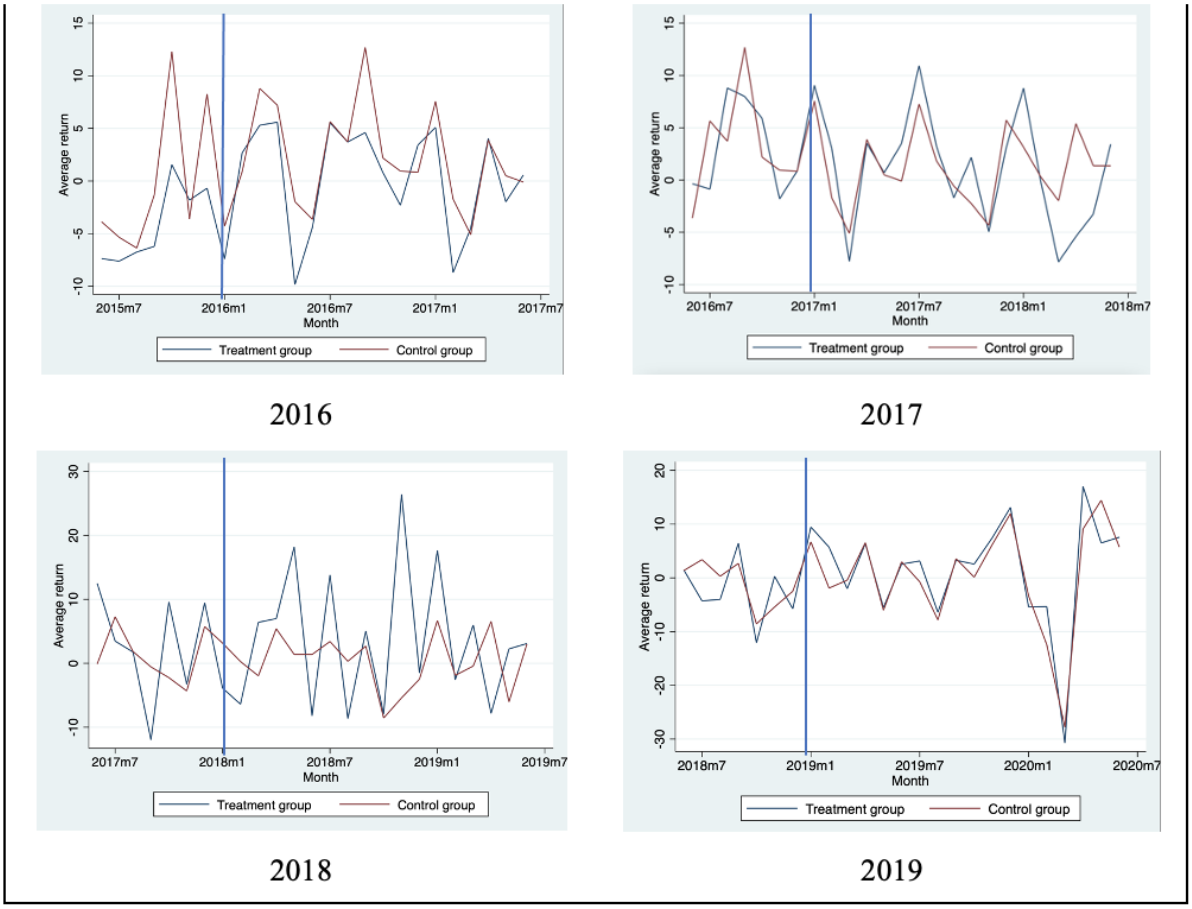


Figure 2: Graphs that show the average returns for the two groups over time

In the graphically illustration of the trends, we find evidence that the two groups act parallel in some periods of our dataset. However, there is none of the graphs that moves exactly the same way before treatment. This indicates that the assumption of parallel trends is not satisfied. The difference in the trends before treatment may lead to a biased treatment effect, and therefor make it difficult to estimate the effect joining the UNGC has on stock price return.

5.3 Development in emissions of CO_2 after joining the UNGC

In this section we will present regression results based on the second hypothesis *"Companies will reduce their emissions after joining UNGC"*.

	ln sum emissions (1)	ln petrolium (2)	ln EPF (petrolium) (3)	ln land based (4)	ln EPF (land based) (5)
UNGC	0,4320094 (0,3401619)	0,4485801 (0,3659252)	-0,1480475 (0,2575294)	0,8724407*** (0,1107171)	0,156665 (0,1746213)
Constant	6,950072*** (0,424319)	4,291288*** (0,4384684)	4,193337*** (0,6683865)	7,232254*** (0,489652)	6,539762*** (1,149999)
N	5.499	351	203	5.060	4.305
adj R2	0,0619	0,0663	0,0115	0,0806	0,1000
Nr. of Companies	764	13	373	13	373
Nr. of treatment	19	2	17	2	17
Nr. of control	745	11	356	11	356
Entity FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes

Clustered standard errors reported as robust clustered standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 10: The output from diff-in-diff regression on emissions of CO_2 after joining UNGC, also controlled for number of employees

The results from the first regression (1) with the natural log of sum emissions as the dependent variable shows a positive effect on emissions of CO_2 after joining the UNGC with 43,2%. The analysis explains the sample variation in emissions by 6,2%. However, the coefficient is not statistically significant, and we cannot reject that the effect is 0. Even though the analysis is not statistically significant, we found that an increase in emissions of 43,2% after joining the UNGC is very curious. The finding is contradicting to our hypothesis and may support both the free riding and the blue washing theory we discussed earlier. As previously mentioned, free riding can occur when companies participate in the program without making a significant effort to improve their sustainability practices (Cengiz, Lindner, Dube, & Zipperer, 2019). Blue washing refers to the situation where companies use voluntary sustainability programs to create a positive image or reputation, without making substantial changes to their practices (Berliner & Prakash, 2015). Our first analysis supported our hypothesis that joining the UNGC has a positive impact on the company's financial performance, while the findings in (1) indicates that the membership do not necessarily lead to lower emissions of CO_2.

To further investigate this unexpected result, we separated the two industries and created two models with emissions from individually petroleum and land based industry as the dependent variable. The model on emissions from the petroleum industry gives us a coefficient of 44,9%, and an explanatory factor of 6,6%. This is in line with the first result we found and supports the theory of blue washing. However, the coefficient is not statistically significant. In the model on emissions from land-based industry we get a coefficient of 87,2%, and an explanatory factor of 8,1%. This extreme result also support that companies joins the UNGC without making substantial changes to their practices.

We looked further into the raw data and found that in some of the companies with multiple facilities there was inconsistency in reporting. Some of the companies failed to report for all facilities from year to year. This may lead to incorrect regression results. We therefor wanted to build the model further based on average emissions per facility per company.

When we changed the dependent variable to average emission per facility in the petroleum industry, we saw a negative shift in the post treatment coefficient. The new coefficient of -14,8% shows a decrease of emission levels per facility after joining the UNGC. This result is more in line with our hypothesis and would be what we expect from companies after joining the UNGC. Despite this, the explanatory factor is now 1,2%, and the coefficient is not statistically significant.

For the average emissions per facility in the land based industry, we still find a positive coefficient but much smaller in magnitude. The coefficient of 15,7% indicated that emissions per facility increases after joining the UNGC. The model explains the sample variation in emissions by 10,0%.

Even though we do not find significant coefficient, we want to discuss the two last findings. The hypothesis we wanted to test was that companies would reduce their emissions of CO_2 after joining the UNGC. We find support for this hypothesis in the model with emissions per facility for the petroleum industry. On the other hand, the result from the model with emissions per facility for land based industry suggests an increase in emissions after joining

UNGC. As discussed in the literature review, this could show signs of blue washing, and may indicate that the efficiency of voluntary programs could be poor.

To investigate the data further we wanted to test if the assumption of parallel trends before treatment holds in this analysis. We created graphs, illustrating the development in emissions of CO_2 for the treatment group and the control group. In this analysis the treatment group consists of the companies that joined the UNGC in the specific years we are testing for. While the control group consists of all companies in the same industries that have never joined the UNGC. From the graphs we will disclose if the two groups follow similar trends before the treatment.

First, we present graphs on average emission per facility in the petroleum sector. We chose to focus on two of the largest companies, to see if these had any impact on the overall emissions for the petroleum sector. One of them being Equinor with an average of 30 facilities per year, and the other being Aker Solutions with an average of 4 facilities per year. The reason why we chose to only look at these two companies is because they are the only two companies in the petroleum dataset that have joined the UNGC before 2022, which means we have observations both before and after treatment.

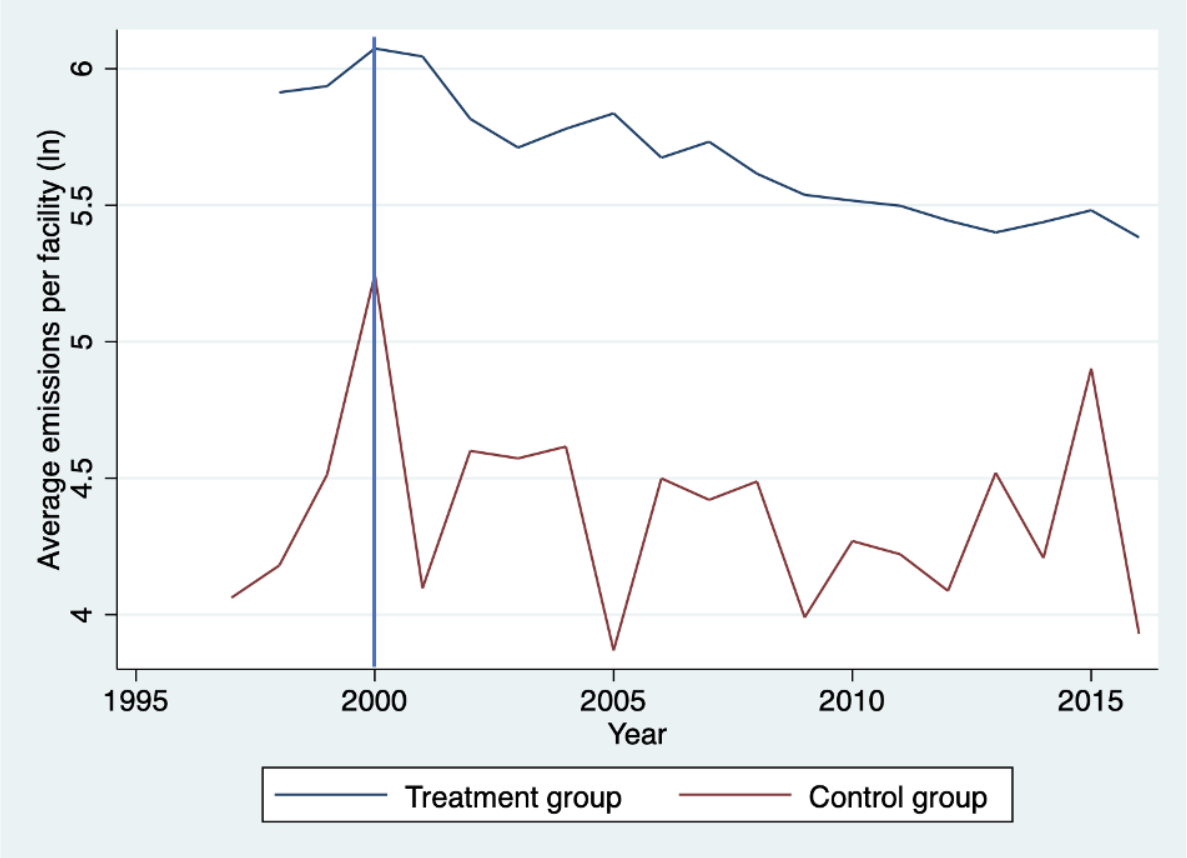


Figure 3: Graph of average emissions per facility for the petroleum sector before and after treatment in 2000 (treatment group: Equinor)

This graph shows average emissions for both the treatment and the control group, before and after the treatment. For this graph the treatment group is defined by companies joining the UNGC in 2000. For the petroleum industry only Equinor joined in 2000, and therefor represents the treatment group. The control group consists of companies in the same industry that have not joined the UNGC. From the graph we find that the level of CO_2 emissions of Equinor is at a higher level than the control group during the whole time period. We find evidence that both groups have increasing emissions of CO_2 during the years prior to the treatment and reaches apex in year 2000. The graph shows that the treatment group have evenly decreased their emissions per facility after joining the UNGC. The control group shows a more fluctuating trend, but on a lower emission level than the treatment group.

The second graph we want to investigate is where treatment happens in 2008. For the petroleum industry, Aker solutions were the only company who joined the UNGC during this

year. Therefor the graph will show how the development in CO_2 emissions for Aker solutions in comparison to the control group.

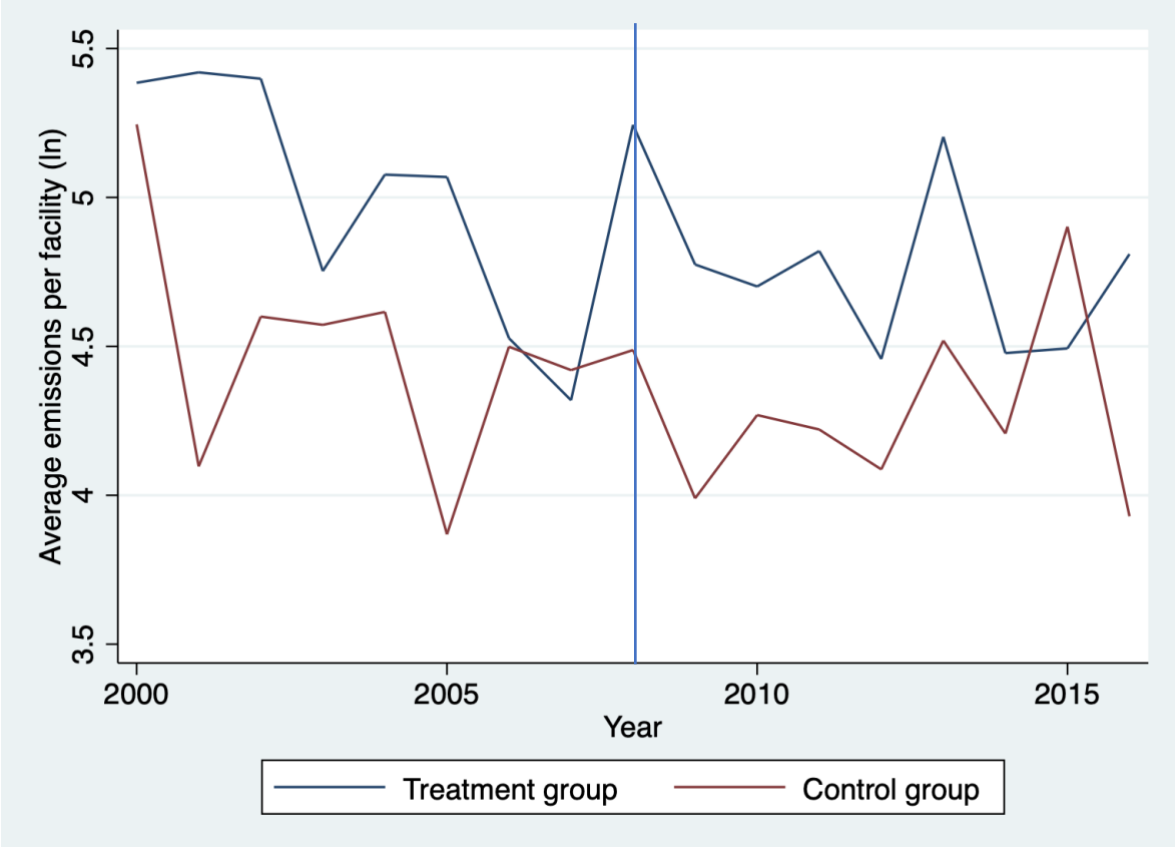


Figure 4: Graph of average emissions per facility for the petroleum sector before and after treatment in 2008 (treatment group: Aker solutions)

This graph shows average CO_2 emissions per facility for both the treatment and the control group, before and after the treatment. In the graph we find evidence that the two groups act parallel in some periods before treatment. However, we see that the two groups deviate in other periods, which indicates that the assumption of parallel trends is not satisfied. The differences between the trends before treatment may also in this analysis lead to biased estimators. When we graphically observe the two groups after the treatment, we find fluctuating tendencies and no clear pattern in the development of CO_2 emissions.

In Figure X we present the graphs for the years where we have populated treatment groups in the land based industry. From these graphs we want to observe if the main assumption of parallel trends before treatment holds.

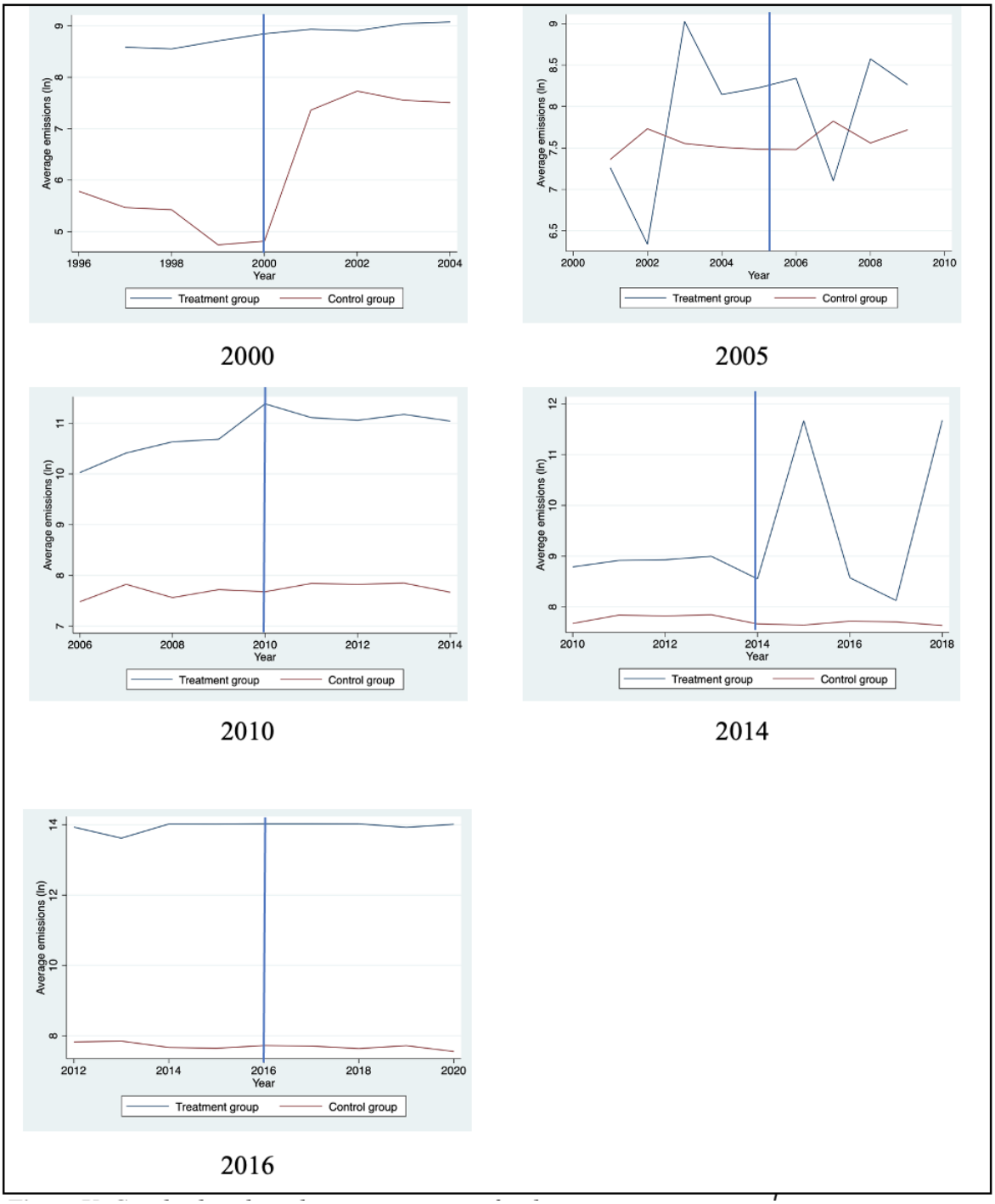


Figure 5: Graphs that show the average emissions for the two groups over time

The graphs show the development in average emission per facility for land based industry for both the treatment and the control group. The treatment group is defined by companies that joined the UNGC in the specific year that is shown below the graphs. The reason we have chosen these specific years is because they have one or more companies joining the UNGC. The control group consists of companies that have never joined the UNGC. We see from the graphs that in general the companies in the treatment group emits on a higher level than the control group. In the graphs of treatment in 2000 and 2005 we find deviations from the assumption of parallel trends before the treatment. In the three following graphs with treatment in 2010, 2014 and 1016 we can observe that the two groups follow a similar trend before the treatment.

In 2010 we do see a reaction. The emissions seem to increase and reaches apex during 2010. It then evens out, but on a higher level than before treatment. We find this interesting and wanted to look further into the raw data to understand where this result comes from. In 2010 the world´s leading seafood company, and the world´s largest salmon producer Mowi joins the UNGC and is the only company represented in the treatment group.

We find a similar situation in 2014. Here we see a flat trend in emissions for the treatment group, until the treatment year in 2014. During the treatment year, the average emissions per facility increases a lot, and experience a lot of fluctuation over the next period. In 2014 the only company representing the treatment group is Borregaard. The company has one of the worlds most advanced and sustainable biorefineries.

As discussed in the literature review there are signs of companies who want to create a positive reputation by joining sustainability programs like UNGC. The results showed in the graphs supports that the companies Mowi and Borregaard fails to implement meaningful sustainability practices to reduce their emissions.

5.4 Curvilinear relationship between financial performance and social responsibility

In this section we will present our regression results based on our third hypothesis: *"The relationship between financial performance and social responsibility is curvilinear".*

	Net Income (ln)
Three years prior to UNGC	-0,4765054** (0,1908263)
Two years prior to joining UNGC	-0,4861976*** (0,1630824)
One year prior to joining the UNGC	-
Treatment year	-0,0793989 (0,1116229)
One year post joining the UNGC	0,0256073 (0,1469887)
Two years post joining the UNGC	0,2384178* (0,1346258)
Three years post joining the UNGC	0,1264605 (0,1506269)
Constant	18,13018*** (0,2369261)
N	303
adj R2	0,0784
Nr. of Companies	53
Entity FE	Yes
Time FE	Yes

Clustered standard errors reported as robust clustered standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 11:The regression results showing the relationship between financial performance and social responsibility

To understand the relationship between the financial performance and the social responsibility we can use the third regression model to follow the development. The

dependent variable net income will give us an indication of the company's profitability. We want to see how the dependent variable evolves over a certain time period. We normalized the dummy for 1 year prior to joining the UNGC to zero. This means that the other coefficients are estimated relative to the level of 1 year prior to joining the UNGC.

If we plot the coefficients in a graph, we do see poor performance before the year the company joins the UNGC. From one year post treatment we see a slightly positive effect on net income, which also increases in magnitude two years post treatment. For the third year after the company joined the UNGC we still see a positive effect on net income, but smaller in magnitude.

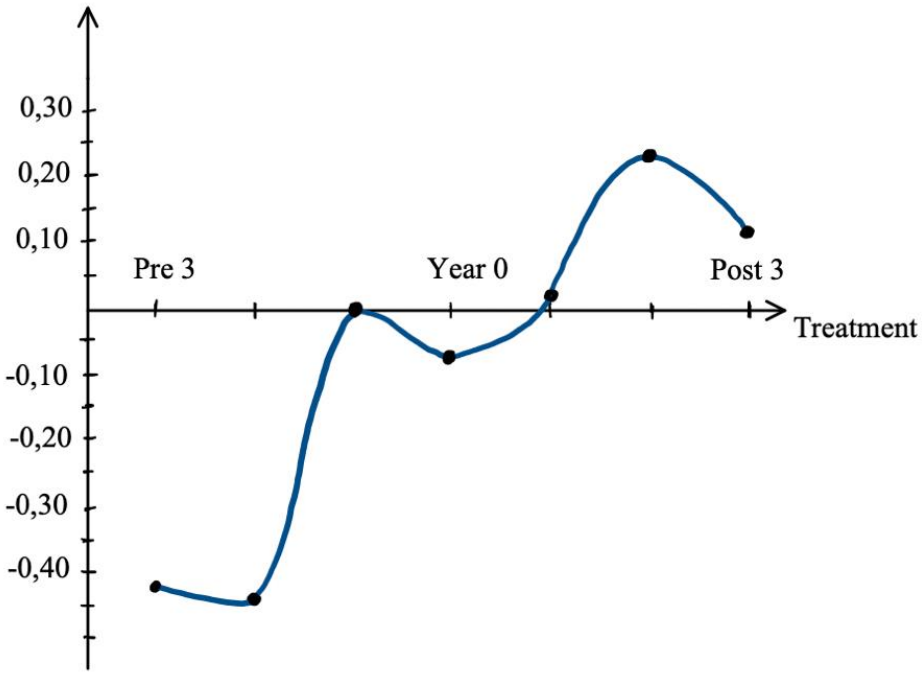


Figure 6: Relationship between financial performance and social responsibility

The interpretation of the results can be that the years before joining the UNGC, the company takes on costly investments in for example new production technology to make practices more sustainable. After joining the UNGC, the company is perceived as more sustainable by customers and society, which may lead to competitive advantages. The company can achieve higher profits because of pricing premiums and loyal customers.

A different interpretation of these results can be that the company have performed poorly for some years and wants to put in a last effort to turn things around. The company knows that their customers and other stakeholders have an interest in sustainability, and they see a growth opportunity in an improved reputation. They might build a sustainability strategy around more superficial dimensions of ESG and joins the UNGC to gain good-will from society.

Both interpretations can explain the results we are seeing in the regression, but there might also be other things impacting the results. We also need to take into consideration that our results are not statistically significant, which also implies that we cannot reject that the effects can be zero.

5.5 Robustness

5.5.1 Compositional change

In the dataset used to test all our hypothesis, we need to address an issue that occurs in regards of compositional change. Since we are looking at data over 32 years, we have some companies existing for periods within these 32 years but does not have observation for the whole time period. For some of the companies we also have missing observations for some years within the time period. This is especially something that needs to be considered in the self-reported data from companies to the Norwegian Environmental Agency. This means that the compositional change is like an omitted variable bias built into the sample itself caused by time-variant unobservable. (Cunningham, 2021).

To address this issue, we create fully balanced panels. This means that we remove the companies that have missing data for some years, but rather look only at the companies present in the data throughout the whole time period.

	Returns (1)	Revenue (ln) (2)	Capital (ln) (3)	Employees (4)
UNGC	0,8965747 (0,5623251)	-0,1464603 (0,2555158)	7,034209 (10,18704)	7258,355* (3643,906)
Constant	8,360822* (3,767423)	21,57132*** (0,7401407)	1076,86*** (1,695596)	15893,38*** (3043,087)
N	3.528	295	294	294
adj R2	0,3672	0,053	0,0947	0,0852
Nr. of Companies	11	11	11	11
Nr. of treatment	8	8	8	8
Nr. of control	3	3	3	3
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Standard errors reported as robust clustered standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 12: The output from diff-in-diff regression on financial performance after joining UNGC on a balanced panel

The first regression model included an unbalanced panel, and we therefor wanted to rerun the same regression after cleaning out companies who only were present for some of the years during 1990-2021. When we reran the regressions, we could see that the number of observations on returns decreased from 13.558 to 3.528.

The results we get from the first regression (1) in this analysis still supports our first hypothesis that stock price returns increase after joining the UNGC. The magnitude of this effect increases, but the coefficient is not statistically significant.

The second regression (2) is inconsistent with the result we found within the unbalanced panel. Now we find a decreasing effect in revenue after joining the UNGC of +14%. The interpretation of this result can indicate that when companies implement an ESG strategy, this may take away the topline focus, and production may decrease. However, the effect is not statistically significant.

The third regression (3) shows a similar effect on capital as in the unbalanced panel, but here with a decreased magnitude. After joining the UNGC companies increased their capital, but

less than in the unbalanced panel. This finding is consistent with our hypothesis that joining the UNGC, and commiting to an ESG strategy will lead to an increase in financial performance.

When we reran the last regressions on a balanced panel, we found consistency in increased number of employees after treatment. The effect is larger in magnitude in the balanced panel. This supports our discussion in regards of the companies forecasting a growth potential or needs more resources to implement a sustainability strategy.

In our second model with regressions on emission levels we decided to investigate the treatment group to see if they were balanced and present throughout the time period. In the emissions data only 19 companies had joined the UNGC. 5 out of these companies joined in 2022 and are therefore excluded due to that we only have emissions data until 2021. Our panel data is unbalanced, but the companies in our treatment group is present for the whole period. This means that the issue of compositional change is not affecting the treatment group, and we therefore decide to not rerun this regression model.

We reran the regression from our third analysis on a balanced panel. The results were similar in comparison to the results we got from the regression with an unbalanced panel. In table 13 we see the effects on net income over the period three years before until three years after treatment.

	Net Income (ln)
Three years prior to UNGC	-0,7894695** (0,2962003)
Two years prior to joining UNGC	-0,7409248*** (0,2569921)
One year prior to joining the UNGC	-
Treatment year	-0,0731485 (0,1748464)
One year post joining the UNGC	-0,0229042 (0,221068)
Two years post joining the UNGC	0,4118414* (0,2131069)
Three years post joining the UNGC	0,1699411 (0,2356824)
Constant	19,57555*** (0,2928443)
N	196
adj R2	0,1078
Nr. of Companies	28
Entity FE	Yes
Time FE	Yes

Clustered standard errors reported as robust clustered standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01

Table 13: The regression results showing the relationship between financial performance and social responsibility

If we compare the results to the one from the unbalanced panel, we find the same tendencies but here with higher magnitude. The companies seem to have poor financial performance before treatment, while we can see a positive effect in net income after treatment. The highest positive effect on net income, within the time period we are looking at, happens two years after treatment.

The interpretations of the results from the balanced panel are consistent with what we discussed in regards of the results from the unbalanced data. There is evidence supporting

that companies gets a positive effect in net income after joining the UNGC. The poor performance before joining can come from costly upfront investments in more sustainable practices. But we cannot reject that companies performing poorly might want to join the UNGC, to rebrand and increase market opportunities.

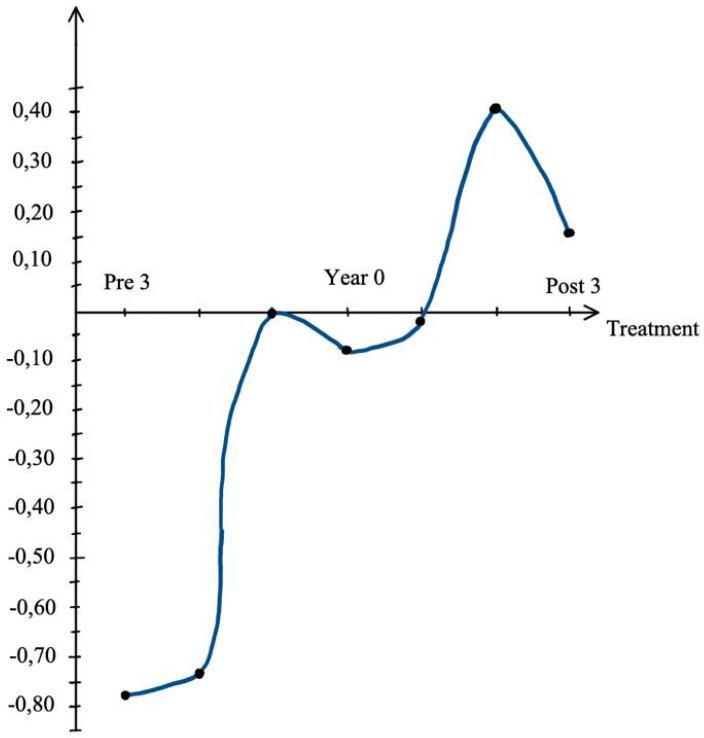


Figure 7: Relationship between financial performance and social responsibility

In the graph we cannot find the same clear curvilinear relationship between financial performance and social responsibility as Barnett and Salomon discussed in their article from 2006 (Barnett & Salomon, 2006). But we see tendencies of an increasing relationship in financial performance after joining the UNGC. However, our results are not statistically significant.

5.6 Limitations

In our research there are some limitations. One of them being data availability. When we look at the emission side of our thesis there may not be enough data available to conduct a robust analysis. We started off with about 410 companies, but when we compared the number of companies that were both part of UNGC and that were listed on the stock

exchange, we were left with around 73 companies. We did the same with emissions, however, when we compared UNGC with Norske Utslipp we were just left with 19 companies.

In addition to this the data we have used may have high variability which could make it difficult to identify patterns and trends. To make accurate predictions about the impact of sustainability commitments could therefore be difficult. We see this in our thesis thought the different results we get by changing and testing for different factors.

There is other robustness test that could have been done with the data to secure t the results validity. We have discussed the two following tests, but did not get the chance to conduct because of lack of data

5.6.1 Staggered implementation

In the analysis conducted in this thesis we have a difference-in-difference design with differential timing. And as we discussed earlier in this thesis we have used "two-way fixed effects" to estimate the regression. To understand what the "two-way fixed effects" does in our study, we have used the Bacon Decomposition theorem. (Cunningham, 2021).

The two-way fixed effects estimator is in this study a weighted average of all potential difference in differences without differential timing. The weights are based on the group sizes and variance in treatment. When there are time-varying treatment effects this can generate a bias.

There are two fundamental problems with the difference-in-difference design. The first problem is weighting. The two-way fixed effects put different weights on the individual 2x2s. This means that a group in the middle of the panel will be weighted more than those at the end. (Goodman-Bacon, 2019). This is problematic and can also change the results by adding or subtracting years to the panel.

The next problem that occurs in the design is that past treated units are used as controls for future treated units. This issue is difficult to resolve, but there is emerging literature trying to

tackle the problem. In a study of the impact of minimum-wage done by Cengiz et al. they wrote in an appendix note the problem they had with aggregating individual difference-in-differences estimates into a single parameter. (Cengiz, Lindner, Dube, & Zipperer, 2019). To tackle the issue, they created 138 separate data sets associated with a minimum-wage event. Each sample had both treatment groups and control groups, but not all units are used as controls. Rather, only the units that have not been treated within the sample window are allowed to be controls. The 138 estimates are then stacked to calculate average treatment effects. (Cunningham, 2021). This method uses a more stringent criteria for which units can be used as controls.

One limitation with the data we have used in this analysis is that there might occur problems with differential timing. We could have tried to resolve this problem by looking to the study done by Cengiz et al. They created different dataset to every event. In our case this would be every year we had companies joining the UNGC. The different datasets would then been used to calculate an average treatment effect. We have not done this robustness test in our analysis, but encourage this as a way to take this analysis further.

5.6.2 Placebo test

Another way to secure robustness in this study could be to do a placebo test. To do this we could add in one or many variables that are similar to the dependent variable but should in theory not be impacted by joining the UNGC. When we add this variable to the study, we can verify that we do not find any significant results.

We have discussed a lot of different variables that can be used as placebo variable but find it very hard to come up with one that is similar to stock price return but would not be impacted by the joining of the UNGC.

6. Conclusion

In this last chapter of the thesis, we will present the conclusion from the analysis. In addition to this, we will present policy implications and suggestions for further research within the topic.

6.1 Conclusion

The main purpose of our study was to investigate if a company's sustainability focus could be a competitive advantage and lead to better financial performance. We wanted to study how a sustainability commitment would impact the company, and if it would pay to be more sustainable. In addition to this we also wanted to investigate if companies changed their behavior after joining the UNGC. If we could see a decreased level of emissions after the company committed to a sustainability strategy.

In our first analysis we found evidence that sustainability commitment has a positive impact on stock price returns. This finding supports the first hypothesis that financial performance through the value of the company increases when the company takes on an ESG commitment. When we expand the model further by adding revenue as the dependent variable, we got contradicting findings from our analysis. In the unbalanced data we found support that the effect from joining the UNGC was increased revenues. While after we controlled for companies existing throughout the whole period, we found that revenues decreased after joining the UNGC. The decrease of revenues may support that companies may reduce their production when they implement an ESG strategy. However, our results from this analysis were not statistically significant.

The results from our analysis on emissions data showed an opposite effect compared to our original hypothesis. When testing for the natural log of emissions of CO_2 we saw an increase in emissions after joining the UNGC. Further on, we decided to separate the two industries in our dataset to see if one had a greater impact than the other. The regression showed different results for the two industries but did not give any indication that the companies would reduce their emission of CO_2 after joining the UNGC. Rather the results gave indications that the companies might have good intention when they commit to the UNGC

but fail to implement new operation methods to reduce the emission levels. However, when we divided the company emissions into emissions per facility, we found that the petroleum industry had a slight reduction in emissions while land based industry still had a positive increase in emissions. The only significant result came from the regression with the natural log of emissions from land based industry as the dependent variable.

The last analysis where we test for a curvilinear relationship between financial performance and social responsibility, we see that in the years before joining the UNGC the companies perform poorly. We see a slightly positive effect on net income from one year after treatment, which increases even more two years after treatment. In the third year after treatment, we still see a positive effect on net income, however, in smaller magnitude.

Even though the results from our analysis are not statistically significant, we find support that companies may have financial motives when joining the UNGC. In our dataset there are evidence that companies perform better on different financial measures like stock price return and capital after they join the UNGC. What is more surprising is that the findings indicates that the companies in our dataset increase their emissions of CO_2 after they joined the UNGC. This interesting result can indicate that there is evidence of blue washing or free riding in our dataset. Companies may have motives to be perceived as more sustainable by stakeholders like consumers and investors, to gain market opportunities. They may report progress on more superficial dimensions of ESG but fail to implement strategies on more crucial dimensions like reduction of CO_2 in their production. To take this finding even further we can argue that some companies join the UNGC to create a marketing strategy. From the third analysis we find support that there is an increasing development in financial performance when companies

6.2 Policy implications

Voluntary programs like the UNGC can serve as a useful tool to engage companies to become sustainable and provide a platform for sharing the best practices and collaboration. These programs can also elevate awareness for the importance of sustainability, and this can further increase the public pressure. Despite of this the effectiveness of voluntary programs like the UNGC depends on the level of engagement and commitment from the participating

companies. As we talked about earlier the risk of voluntary programs leading to blue washing is high. Here companies make misleading and superficial sustainability claims to improve their image without having to implement any changes.

Therefore, we believe that a combination of strong government policies and voluntary programs is necessary to ensure that the wanted sustainable goals are met. This will create a more significant impact and hold the companies more accountable for their environmental impact.

6.3 Further research

There are several ways to take this research further. Investigating and comparing our results to similar companies operating in different countries could be and interesting way to take the research further. To identify the effects of institutional and regulatory settings. For example, to look at the larger countries like USA and China, who accounts for much of the emissions in the world. In addition to this it would be interesting to investigate further if the effect of voluntary programs. To see if the data is credible or if blue washing undermines the effectiveness, as there are signs of in our thesis. Another interesting subject would be to analyze the interaction between sustainability commitments and technological innovations as both subjects are up and coming as well as to understand the dynamic of a sustainable business practice.

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